

# 2020 Challenge for Scotland's Biodiversity



A Strategy for the conservation and  
enhancement of biodiversity in Scotland

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# Foreword



Scotland is defined very much by its nature and this is reflected in a wealth of references to nature in our literature and rich cultural heritage. We treasure Scotland's native animals and plants and enjoy the vibrant landscapes and protected areas with their great beauty and complex webs of life. Biodiversity sustains our own lives and is at the core of what makes Scotland so special.

Scotland's people have long known we are part of and reliant upon the natural world around us. However, today, in the 21<sup>st</sup> Century, we have a deeper awareness of the need to protect Scotland's nature to ensure a healthy and prosperous future for our country. Now, we need to respond to that increased understanding of how nature sustains us, and the connections between biodiversity, healthy functioning ecosystems and wider benefits to individuals and society. We must respect the intrinsic appeal of nature too, because where we lose species or natural habitats we are diminished as a nation and our nature is the poorer. Reversing such changes and restoring nature is a challenge, but it is a hugely rewarding feat.

New international targets place an equal status on the prevention of the loss of species and the preservation of the benefits from nature (which are referred to as 'ecosystem services'). It is my view that consideration of ecosystem services must be part of how we plan all policies that impact on the natural environment.

Scotland's rich and diverse natural environment is a national asset and a source of significant international competitive advantage. We trade on its quality, so its continuing health and improvement is vital to sustainable economic growth. Many of Scotland's growth sectors such as tourism, and food and drink depend on high quality air, land and water.

*Scottish Government Economic Strategy (2011)*<sup>1</sup>

Biodiversity plays an essential role in meeting the Scottish Government's vision of a smart, sustainable and successful Scotland, and lies at the heart of our economic strategy. Our natural environment plays a vital role in the prosperity of Scotland and in our national identity. It supports our tourism, farming, forestry, aquaculture and fishing industries and is crucial to attracting investment and marketing of our food and drink. It adds variety to our urban green spaces and contributes hugely to our health and wellbeing. Scotland's nature can, and does, inspire our people.

There is much that the Scottish Government can still do to improve our response to this biodiversity challenge. We need to move further in aligning policies across a wide range of areas concerned with biodiversity. We need to ensure there is adequate protection of nature. We must seize opportunities to achieve other goals in an effective and low cost way through improvements to the natural environment, e.g. in looking for further opportunities to deploy natural flood management. In working through such opportunities, we should reflect the lessons of the *Christie Commission (2001)*<sup>2</sup> on public services.

There is also much that can be achieved by local government, agencies and other public bodies. While there are many great examples of progress, I urge our partners to improve the way they work together and to step up to their 'biodiversity duty'. Achieving the desired outcomes for biodiversity is not something that the Scottish Government can do alone. We look forward to continued valuable contributions from the nature charities through their campaigning work and all that they do on their own land. We want Local Biodiversity Action Partnerships to provide a model for effective encouragement and coordination of local action. We urge local communities to seize opportunities to manage and improve their local environment. Businesses are rising to the challenge, but many can do more as part of their wider civic responsibilities. We need more landowners and managers to appreciate that protecting nature is a vital part of their role because so much of our nature relies on their stewardship.

**Together, we can make a difference.**

A handwritten signature in black ink, appearing to read 'Paul Wheelhouse', written in a cursive style.

**Paul Wheelhouse MSP**

Minister for Environment and Climate Change



# Introduction

Biodiversity – nature to most people – underpins our lives, our prosperity and the very essence of our world. The wildlife, habitats and other forms of nature with which we share planet Earth are valuable in their own right quite apart from the pleasure we take from their existence and the ways in which they support us.

This strategy document is about protecting biodiversity and how we can harness nature and its many processes and functions to improve our prosperity and welfare. It is primarily targeted at decision makers in the public sector, but also aims to draw in those whose business enterprise and work, do so much for the environment. As such it uses some technical language not widely used for communicating with the wider public.

*Scotland's Biodiversity: It's in Your Hands (2004)*<sup>3</sup> is designated as the Scottish Biodiversity Strategy. The Strategy has the aim 'to conserve biodiversity for the health, enjoyment and wellbeing of the people of Scotland, now and in the future.' It sets out a vision for 2030 as well as objectives and desired outcomes leading us there. These are still valid. However, the way in which the Strategy will be taken forward has changed from that set out almost 10 years ago.

Scottish Natural Heritage published a comprehensive assessment of *Scotland's performance against the 2010 international targets*<sup>4</sup>. This showed that good progress had been made towards meeting the UN target of a significant reduction in the loss of biodiversity. Lessons learnt from the 2010 assessment included the need to influence more policy areas and decisions, and in particular to include the many values of nature in decision-making. Accordingly, we need to adopt a more adaptive approach, learning from experience and trying to tackle the causes of biodiversity loss.

Internationally, the 2010 targets to preserve biodiversity were missed. This led to the UN Convention on Biological Diversity setting new targets for 2020, the so-called '*Aichi Targets*' (2010)<sup>5</sup>. In addition new 2020 targets were set for the EU and a new *European Biodiversity Strategy*<sup>6</sup> was published in 2011. The new international targets call for a step change in efforts to halt the loss of biodiversity and to restore essential services that a healthy natural environment provides.

This *2020 Challenge* is a supplement to the *Scottish Biodiversity Strategy (2004)*<sup>3</sup>, focused on desired outcomes for 2020. It shows how the Scottish Government, its public agencies, Scottish business and others can contribute to the Strategy's aims as well as supporting sustainable economic growth. With the publication of this document, the Scottish Government hereby designates the two strategy documents together, as comprising the Scottish Biodiversity Strategy. The *2020 Challenge* provides greater detail in some areas, responds to new international targets, and updates some elements of the 2004 document. The three-year reporting cycles for the strategy will ensure that progress is recorded and necessary action taken. *The Scottish Biodiversity List (2004)*<sup>7</sup> will be reviewed and help focus priorities.



*The Nature Conservation (Scotland) Act 2004*<sup>8</sup> places a 'Biodiversity Duty' on public bodies to further the conservation of biodiversity and to have regard to the *Scottish Biodiversity Strategy (2004)*<sup>3</sup>. This document provides a clearer view of the types of activities that should be considered with regard to that duty.

The Strategy does not list the huge range of actions, policies and strategies that have an impact on biodiversity. Instead, it sets out the principles and approaches adopted by the Scottish Government with its partners to meet the *2020 Challenge*.

The Scottish Government will develop a 'Delivery Agreement' with partners and invite them to commit to making the Strategy work through new governance arrangements.

# Executive summary

This *2020 Challenge* is Scotland's response to the *Aichi Targets (2010)*<sup>5</sup> set by the *United Nations Convention on Biological Diversity (2010)*<sup>10</sup> and the *European Union's Biodiversity Strategy for 2020 (2011)*<sup>6</sup>. These call for a step change in efforts to halt the loss of biodiversity and to restore the essential services that a healthy natural environment provides. Investment in the natural assets of Scotland will contribute to sustainable economic growth and support wellbeing and wealth creation.

## Scotland's *2020 Challenge* aims to:

- **protect and restore biodiversity on land and in our seas, and to support healthier ecosystems.**
- **connect people with the natural world, for their health and wellbeing and to involve them more in decisions about their environment.**
- **maximise the benefits for Scotland of a diverse natural environment and the services it provides, contributing to sustainable economic growth.**

All of this supports the Scottish Government's purpose of '*creating a more successful country, with opportunities for all of Scotland to flourish through increasing sustainable economic growth*'. Table 1 shows key outcomes from the chapters of the *2020 Challenge*, which contribute towards the Scottish Government's purpose and strategic objectives.

Our understanding of biodiversity has changed since 2004. *The UK National Ecosystem Assessment (2011)*<sup>11</sup> (UKNEA) provides the first objective analysis of the benefits of the environment for nature itself, society and economic prosperity. Examples include the ways in which natural riverside habitats help to regulate river flows, and peatlands and woodlands lock up carbon from the atmosphere. Together, these many benefits represent a massive financial asset to Scotland, valued at between £21.5 and £23 billion per year.

**Chapter 1** makes the case that **ecosystems need to be protected**, and where necessary restored and enhanced, to ensure that they continue to support nature, wellbeing and a thriving economy. Maintaining nature's capacity to provide vital services costs far less than replacing them. Tackling flooding, erosion and other forms of degradation require broad scale action across entire river catchments, landscapes and marine areas.



**Table 1. The contribution of the 2020 Challenge to the Government’s strategic objectives and aims for increasing sustainable economic growth.**

<b>Scottish Government’s purpose: increasing sustainable economic growth</b>				
<b>Strategic Objectives</b>	<b>2020 Challenge for Scotland’s Biodiversity</b>			
	<b>AIMS</b>	<b>KEY OUTCOMES</b>	<b>CHAPTER</b>	
<b>Wealthier and Fairer</b>	Maximise the benefits of a diverse natural environment	<ul style="list-style-type: none"> <li>Natural resources contributing to strong, sustainable economic growth</li> </ul>	<b>Ch 2</b>	
		<ul style="list-style-type: none"> <li>Diverse natural environment is a national asset we must protect</li> </ul>		
<ul style="list-style-type: none"> <li>Health and well-being improved through physical activity and contact with nature</li> </ul>		<b>Ch 3</b>		
<ul style="list-style-type: none"> <li>Nature providing goods and services which support our lives, welfare and economy</li> </ul>		<b>Ch 1</b>		
<ul style="list-style-type: none"> <li>Healthy natural environment is much more resilient to climate change</li> </ul>				
<ul style="list-style-type: none"> <li>Communities involved in decision-making take pride in their local environment</li> </ul>				
<b>Smarter</b>		Engage people with the natural world	<ul style="list-style-type: none"> <li>An integrated approach taken to land and water use</li> </ul>	<b>Ch 5</b>
			<ul style="list-style-type: none"> <li>Healthier local environments more widely understood and supported by communities</li> </ul>	<b>Ch 7</b>
<b>Greener</b>	Support biodiversity and ecosystems	<ul style="list-style-type: none"> <li>Scotland’s internationally renowned nature is highly valued and secure</li> </ul>	<b>Ch 4</b>	
		<ul style="list-style-type: none"> <li>We have clean, healthy, safe, productive and biologically diverse seas and coast</li> </ul>	<b>Ch 6</b>	

The *2020 Challenge* takes ‘an ecosystem approach’ to securing multiple benefits from sustainable management of our land and seas. This approach to planning and decision-making will establish what needs to be done at the landscape scale to solve problems. It provides a unified agenda that public bodies, land managers and marine users can work towards and focuses action on areas in greatest need of restoration based on assessments of ecosystem health. This approach can empower communities by giving them a say on priorities at the local level pursued through a framework of national action.

**Growing our natural capital** is central to **chapter 2**. Scotland trades heavily on the quality of its natural environment in the imagery used by the food and drink industry, tourism, and to attract new businesses. Nature contributes to all of this in ways that are hard to measure in amounts of money, but we know the value is high.

The *Natural Capital Asset Index (2012)*<sup>12</sup> describes changes across Scotland since the 1950s. This reveals a marked decline in natural capital from 1950-2000 with some encouraging signs of recovery in some habitats since 2000. A key purpose of this Strategy is to extend those signs of recovery to all habitats, to invest in the assets that support wellbeing and wealth creation and to sustain benefits for the future. The importance of natural assets should be reflected in national accounts and ultimately in business accounting. Peatlands are given particular emphasis because of their vital role in storing carbon and thereby contributing to a low carbon economy, and also because of their international conservation importance.

**Health, wellbeing and education** are key benefits provided by the natural environment. **Chapter 3** describes these, showing how an increase in physical activity is often described as ‘the best buy in public health’. A growing number of studies show benefits from outdoor exercise and regular contact with nature, contributing both to physical and mental wellbeing. The educational benefits of out-door learning are now firmly rooted in the Curriculum for Excellence.

Good quality green space and path networks play an important role in place making and regeneration. These need to be provided closer to people who need them, especially in the most deprived areas of Scotland where access to good quality greenspace can be very limited. In addition, providing more of these green spaces in and around National Health Service grounds can add value to health treatment and rehabilitation.

Local communities need greater opportunities to be much more involved in managing ‘their’ green spaces – around schools, community centres and of course where they live. Public bodies and businesses are encouraged to play a more active role in realising these benefits.

**Chapter 4** considers the vital roles of **protected places and action for wildlife and habitats** in helping nature itself, as well as supporting our prosperity, health and wellbeing.

There are compelling reasons for protecting and managing wildlife. Iconic species like dolphins in the Moray Firth and white-tailed eagles on the Isle of Mull provide thrilling entertainment for residents and tourists. Beyond such examples we need to improve our understanding of the role of less spectacular plants, animals and other organisms in providing vital services such as recycling nutrients in soils and purifying water.

Much still needs to be done to conserve, manage and reintroduce species to ensure the greatest gains for nature and us. We have indicated some priorities, and recognise in particular that we must tackle the threats posed by invasive non-native species, where early action is vital. A few conflicts between wildlife and people dominate the headlines, and we need to work together creatively to eliminate some of the consequential problems.

**Chapter 5** makes the case for a much more integrated approach to **land and freshwater use and management**. The pressures on the natural environment from habitat loss, nutrient enrichment and climate change require concerted action at the landscape scale. Building on the *Land Use Strategy (2011)*<sup>13</sup>, this chapter proposes an ecosystem approach, aimed at securing multiple benefits for nature, businesses and people.

The Scottish Government intends to build on river basin management planning as the basis of more integrated land and water use planning across whole catchments. This will provide a means of integrating public policy objectives in order to tackle issues such as diffuse pollution, flood risk, soil protection, peatland restoration and an expansion of woodland cover. We shall support 'high nature value farming and forestry'. We are looking to provide ways of coordinating action among public bodies and targeting financial incentives at land managers working at the local level. The Scottish Rural Development Programme (SRDP) remains the major source of funding for this.

The **marine and coastal environment** features in **chapter 6**. This is especially important for jobs and tourism, particularly in remote parts of the country. Fishing and aquaculture industries, tourism and recreation all rely on marine and coastal environments that are clean, healthy, safe, productive and biologically diverse. Changes in sea temperature, rising sea level and more frequent storm surges are already affecting marine species and coastal habitats adding urgency to the need for effective marine and coastal management. In Scotland we have some of the world's strongholds for marine wildlife so we will be focusing efforts on protecting these.

The *Marine Nature Conservation Strategy for Scotland (2011)*<sup>14</sup> describes much of what needs to be done. We need to establish a network of Marine Protected Areas with an emphasis on adaptive management, improving the status of priority marine features, and introducing a new system of marine planning to improve the management of our seas. Central to this is the sustainable use of marine resources and involvement of stakeholders in decision-making. Coastal areas need special consideration, ranging from maintaining sustainable inshore fisheries to helping habitats adapt to sea level rise. Contingency plans will be put in place to protect our islands, the marine environment and industries from invasion by non-native species.

**Chapter 7** considers how we will **track progress towards the 2020 Challenge**. Already-established UK indicators will feed into reporting at Europe-wide and global levels.

We need good data to measure progress effectively. In Scotland we are very fortunate to have a wealth of biodiversity information, thanks largely to the efforts of specialist volunteers and national recording schemes. Web-based information portals such as Scotland's Environment Web offer excellent opportunities to combine biodiversity information and other environmental data. Indicators for healthy ecosystems will help us to guide adaptive management at the catchment/landscape levels. These indicators will contribute to Scotland's reports on progress against the *Aichi Targets (2010)*<sup>5</sup>, and more widely.

It is vital that we have clear ways to both track progress and identify where there are problems. Where there are success stories we need to share them rapidly and widely not least so we can demonstrate how a more inclusive and joined-up approach to managing nature helps our country, and nature, grow stronger.







# 1 Healthy ecosystems



## Outcome

Scotland's ecosystems are restored to good ecological health so that they provide robust ecosystem services and build our natural capital.

## Key steps

- Encourage and support ecosystem restoration and management, especially in catchments that have experienced the greatest degradation.
- Use assessments of ecosystem health at a catchment level to determine what needs to be done.
- Government and public bodies, including SNH, SEPA and FCS, will work together towards a shared agenda for action to restore ecosystem health at a catchment-scale across Scotland.
- Establish plans and decisions about land use based on an understanding of ecosystems. Take full account of land use impacts on the ecosystems services that underpin social, economic and environmental health.

## Introduction

Biodiversity is all of life: animals, plants, fungi and microorganisms and their interactions with their environment. Together, these form living systems, called ecosystems, which sustain nature and upon which our own survival depends.

In 2011 a full account of the value of the 'services' we get from ecosystems was published in the *UK National Ecosystem Assessment (2011)*<sup>11</sup> (UKNEA). This landmark publication provided many fresh insights into the value of nature. Some key messages included the need for us to:

- value all the services and benefits we get from our environment. This means finding ways to account for, and build into decision-making, services that are currently undervalued or omitted (and therefore at risk) from conventional economic analysis. Chapter 2 expands on this.
- take a more integrated and less sectoral approach to land management. Rather than thinking about 'forestry' or 'farming', or about 'rivers' or 'uplands', it is better to think about 'river catchments', or some other landscape scale. Chapter 5 considers this further.
- find ways to make the ecosystems we depend upon more resilient, as both population growth and climate change are likely to increase the adverse pressures on them.
- take the long view, as land management can have consequences far into the future. We need to do better at understanding what these consequences might be. Restoring damaged ecosystem functions or paying to overcome the loss of function is far more costly than being careful to nurture, and build upon, what we have in the first place.

### **The evidence base on the changing nature of Scotland.**

The Strategy is founded on a substantial evidence-base. *Scotland's 2010 biodiversity assessment (2010)*<sup>4</sup> concluded that biodiversity loss had been slowed where targeted action had been applied, but halting it would require renewed and sustained effort over a longer period. This systematic account was based on, for example: the Countryside Survey; our knowledge of protected areas and a suite of biodiversity indicators designed specifically for such a factual overview.

*The Changing Nature of Scotland (2001)*<sup>15</sup>, the seventeenth in an annual series of publications from SNH, provides an update of environmental change across the land, water and seas of Scotland. *Scotland's Marine Atlas (2011)*<sup>16</sup> gives a uniquely comprehensive account of the surrounding seas. *Scotland's State of the Environment Report (2006)*<sup>17</sup> concludes that, despite a generally good environment, issues continue to affect human health, wildlife and economic success. A key message from the *UKNEA (2011)*<sup>11</sup> is that the natural world, its biodiversity and constituent ecosystems, are critically important to our wellbeing and economic prosperity, but are consistently undervalued in conventional economic analyses and decision making.



## **An ecosystem approach**

All of this is central to what is called an 'ecosystem approach', which is defined in the Convention on Biological Diversity as:

**'A strategy for the integrated management of land, water and living resources that promotes conservation and sustainable use in an equitable way, and which recognises that people, with their cultural and varied social needs, are an integral part of ecosystems'.**

Three key steps guide our use of an ecosystem approach:

1. Take account of how ecosystems work. Nature connects across landscapes, so we need to consider the broad and local scales. The capacity of ecosystems to respond to impacts and provide resources is not infinite. Ecosystems are dynamic so we must recognise that change will happen. By using up-to-date information, embracing adaptive management principles, and trying to sustain nature's multiple benefits, we can ensure that nature continues to contribute to Scotland's growth.
2. Take account of services that ecosystems provide to people, such as regulating floods and climate, breaking down waste, providing food, fuel and water, and contributing to quality of life, culture and wellbeing.
3. Involve people in decision-making, especially those who benefit from ecosystem services and those who manage them. This means valuing people's knowledge, helping people to participate, and giving people greater ownership and responsibility.

## Nature connects across landscapes, so we need to consider broad local scales.

### Recent progress

Scotland has already begun adopting this approach to national policy. Since 2004, all public bodies have a duty under the *Nature Conservation (Scotland) Act (2004)*<sup>8</sup> to further the interests of biodiversity. Through the planning system, Planning Authorities have an important role to play in improving the environment, for example by strengthening green infrastructure, safeguarding and enhancing urban and rural biodiversity, and contributing to the improvement of water, air and soil quality. The second *National Planning Framework for Scotland (2009)*<sup>18</sup> highlights the fact that the environment is one of Scotland's chief assets, a source of natural capital that can drive broad-based sustainable growth (chapter 2 gives more detail on this). The *Biodiversity Duty (2004)*<sup>9</sup> will also provide a general statutory underpinning to the need for public bodies to work together to meet the *2020 Challenge* and achieve its biodiversity outcomes in a cohesive way, and to report on progress (more detail is in chapters 3 and 7).

*Scotland's Land Use Strategy (2011)*<sup>12</sup> promotes an ecosystem approach, with land management aimed at securing multiple benefits. An information note on an ecosystem approach for decision-makers and managers has been produced to assist in applying the Strategy. A similar ecosystem approach for our seas is discussed further in chapter 6.

The climate change adaptation plans prepared under the *Climate Change Act (2008)*<sup>19</sup> provide sound guidance on a wide range of activities that can improve ecosystem resilience. *Farming for a Better Climate (2011)*<sup>20</sup>, in particular, deals with critical action at the farm scale.

The Scottish Government's planning policy is set out in the *National Planning Framework (2009)*<sup>18</sup> and *Scottish Planning Policy (2010)*<sup>21</sup>. Planning policy gives significant support for the greater connectivity of habitats, and contains proposals to enhance green infrastructure. Across the central belt, there is a history of a degraded natural environment and a lack of connections between people and nature. The establishment of the Central Scotland Green Network (CSGN), introduced as a National Development in the second National Planning Framework, represents a step change in meeting environmental, economic and social goals through the natural environment.

*Scottish Planning Policy (2010)*<sup>21</sup> encourages Planning Authorities to promote green infrastructure that will add value to the provision, protection, enhancement and connectivity of open space and habitats; both within and between towns and cities. Green infrastructure can include lochs, ponds, watercourses and wetlands as well as woodlands, parkland and other open habitats. These provide recreational resources and wildlife habitats, and we need to protect and enhanced them wherever possible.

As a result, Planning Authorities have worked hard to set clear proposals for green infrastructure within their development plans and planning policies. Within the CSGN area there is close collaboration through partnership, involving all the local authorities, Scottish Natural Heritage, Forestry Commission Scotland and Scottish Enterprise. This is considered further in chapter 3.



This landscape-scale approach has also been supported by a number of the non-governmental organisations: the Scottish Wildlife Trust in its 'Living Landscapes' initiative; the Royal Society for the Protection of Birds in its 'Futurescapes' work; the Heritage Lottery Fund through its 'Landscape Partnership' programme; and the Scottish Forest Alliance in its 'Great Trossachs Forest Project'. Such thinking and practical application, show that the opportunity for action is considerable, and its support is wide.

*The Flood Risk Management (Scotland) Act (2009)*<sup>22</sup> supports a catchment level approach to managing flood risk sustainably. Managers are required to consider a wide range of solutions, including natural flood management, which promotes techniques that work with nature to enhance, restore or alter natural features and characteristics. This more sustainable approach ensures opportunities to secure multiple benefits.

## Developing an ecosystem approach

This range of examples shows how far we have come since the *Scottish Biodiversity Strategy*<sup>3</sup> was published in 2004. It demonstrates the extent to which people have risen to the challenge of taking a more integrated, landscape-scale approach, as advocated in that document.

Through the Scottish Environment and Rural Services (SEARS) initiative, the Scottish Government has sought to bring about a more coordinated rural service in Scotland, aligning the agricultural, forestry and environmental agencies of government. The approach needed to care for nature and safeguard ecosystem services is simply an extension of this. This integrated approach, providing multiple benefits, is reinforced through the *Land Use Strategy (2011)*<sup>13</sup>.

River basin management planning provides information about the current ecological status of Scotland's freshwater systems, highlights pressures on water bodies, and identifies measures to resolve any issues and targets for improvement. It establishes a structure for involving a wide range of organisations in assessing the state of the water environment and in identifying where action is needed. The Scottish Government intends to build on this work to foster further collaboration.

In the coming years we want to determine the status of Scotland's ecosystems more generally, using a broad range of indicators of ecosystem health. These should be assessed on a catchment by catchment basis across Scotland. Applying an ecosystem approach at a river catchment level will secure efficiency by:

- streamlining and integrating stakeholder engagement and work into one process with aligned goals.
- building collaboration amongst SEARS members.
- meeting simpler and more coherent priorities for land managers and land owners.
- helping build confidence in what we mean by ecosystem health.

This should enable us to have more focused regulation and less demanding appraisals in advance of development.

At a national level, this approach should identify catchments most in need of attention. At a more local level, information about particular problems within catchments will help us sharpen local priorities (not least those in the SRDP and Local Biodiversity Action Plans), and identify where investment in ecosystem restoration might be most beneficial. All of this will, in turn, help us enhance or restore ecological health. And if we can do that, we should be able to have:

- a framework for establishing a national ecological network.
- greater resilience against adverse changes, such as those arising from climate change.
- key work underway outside protected places to meet requirements under the EU Habitats Directive.
- agreed regional priorities for the SRDP.
- a means for planning forest expansion.
- Local Biodiversity Action Plans contributing to national priorities.

## **Towards a national ecological network**

The second *National Planning Framework (2009)*<sup>18</sup> proposed the recognition and enhancement of a national ecological network. This idea of a 'network' is grounded in a well-understood feature of nature that species depend on each other in complex relationships; that movement of species across or through the environment requires proximity or connectivity of habitat; and that some species require different habitats for different aspects or stages of their lives. It also recognises the fact that energy and information are carried through natural systems, and that water, nutrients and elements such as carbon are cycled, stored and recycled in complex ways. The term 'network', then, encompasses this idea of functional connectivity, interdependence and the channels of energy, material and information flow that life requires.

Hence, a 'national ecological network' is a way of characterising the nature of Scotland, laying importance on how its different parts relate to each other in ways that best support biodiversity and provide the many benefits (or ecosystem services) to people. This network in the array of woodlands, grasslands, moorlands, wetlands, rivers and lochs across great swathes of countryside, and also the smaller mosaics of hedgerows, marshlands and bogs, woodlands, pastures and arable land on individual farms. This can work well in sustaining diversity and providing multiple benefits of wildlife as well as food, fibre and fuel.

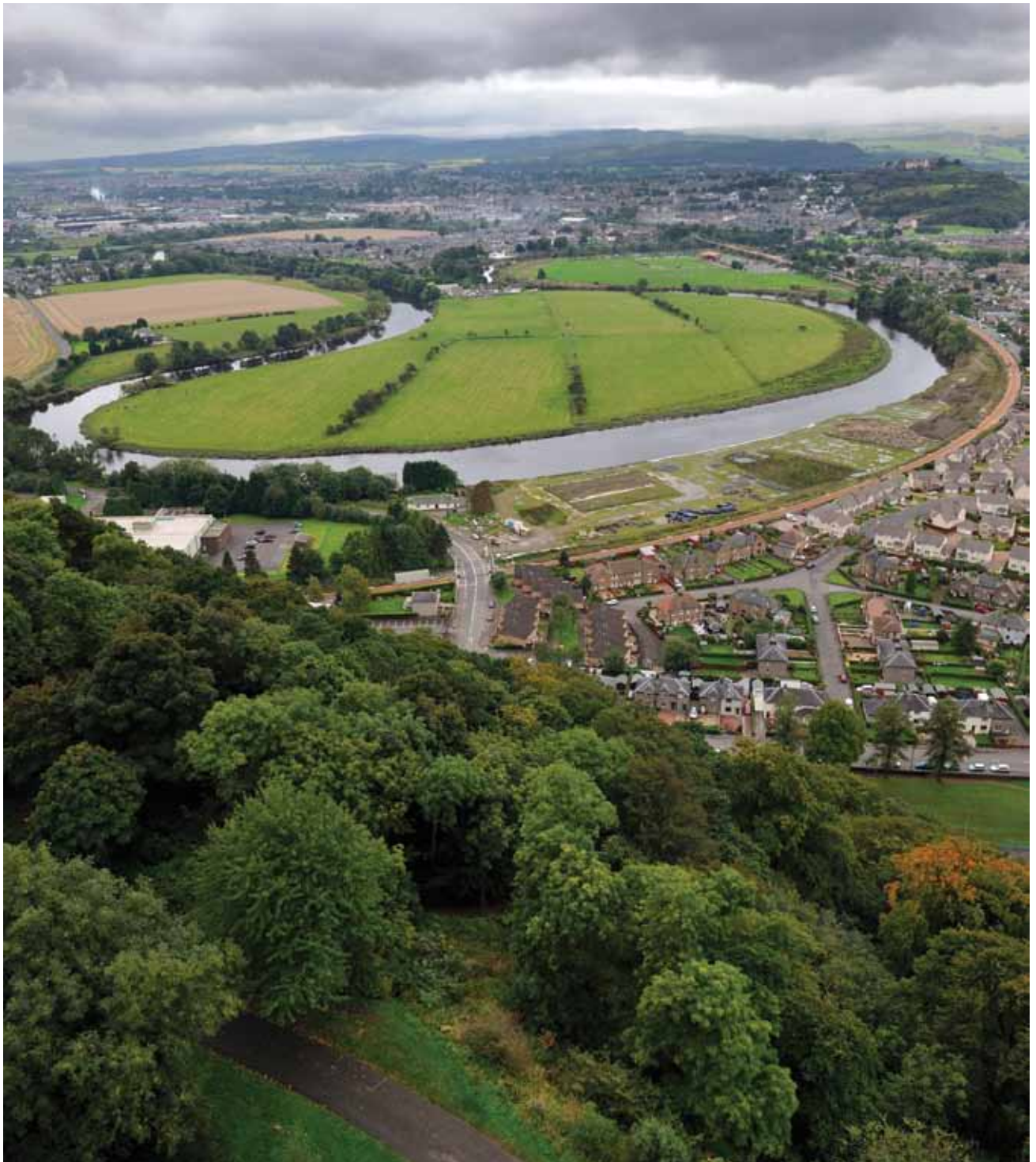
But, as we have seen from the *UKNEA (2011)*<sup>11</sup>, some ecosystem services are deteriorating. Work on a national ecological network should endeavour to redress and restore these services. Development of green infrastructure in and around our towns and cities will help, as should enhancement of ecosystem health across river catchments.

## Improving ecosystem health

There are three simple steps to improve ecosystem health;

- (i) devise a simple but robust way of assessing it;
- (ii) know what needs to be done to maintain or improve it; and
- (iii) ensure that resources follow the priorities so that work gets done.

None of this is straightforward, and we need to learn by doing through adaptive management.



## Assessing ecosystem health – the need for indicators

We know from the *UKNEA (2011)*<sup>11</sup> that ecosystems across Scotland are not meeting their full potential. It is not that they are close to collapse; rather the evidence suggests degradation across wide areas and so reducing their value. Examples of these extensive issues relate to diffuse pollution (mainly by nitrogen oxides); poor soil quality (compaction, loss of soil biodiversity and reduced soil carbon); reduced water retention on land; siltation and scouring in rivers; fragmentation of habitats; the spread of invasive species, such as rhododendron in woodland or signal crayfish in rivers; and rapid change in land use. We want to reverse these trends, pursuing the Aichi target of restoring 15% of degraded ecosystems.

Ecosystems, by their nature, are extremely complex. No single measure of 'ecosystem health' can usefully be derived. Rather, as for our own health, we need a suite of indicators with which we can make a diagnosis and determine the treatment. In the first instance, we plan to have around 6-12 broad indicators. These will be drawn from time-series data collected routinely, and which can be assessed at the catchment scale. Chapter 7 considers this further.

## What needs to be done to improve ecosystem health?

Assessment of catchments using indicators will produce information about what needs to be tackled and where. Action must be informed by science and by practical experience through adaptive management. Science tells us that the following sorts of action are the ones most likely to help;

- reduce adverse pressures on ecosystems, habitats and species.
- make space for natural processes, including geomorphological and soil processes.
- enhance means for species dispersal and genetic adaptation through improving connectivity and habitat availability.
- improve habitat management where it is the cause of decline in species diversity or where it could improve resilience to climate change through increased habitat diversity on farms, in forests and elsewhere in the landscape.
- take an adaptive approach to land and conservation management, changing objectives and management measures in response to new information and by anticipating effects.
- plan for change where assessments indicate that it is likely and unavoidable, for example as a result of sea level rise.

Restoring the quality, or increasing the area, of some habitats, which past land uses have adversely affected is an important way of trying to recover ecosystem health. Some examples of what we need to do to help us meet restoration targets under the CBD, include;

- restoration of the hydrological integrity of peatland.
- restoration of coastal dune systems.





- restoration of native woodland, montane scrub and near-natural treelines where these have been suppressed or eliminated by grazing and burning.
- expansion of woodland in some catchments.
- restoration of riparian and woodland flora where invasive species such as rhododendron or Japanese knotweed are becoming dominant.
- establishment of saltmarsh in some areas where there is coastal inundation.

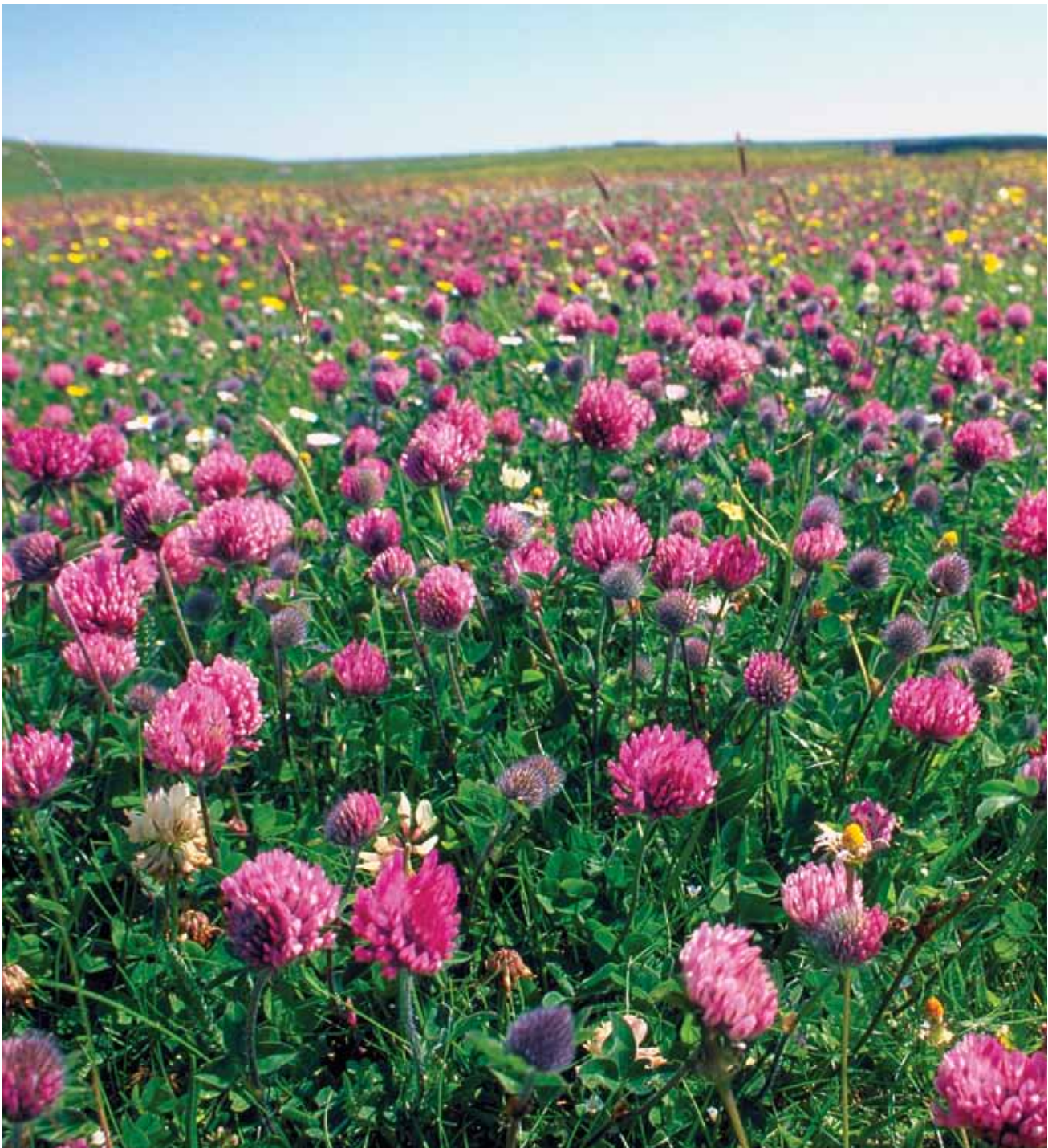
The importance of adaptive management, and our need to learn, means we should give extra attention to current projects that are tackling land management through an ecosystem approach at the landscape scale. We need to learn from what works well and share the results widely. In addition, we intend to explore this further through the Land Use Strategy regional pilot studies.



## Resources needed to meet the priorities.

The Scottish Government intends to target resources where they will have greatest impact in meeting the *2020 Challenge*. From 2015, the revised SRDP will be of key importance in making a difference. Rural priorities may be more targeted towards specific measures that address the issues identified as locally important in individual catchments. The 'greening measures' associated with direct support payments can help ensure that good practice in land and soil management is adopted across the country.

A more cohesive approach by the Scottish Government and its agencies should result in shared common objectives at local and national levels being met. In the early years of the *2020 Challenge*, the focus has to be on projects and places already identified as priorities for action among the agencies, local government and NGOs.



## **Key messages from this chapter**

- Ensure we benefit from resilient ecosystems that continue to provide robust ecosystem services and natural capital for future generations.
- Use an adaptive, integrated approach at the ecosystem level, which is best managed at the spatial scale of river catchments.
- Coordinate policies and action across Government and public bodies, and involve others including managers of land and sea and non-governmental bodies.
- Devise an effective means of assessing ecosystem health.
- Restore and enhance ecosystems.

## **What will be different as a result of applying the principles in this chapter?**

- Agencies, including SNH, SEPA, FCS and Local Authorities, will work together to restore ecosystem health in catchments across Scotland.
- Land-use plans and decisions will take better account of how nature functions and provides valuable services to communities and the economy; effective data and analytical tools will support these.
- Resources will be used where they are most needed, to ensure the resilience of ecosystems, and to sustain natural capital for the economic wellbeing of Scotland.
- We will have a far better understanding of the benefits nature provides through the systematic mapping of ecosystem health and ecosystem services at the catchment scale.







## 2 Natural capital



### Outcome

Natural resources contribute to stronger sustainable economic growth in Scotland, and we increase our natural capital to pass on to the next generation.

### Key steps

- Encourage wide acceptance and use of the *Natural Capital Asset Index (2012)*<sup>12</sup>, including a comparable measure for the marine environment.
- Use this index to influence decision-making and market-based approaches, so that the wider monetary and non-monetary values for ecosystem services are recognised and accounted for.
- Undertake a major programme of peatland conservation, management and restoration.

## Introduction

The Scottish Government recognises that Scotland's rich and diverse natural environment is a national asset and a source of significant international competitive advantage. Its continuing health and improvement is vital to sustainable economic growth. Many of Scotland's growth sectors, such as tourism, food and drink, depend on high quality air, land and water. There are many other less tangible ways in which nature sustains us, contributing to our health, wellbeing, enjoyment, sense of place and who we are as a nation.

Once the value of this natural asset is recognised, we need to manage and invest in it to maintain its many functions. We need to sustain and improve the health of the ecosystems that support this (see chapter 1). We need to make efficient use of natural resources, and add to the quality of these to gain better outcomes for our economy and society, now and for the future. In doing this we have to recognise that our impacts on nature and ecosystems extend through trade far beyond our own boundaries.

## The value of natural capital – nature's support for prosperity

The value of nature to people and the economic importance of natural systems have been demonstrated by two studies: *The Economics of Ecosystems and Biodiversity (TEEB, 2010)*<sup>23</sup> and the *UKNEA (2011)*<sup>11</sup>. These evaluated the benefits that flow from nature (ecosystem services), giving a measure of the value of natural capital.

The *UKNEA (2011)*<sup>11</sup> showed that over the past 60 years there have been significant changes to Scotland's natural environment and the way people benefit from it. Production of food from agriculture has increased significantly but many other ecosystem services declined, particularly those related to air, water and soil quality. These tend to be the services that are less visible or that have less market value. Some ecosystem services have shown welcome improvements, while others are still in decline or remain in a reduced state, including marine fisheries and native species diversity. Possible responses to this have been discussed in chapter 1.

Monetary values for all ecosystem services are impossible to determine. Some services, such as providing the oxygen we breathe, cannot be given a meaningful value. The services that can be given a monetary value, however, have been estimated to be worth between £21.5 and £23 billion per year to Scotland. The Scottish Government is funding research both to develop and improve techniques to assign monetary values to ecosystem services, and to understand the value of these for Scotland. A recent review of *ecosystem services (2013)*<sup>24</sup> has shown the clear linkage between the living and the physical environment, providing many services to society.



## Examples of nature's services and their values

- The peatland soils of Scotland are estimated to store ten times more carbon than in all of the UK's trees (*UKNEA (2011)*<sup>11</sup>).
- Lochs in Scotland store almost 35 billion cubic metres of water, and Scottish soils up to 42 billion cubic metres of water (*UKNEA (2011)*<sup>11</sup>). For comparison, one cubic metre equates to the average daily water use of six people in a household.
- The value of insect pollination services in Scotland is estimated at £43 million per year (*UKNEA (2011)*<sup>11</sup>).
- The value of coastal wetlands in Scotland has been estimated at £49-76 million per year (*UKNEA working paper*).
- Visits to the outdoors made by people living in Scotland generated around £2.3 billion in expenditure in 2010 (*Scottish Recreation Research (2011)*<sup>25</sup>).
- In 2004, the value of marine biodiversity-related industries in Scotland was estimated to be over £1.2 billion (*Sustainable Seas for All (2008)*<sup>26</sup>).

An important element of Scotland's natural capital is our farmed and cultivated biodiversity and associated genetic diversity. Work to preserve this is taken forward by many bodies, with the Farm Animal Genetic Resources Expert Committee and the UK Plant Genetic Resources Group providing coordination and leadership. Securing genetic diversity in farmed and cultivated biodiversity ensures the robustness of food production. There are important links with traditional knowledge, and with diversity of farmed habitats for wild species. An example of this work is the Scottish Landrace Protection Scheme, administered by Science and Advice for Scottish Agriculture (SASA), which is providing a safety net for the continued use of traditional varieties of farm animals and crops in Scottish island communities.



## Principles for sustaining the value of Scotland's natural capital

Taken together, evidence from the TEEB and UKNEA reports points to a series of principles that should be reflected in public policy and decision-making to sustain the benefits from Scotland's natural capital:

- **The full benefits from nature should be integrated into cost-benefit appraisal of policy, management or development options.** Where the value of nature's benefits cannot be measured, the consequences of different options can still be identified through *Strategic Environmental Assessment (2005)*<sup>27</sup> and *Environmental Impact Assessment (2011)*<sup>28</sup>. We want to minimise negative impacts on nature and to enhance natural capital and the benefits from it. Trade-offs between different ecosystem services should be made more explicit to decision makers, so that changes to public benefits from nature are considered alongside other costs and benefits.
- **Safe minimum standards and precautionary approaches should be adopted alongside valuations and assessments.** This will ensure that the importance of nature for maintaining resilience to future change is captured, and the presence of tipping points or thresholds is recognised, not least where a small change may lead to a long-term irreversible impact. For example, the *EC Water Framework Directive (2000)*<sup>29</sup> and the *Marine Strategy Framework Directive (2008)*<sup>30</sup> both identify ecological status standards, which help to assign priorities for restoring water bodies and to judge the significance of proposals for future use of these natural resources. Nature conservation legislation identifies key sites and species, which need to be protected in order to sustain Scotland's natural assets for current and future generations. *The Flood Risk Management (Scotland) Act (2009)*<sup>22</sup> requires SEPA to consider whether techniques that restore, enhance or alter natural features and characteristics can contribute to managing flood risk.



- **The value of nature should be reflected in incentives and price signals.** This can include payments for ecosystem services, reform of environmentally harmful subsidies, tax breaks for conservation, or new markets for sustainably produced goods and services. Market-based mechanisms need to be used in a way that sustains public benefits for current and future generations. The Woodland Carbon Code is a voluntary standard for woodland creation projects in the UK, which estimates the carbon dioxide they sequester. Independent certification to this standard provides assurance and clarity about the carbon savings of these sustainably managed woodlands. A peatland carbon code could enable peatland restoration to be promoted within carbon markets in a similar way. Within the UK, the Ecosystem Markets Task Force aims to identify market-based opportunities for business as a contribution towards nature being properly valued and protected.
  
- **Investment in protecting and building up natural capital can bring economic benefits that greatly outweigh the costs.** The *TEEB (2010)*<sup>23</sup> study showed that protected places provide economic returns that are 100 times greater than the cost of their protection and maintenance. Maintaining nature's capacity to provide the functions upon which we rely is often cheaper than having to replace them by investing in infrastructure or technical solutions. Taking preventative action before invasive non-native species become widespread will be much less costly than dealing with their economic impacts, such as damage to forestry, crops and infrastructure. These impacts have been estimated to cost up to £1.7 billion per year in Great Britain and possibly as much as £250 million in Scotland.
  
- **The value of natural capital assets should be incorporated into national accounting and business accounting** to ensure this is fully considered in assessing the effectiveness and sustainability of Government and business. This is a desirable goal that requires development of data, methods and standards. Companies should already be considering changes to the condition of natural assets that could have a significant impact on their business, as part of their review of the main trends and factors likely to affect their performance. There is a commitment at the UK level to putting 'natural capital at the heart of Government accounting' (*UK Natural Environment White Paper, 2011*)<sup>31</sup>.

## **Taking account of the benefits from nature: Scottish Government's Principles for Sustainable Flood Management Appraisal (2011)<sup>32</sup>.**

An appraisal of options should support decision-making at all levels of flood risk management planning; from strategic flood risk management plans to individual projects. To ensure sustainable actions are taken, the assessment of options should not be limited to impacts that can be measured easily in monetary terms. Other significant impacts such as on health and the environment must be described and valued. Assessment of environmental impacts should include valuing the environment according to the range of goods and services it provides to people, and how provision of these benefits might be altered by different options.

## **Resource efficiency – making the most of our natural assets**

Resource efficiency means preserving the natural assets while increasing the value obtained from them to enhance our prosperity. Some natural assets, such as the extent of our land area, are fixed, while area of sea is set by international agreements. We have real choices to make about how to balance the uses of these in order to ensure they support a prosperous nation. This echoes the perspective of the European Commission in its strategy document '*A resource-efficient Europe*' a flagship initiative under the *Europe 2010 Strategy*<sup>33</sup>.

Natural resources underpin the functioning of the European and global economy and our quality of life. These resources include raw materials such as fuels, minerals and metals but also food, soil, water, air, biomass and ecosystems. The pressures on resources are increasing.

The Scottish Government published its *Land Use Strategy*<sup>13</sup> in March 2011. This sets out a vision and objectives for Scotland's land resources, and it proposes ten principles to help us meet these objectives in decision and policy-making. 'Responsible stewardship of Scotland's natural resources delivering more benefits to Scotland's people' is one of the three objectives.

Consumer driven innovation can contribute towards more resource-efficient consumption and lead to benefits for biodiversity and ecosystems. For example, the Food and Drink Federation recognises the need to look at the environmental impacts of product sourcing and to consider supply chains (including its global footprint). One cereal company sets a good example of a business which has fully incorporated its commitment to biodiversity into its operations; for over 25 years, it has worked only with grain farmers who dedicate 10% of their land to wildlife habitats.



Several Scottish planning authorities have used planning agreements to secure biodiversity actions to offset damage to sites caused by a development. Scottish Borders Council has been a pioneer of this approach. For a number of renewables developments, the Council reached agreement with developers to pay contributions to fund nearby biodiversity improvements. Partners then took these projects forward, and many yielded multiple benefits including natural flood management, diffuse pollution control and biodiversity gains.

## **The role of peatlands in a low carbon economy**

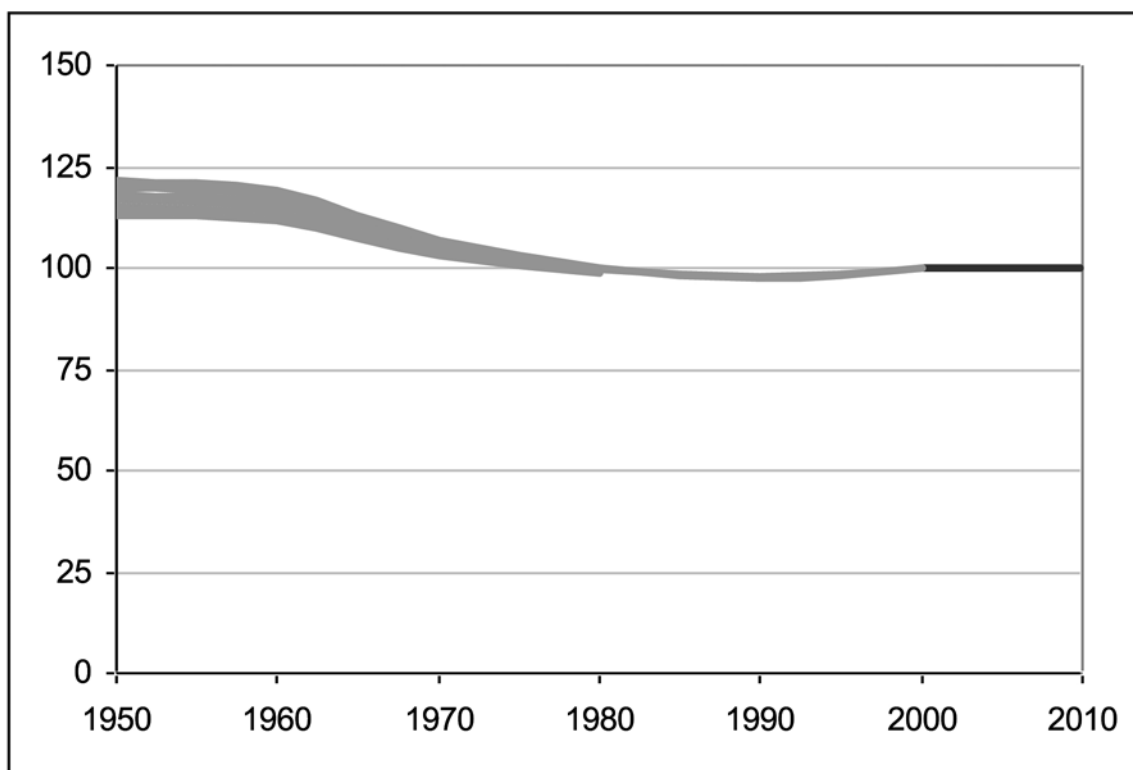
The Scottish Government's *Low Carbon Economic Strategy (2010)*<sup>34</sup> sets out plans for a transition to a low-carbon, highly resource-efficient economy for Scotland. The natural environment has a key role to play here. Over 60% of Scotland's land cover has peat or peaty soils, and Scotland has most of the UK's peatlands. Few other countries have more peatland than Scotland. The blanket and raised bog peatlands are together the most important terrestrial carbon store in Great Britain, while 'active bogs' continue to accumulate more carbon, as well as contributing to water regulation, water quality and supporting biodiversity. A loss of only 1% of the carbon locked up in Scotland's peatland would equate to the total annual Scottish human-related emissions of greenhouse gases.

The *IUCN UK Peatland Commission of Inquiry report (2011)*<sup>35</sup> urged a speedy response to protect and restore our peatlands, and warned that delay would lead to far greater costs. The important role of peatlands in mitigating and adapting to climate change is recognised under international climate change agreements. Focused action and investment in peatland restoration provides a cost-effective approach to reducing carbon emissions alongside other measures. The Scottish Government has asked SNH to lead a new programme of work on the conservation, management and restoration of peatlands. This £1.7 million demonstration project will focus on achieving carbon savings and biodiversity gains, with 2,000 hectares of peatland restored over 2.5 years. SNH will work closely with land managers to make this happen. This programme should prepare the way for implementation of the proposal in the draft Second Report on *Proposals and Policies (RPP2)(2013)*<sup>36</sup>.

## The Natural Capital Asset Index – looking ahead

SNH has been developing a *Natural Capital Asset Index (2012)*<sup>12</sup> (NCAI) to describe changes across Scotland's ecosystems since the year 2000, with indicative back projections to 1950. Figure 1 shows a broad trend from 1950 to 2010. Analyses of individual ecosystems indicate that three broad habitats (freshwater, coast and urban greenspace) showed an improvement in natural capital between 2000 and 2010, while two declined (moorland and grassland) and two saw little change (woodland and cropland). The NCAI is now being developed in collaboration with the James Hutton Institute and others to improve its robustness, and explore whether regional and marine indices can be produced.

**Figure 1. Changes in the Natural Capital Asset of Scotland's principle ecosystems on land since 1950.**





## **Key messages from this Chapter**

- Nature supports Scotland's prosperity in ways that are not always visible, but the value is real.
- Scotland should make the most of its natural assets to support sustainable economic growth.
- The economy and wider wellbeing of Scotland's people will benefit from action that enhances nature and ecosystem services.

## **What will be different as a result of applying the principles in this chapter?**

- Public subsidies, incentives and taxes will support the building of natural capital, rather than supporting unsustainable uses of nature.
- Government and large businesses will move towards environmental accounting that shows their impact on natural capital in Scotland and overseas.
- Research and investment will support innovative ways to work with nature and make the most of natural assets to reduce costs and increase benefits to Scotland.
- The NCAI will provide a way of assessing the sustainability of the Scottish economy and its value will be maintained or increased, reversing decades of decline.
- Local Authorities will work towards embracing the NCAI and explore ways of contributing to increase its value.



# 3 Biodiversity, health and quality of life



## Outcome

Improved health and quality of life for the people of Scotland, through investment in the care of green space, nature and landscapes.

## Key steps

- Provide opportunities for everyone to experience and enjoy nature regularly, with a particular focus on disadvantaged groups.
- Support local authorities and communities to improve local environments and enhance biodiversity using green space and green networks, allowing nature to flourish and so enhancing the quality of life for people who live there.
- Build on good practice being developed by the National Health Service (NHS) and others to help encourage greenspace, green exercise and social prescribing initiatives that will improve health and wellbeing through connecting people with nature.
- Increase access to nature within and close to schools, and support teachers in developing the role of outdoor learning across the Curriculum for Excellence.
- Encourage public organisations and businesses to review their responsibilities and action for biodiversity, and recognise that increasing their positive contribution to nature and landscapes can help meet their corporate priorities and performance.



## Introduction

Connecting with nature enriches our lives. Many benefits arise from this across a range of policy areas, including health, wellbeing, education, community development and regeneration. Better integration of environmental and social objectives will undoubtedly secure long-term benefits for people and nature. This chapter reviews progress and considers the next steps needed to achieve this integration, which offers one of the most exciting challenges as we move towards 2020.

Public bodies have a duty under the *Nature Conservation (Scotland) Act 2004*<sup>8</sup> to 'further the conservation of biodiversity' as they carry out their work, reporting their actions at least every three-years. This duty is not just beneficial to biodiversity; it can also help meet other public service aspirations and, in the process, provide significant cost savings and efficiencies.

There are many different ways in which public bodies meeting this duty can benefit biodiversity and a range of other policy goals including:

- **Health** – contact with nature can improve physical and mental health and encourage healthier lifestyles.
- **Education** - outdoor learning is a core part of the Curriculum for Excellence.
- **Parks and Grounds** – management of greenspaces and creating wildlife friendly spaces around offices.
- **Planning and Development** - is about more than just protected species, green infrastructure can benefit both people and nature.
- **Volunteering** - encourage staff to take part in local projects and take pride in their local community.
- **Transport** - road and rail verges provide great habitat for wildflowers; nature friendly management can offer potential cost savings as well.

Investment in biodiversity is also good for many business sectors. It links with corporate social and environmental responsibility programmes.

## Nature, health, and the economy – the developing evidence base

The long-standing and largely successful approach to environmental health has focused on the minimisation of environmental ‘bads’, such as air or water pollution. Today, a new extra emphasis is being placed on environmental ‘goods’. The accessibility, diversity and quality of much of Scotland’s natural environment is now recognised as an important resource for promoting physical and mental health, improving educational outcomes, and supporting community development and regeneration. We can enhance the benefits of these natural assets through:

- better planning, design and management of accessible high quality green spaces, close to where people live, work and learn.
- encouraging greater physical activity and contact with nature through informal recreation and play, environmental volunteering and outdoor learning.
- using the outdoors in programmes for health treatment and rehabilitation, on NHS land and elsewhere.

‘A relevant environmental health agenda for the 21st century is as much about the creation of places which engender good physical and mental health, as it is about protection from hazards.’

Annual Report of the Chief Medical Officer Scotland, 2006.



Supporting this thinking is a range of research that describes and quantifies the health benefits from physical activity while in contact with nature. These include:

- improved levels of physical and mental health through regular participation in informal recreation, volunteering and learning in the outdoors.
- improved rates of recovery from physical and mental health problems, and a guard against future illness.
- increased physical and mental wellbeing, capacity and confidence, both in individuals and communities more generally.
- a stronger commitment to healthier lifestyles in young people by stimulating interest in the natural world and promoting outdoor activity and play, especially as part of the early years and primary school intervention.

Evidence suggests that investment in nature and landscapes can also be cost effective. Analysis of an 8-week wildlife and nature activity programme in Perth and Kinross for patients with a variety of mental health problems produced a social benefit of £12.43 for each £1 spent. An analysis of 'Greenlink' – a multi-use path running between Strathclyde Country Park and Motherwell town centre generated a social return of £7.63 for every £1 invested. Similarly, investment in a natural play space at Merrylee High School in Glasgow produced far greater benefits to learning, and physical and emotional wellbeing than the same expenditure on a traditional tarmac playground.

## Linking nature and nurture – from policy to action

The contribution that nature and landscapes can make to health and quality of life is increasingly recognised by the medical profession and policy makers more generally. The *Ministerial Task Force on Health Inequalities (2008)*<sup>37</sup> recommended that Government, NHS Boards and other public sector organisations should take steps to encourage the use and enjoyment of green space by all, as a means of improving health. Equally, the Scottish Government's strategy on health and the environment, *Good Places, Better Health (2008)*<sup>38</sup>, recognises that the physical environment has a significant impact on the health of Scotland's people and that action is required to create positive physical environments that nurture better health and wellbeing for everyone. It focused on children's health, setting a vision in which 'children play, explore and relax outdoors in streets, parks, green places and open spaces and have contact with nature in their everyday lives'. These two examples illustrate the significant change in approach that is now emerging across a number of policy areas.

## Improving places for people and nature

The Scottish Government's regeneration strategy, *Achieving a Sustainable Future*<sup>39</sup>, published in December 2011 contains a vision of 'a Scotland where our most disadvantaged communities are supported and where all places are sustainable and promote wellbeing.' Alongside other national policy statements such as *Architecture and Placemaking (2012)*<sup>40</sup> and *Scottish Planning Policy (2010)*<sup>21</sup>, the regeneration strategy also highlights the importance of place making and the impact it can have on the long-term sustainability and quality of the communities created.



The provision of good quality green space, parks and paths, and associated green networks, is an important component of place making and regeneration. This is supported by national planning policy and practice. Most ambitiously, the *National Planning Framework (2009)*<sup>18</sup> proposed the development of a Central Scotland Green Network, with the aim of creating ‘an environment to support healthy lifestyles and good physical and mental wellbeing’. More generally, strategic approaches such as open space audits and core path plans are valuable tools for local authorities, especially when complemented by investment programmes targeted at increasing the opportunities for public enjoyment and the biodiversity value of the green space created. In taking this forward, it is vital that communities are fully involved in the development and management of their green spaces.





## Encouraging physical activity and contact with nature

Increasing the number of visits to the outdoors has been identified as a key Scottish Government indicator of success. Such visits encourage a stronger outdoor culture and help instil greater personal commitment to biodiversity. SNH's 'Simple Pleasures Easily Found' campaign is aimed at encouraging people to explore and enjoy their local green space and path networks. The celebration of the 'Year of Natural Scotland' (2013) and the 'Year of Homecoming' (2014) provide an important platform for increasing effort across the public sector to encourage more people to enjoy the outdoors and its nature.

Environmental volunteering is another important means of increasing physical activity and engagement with nature. The Scottish Government and SNH are funding the Forum for Environmental Volunteering to help build capacity in organisations to support more volunteers for outdoor tasks. Increased participation in voluntary biological recording is being encouraged through 'citizen science' initiatives. Volunteers benefit from greater physical activity and associated health benefits. But they will also experience the social aspects of working towards a shared goal and gain a stronger pride of place. Volunteer initiatives for young people can help create new skills and provide important training; these will be a priority for the Scottish Government over the coming years.

While participation is increasing across Scotland, it is lowest amongst the most disadvantaged in society. More effort is needed to ensure everyone can enjoy the outdoors, whatever their background, health or age. All public sector bodies are required to consider these issues as part of their new equality duties. Investment in opportunities for natural play are also a recognised part of the *Scottish Government Early Years Framework (2012)*<sup>41</sup>.





## **Developing a natural health service**

With its estimated 1,800 properties and 2,900 hectares of land, the NHS has considerable potential to use greenspace within its estate for health treatment and rehabilitation, and for increasing physical activity and contact with nature for patients, visitors and staff. A national programme has been established by the Green Exercise Partnership; made up of SNH, FCS and NHS Health Scotland to help health boards make more use of this resource. This has included an audit of the overall estate and the development and implementation of master plans for specific sites. These include path developments, tree planting and other improvements for people and nature. Continuing effort is needed to integrate this work into policy and practice and to increase recognition within all levels of the NHS of the contribution these greenspace assets can make to health.

Several programmes and projects focusing on physical activity and mental health issues have also been established; involving walking, green gyms, gardening and eco-therapy schemes. Many of these have been set up by voluntary and community groups, with short-term funding and mixed levels of awareness and commitment from health professionals. There is considerable scope to promote and develop the use of nature and landscape in health policy. Businesses across Scotland should also consider similar initiatives on their land, on the basis that a healthy work force is a productive one.

## **Learning out of doors**

The role of outdoor learning is firmly established in the new Curriculum for Excellence and is part of Education Scotland's school inspection programme. There are also good examples of school grounds that encourage physical activity and contact with nature. More needs to be done, particularly in central Scotland, to ensure that all schools either have



such resources or can obtain them locally. School building, refurbishment programmes and estate management plans need to make better provision for greenspace and contact with nature, building on the work of Grounds for Learning, EcoSchools and the Forest Schools Programme.

Developing enthusiasm and skills in teachers through continuing professional development is also important. The 'Teaching in Nature' demonstration project run by SNH and other initiatives by Education Scotland and the National Park Authorities have shown how the capacity of teachers to take learning outdoors can be increased through a peer-led approach. Realising the benefits of outdoor learning for our children, and society more widely, requires this approach to be absorbed into relevant strategies and day-to-day teaching practices.

## **Key issues and opportunities**

The examples above illustrate the potential of Scotland's nature and landscapes to improve public health and quality of life. Relatively little public expenditure is required, especially in comparison to the overall health budget and it represents good preventative spend.

In order to realise this potential we need a sustained commitment to these programmes and projects from the environment, health and education sectors. Greater investment should realise the benefits and cost effectiveness of these nature-based interventions. This is not easy given the small scale of many projects and the many organisations involved. However, it is important to develop this case, especially against the backdrop of increasing financial constraints within the NHS, local authorities, and across the public sector generally.

While the *Biodiversity Duty (2004)*<sup>9</sup> places important responsibilities on public bodies, real changes in our relationship with the natural world will only come about when we recognise the full public benefits provided by nature. This is beginning to happen in the health sector, helped by a more holistic approach to health care focused on place and communities, the economy and the environment, as well as medical interventions. These lessons need to be taken up in other sectors and businesses.

Public bodies are urged to play their part in realising these outcomes, with a more collaborative approach between sectors and connecting single outcome agreements, community planning and health partnerships. The environment sector has a leadership role here, and the biodiversity community should learn from the demonstration projects that are beginning to win the hearts and minds of the professionals and the public.

## **Key messages from this chapter**

- Scotland's nature and landscapes are key assets for public health and wellbeing and more should be done to use the natural world to help improve the quality of our lives.
- There is a strong case for investing more in nature close to where people live, work, or go to school as this can improve public health and reduce pressure on health budgets in the longer term.
- Sustained investment in good-practice demonstration projects is required if we are to realise the longer-term improvements in physical activity and mental health.
- Investment in the availability of good quality greenspace in and around schools and other centres for learning will improve educational outcomes.
- All organisations with responsibility for biodiversity must work towards bringing this into their mainstream policies and practices.

## **What will be different as a result of applying the principles in this chapter?**

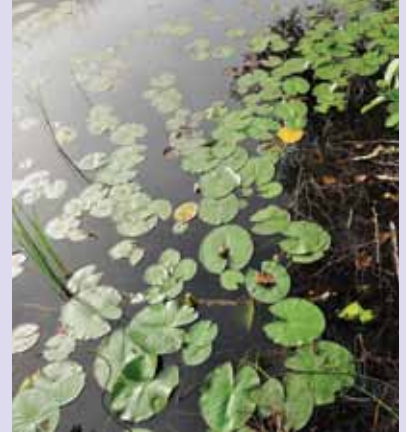
- More people will enjoy nature, and recognise the benefits this brings for their health and quality of life.
- Our health and wellbeing will be improved.
- A greater number of people will enjoy, understand and support nature.
- Nature close to where people live and work will be better cared for, including that on public land owned by the NHS and education authorities.







# 4 Wildlife, habitats and protected places



## Outcome

The special value and international importance of Scotland's nature and geodiversity is assured, wildlife is faring well, and we have a highly effective network of protected places.

## Key steps

- Ensure that the management of protected places for nature also provides wider public benefits.
- Align habitat restoration on protected areas with national goals for improving ecosystem health, with local priorities determined at the catchment or landscape scales.
- Integrate protected areas policy with action for wider habitats to combat fragmentation and restore key habitats.
- Develop a wildlife management framework to address the key priorities for sustainable species management, conservation and conflict issues, including reintroductions and invasive non-native species.
- Involve many more people than at present in this work and improve our understanding of the poorly known elements of nature.

## Introduction

This chapter considers how we can take better care of nature. Scotland has some of the world's best places for wildlife; our seabird colonies, blanket bogs, remnant Scots pine woods, species-rich western woodlands and heaths are world renowned. Heather-dominated moors and machair grasslands are prized as cultural landscapes. These and much more characterise what is best about Scotland.

In the context of wider economic and social demands, we need to be clear about what needs to be done to care for nature and where. This chapter outlines what is needed.

## Nature defines what is so special and distinctive about Scotland.



## Drivers of change

Scotland's Environment Web identifies the main drivers of environmental change in Scotland, including:

- changing land use and land management practices, resulting in varying degrees of habitat fragmentation and loss.
- eutrophication and pollution of land and water.
- climate change, influencing the functioning of ecosystems.
- trade in plants and animals and globalisation of transport, leading to the spread of invasive non-native species, pests and diseases.
- the rise in environmentalism and its expression through international and national strategies and legislation.

## Action for habitats, species and protected places

Ecosystems are made up of a range of habitats, species and processes. Protecting these is essential to support natural capital and to underpin the many ecosystem services discussed earlier. Habitats should be protected through wide measures considered in the next two chapters. However, we also need to have the best areas safeguarded and managed as protected places, and ideally connected within wider ecological networks.

In order to protect special places, we have a suite of Sites of Special Scientific Interest (SSSIs) and 'Natura' sites, established under the *EC Habitats and Birds Directives (1992 & 2009)*<sup>42,43</sup>. National Nature Reserves (NNRs) showcase the best of nature. A range of other designations; National Parks, Geoparks and Biosphere Reserves promote sustainable development and local community involvement, and Local Nature Reserves reflect nationally as well as locally important priorities. Most people in Scotland live close to protected places and have great opportunities to visit and enjoy them.

Protected places are especially valuable providers of ecosystem services because the ecosystems within them are in the best condition. They integrate conservation with people's enjoyment of nature, provide jobs, particularly in rural Scotland, and offer many other public benefits to health, education, employment, environmental justice and tourism. They contribute towards many of the Scottish Government's 15 National Outcomes and its over-riding purpose of sustainable economic development.

Nature conservation sites cover about 18% of Scotland's land area and are particularly extensive across mountains, moorlands and coasts. SSSIs are the main protective mechanism, and over 75% of our SSSIs (by area) are also designated as Natura sites, highlighting their international importance.

Scotland, along with the rest of the UK, has recently identified a number of Marine Protected Areas (MPAs). These will potentially bring together new areas to add to those covered by other designations such as SSSIs, Special Areas of Conservations and the Ramsar Convention providing an overarching and unifying network of marine protection. The Scottish Government may also consider other suitable areas for MPA designation. The suite offers opportunities for ensuring conservation targets are met, broadening the





sustainable management of marine ecosystems, and deepening public awareness and involvement in marine issues.

SNH monitors the condition of nature conservation sites and reports on this every six years. This gives a good indication of the pressures acting on these sites, and on their habitats, species and other features e.g. grazing levels, agricultural and forestry operations, the spread of invasive species, built developments and human disturbance.

Improving the condition of protected sites is a high priority in the *European Biodiversity Strategy (2011)*<sup>6</sup>. A lot of progress has been made in Scotland, with an overall 6.7% improvement in the condition of protected habitats and species since 2005. Nevertheless, with only 78% of protected features in favourable condition, we need to do much more. Some protected areas are too isolated to be at their most effective, and joining them up through an ecologically coherent network is vital. Networks can ensure resilience and better protection, and improve land and freshwater management. However, we need to ensure these connections do not ease the spread of invasive non-native species.

Great advances have been made in recognising how geodiversity (rocks, soils, landforms and related processes) supports biodiversity and underpins ecosystem services. We must develop our understanding of this in order to improve the management and care of nature. We need to draw on specialist skills and expertise in this area, a lot of which is found in the voluntary sector.

We have many excellent species and habitat atlases and some of these provide fascinating and vital detail on changes across Scotland, often placed in wider UK and international contexts. However, we still have more work to do on habitat mapping. Following the requirements of the *European INSPIRE Directive (2007)*<sup>44</sup>, we want to produce a comprehensive map of Scotland's main habitats.



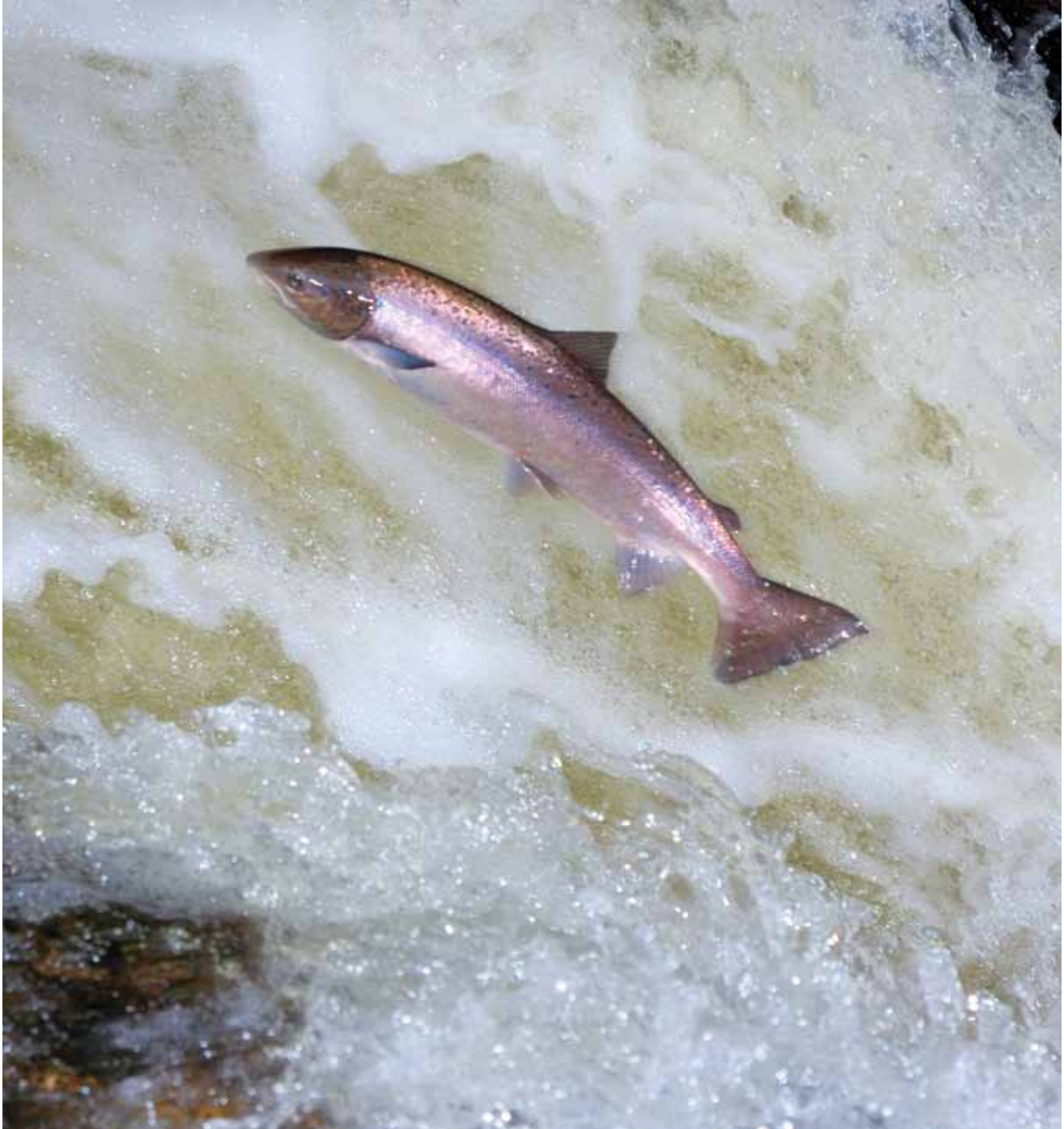
With a core area of green infrastructure already in place, wise investment can restore many natural systems back to near full capacity. We shall produce a priority list of key habitats for restoration, including peatlands and other wetlands, native woodlands, coastal dunes and species-rich grasslands, to support carbon capture, adaptation to climate change and to encourage low impact recreation.

We have great ambitions for nature and to meet these we need to work with the land-use sectors, not least the environmental NGOs, to protect, improve and manage nature. Overall, our priorities for habitats, species and protected places are to:

- conserve at least 18% of land and inland water, and 10% of coastal and marine ecosystems, within protected areas by 2020.
- complete the suite of protected places, and improve their connectivity through a national ecological network centred on these sites.
- meet the targets for favourable condition of Natura sites and SSSIs, and the conservation objectives for priority habitats and species.
- make significant advances in developing the relatively new suite of Marine Protected Areas (MPAs).
- publish a comprehensive terrestrial habitat map of Scotland.
- In the face of climate change, take forward an adaptive management programme for key habitats and species.
- use data from the *Native Woodland Survey of Scotland (2012)*<sup>45</sup> to guide expansion, restoration and improvements in all types of priority woodland habitats.



- use NNRs to promote best practice for conservation and adaptive management.
- improve our understanding and strengthen the role of geodiversity in our care for nature.
- Improve and broaden awareness of the many benefits of protected places.



## **Action for wildlife – setting priorities**

Earlier chapters consider the great value of nature for Scottish life not just for the provision of water, food, fuel and timber, but as a defining characteristic of Scotland. There are compelling reasons for at least maintaining and restoring the diversity of wildlife in its own right. Most of us enjoy seeing birds and mammals, insects and flowers; our spectacular



wildlife is a magnetic draw for visitors. The Scottish Government is committed to conserving this rich diversity of wildlife, and there are many examples of this such as its support of the *Wild Plant Horizons (2010)*<sup>46</sup>; the UK's response to the *Global Strategy for Plant Conservation (2011)*<sup>47</sup>, and the *Strategy for Scottish Invertebrate Conservation (2009)*<sup>48</sup>.

The *Scottish Biodiversity List (2004)*<sup>7</sup> (SBL) is the statutory list of animals, plants and habitats considered to be most important for conservation in Scotland. Work is already underway to provide greater clarity on priorities for the SBL, which will help public bodies meet their *Biodiversity Duty (2004)*<sup>9</sup> and help set priorities for Scottish species and habitats.

In managing wildlife populations, urgent action is often needed to address species conflicts or to manage wildlife resources sustainably. In Scotland we have had considerable successes with the recovery of species such as the corncrake, woolly willow and slender Scotch burnet moth. There are further candidates for action and we have to focus our limited resources on those in most urgent need of help. For red and roe deer and several geese species we have to work at ways of managing populations sustainably.

The *Species Action Framework (SAF) (2007)*<sup>49</sup> and *Woods for Nature (2008)*<sup>50</sup> laid out strategic approaches to species management in Scotland which are making a real difference for nature. These concentrated work by a range of partners on 34 key species, resulting in great gains for nature and people. A management handbook arising from the SAF programme will set the benchmark for good practice.

SNH is developing a Wildlife Management Framework to help SNH make consistent, targeted and cost-effective decisions on wildlife management - some of these involving sensitive and contentious issues. Through its leadership of the National Species Reintroduction Forum, SNH is developing a code of good practice for species reintroductions to guide its work and proposals from others.

All of this work means we need to focus on clear priorities for wildlife action. We propose to:

- clarify the significant actions for habitats and species arising from the Scottish Biodiversity List, and use this to guide funding.
- integrate species management covering plants, animals and other organisms to ensure far better results for whole ecosystems.
- devise species indicators that reflect the broad state of biodiversity in response to the major drivers of biodiversity loss and monitor these.
- use the Wildlife Management Framework to identify priorities for tackling species conflicts, species conservation issues, reintroductions and sustainable management of wildlife resources.
- develop a strategic programme for re-establishing species lost locally or nationally, or threatened by climate change and other pressures, and take this forward through the National Species Reintroduction Forum.
- put in place a new programme for priority farmland species, recognising that some of these are in a parlous state.



## Tackling invasive species, pests and diseases

Invasive non-native species (INNS) are damaging our environment, economy and health. They cost Scotland as much as £250 million annually. INNS are a significant cause of species decline and extinctions worldwide. Although only a small proportion of introduced species become invasive, these can cause great harm by carrying disease, preying on native species, crowding out native vegetation and even damaging buildings and infrastructure. Islands are particularly vulnerable to the impacts of INNS.

The worst invaders are land mammals, aquatic plants and invertebrates. Our top priorities are to identify how these species invade and act quickly to prevent their establishment and spread. Once they take hold, their control is expensive and sometimes not possible. This is particularly the case in the marine environment where we need internationally agreed prevention measures.

Diseases like ash die-back and *Phytophthora* threaten biodiversity as well as rural industries. We need to work closely with plant and animal health colleagues on biosecurity issues not least to maintain the resilience of ecosystems.

**Invasive non-native species cost Scotland as much as £250 million annually.**

To combat the threat of INNS, we must work to:

- prevent their establishment and spread, identify their means and routes for invasion, raise awareness of the need for biosecurity, and implement legislation and international agreements.
- act quickly to respond to emerging threats; support early detection through monitoring programmes (including 'citizen science'), assess risks as these arise, and develop appropriate responses.
- restore terrestrial ecosystems degraded by invasive species, develop strategies to deal with established species (e.g. rhododendron and riverside invasive plants), in a coordinated and cost-effective way that engages the public, landowners and industry in tackling problems at a catchment-scale.
- make concerted efforts to protect Scottish islands and water-dominated environments.





## **Developing our understanding and awareness of nature**

Arguably the least understood parts of our biodiversity are the most important to ecosystem services. Some of the latest research is identifying the role of soil invertebrates, fungi and microbes in supporting decomposition, nitrogen and carbon cycles. Some plants such as bryophytes, need further work because we have world hotspots of some species and uniquely rich communities in the west.

New techniques and technology (such as DNA barcoding and species diagnostic kits) are helping us discover much more about the diversity and role of nature. Much remains to be learnt about life in the soil, which supports many of the ecosystem services described in earlier chapters. We want to see universities and research institutes devoting more resources to this area, and greater efforts to bolster 'small biodiversity research' below ground and in fresh waters.

We must develop the remarkable volunteer base we have in Scotland, to help identify where action is needed for wildlife. And of course involvement in this will reap additional dividends for our health and wellbeing.

## **Key messages from this chapter**

- Protected areas offer many benefits beyond caring for nature, and provide enhanced ecosystem services, create jobs (especially in rural Scotland) extend recreational opportunities, (which benefit health and wellbeing), and contribute to tourism and our quality of life.
- An integrated, adaptive approach to the management of protected places, involving the range of land-use interests, will enhance these benefits.
- More concentrated work is needed on key species and habitats to target threatened native species, species conflicts, invasive non-native species, and potential reintroductions.

## **What will be different as a result of applying the principles in this chapter?**

- Protected areas will lie at the heart of healthy landscapes that contribute multiple benefits to the people of Scotland.
- Scotland's ecosystems will be more resilient, and threatened species will be recovering through targeted conservation action.
- The damage to our environment, economy and health from invasive non-native species will be greatly reduced, and contingency plans will be in place to guard against future invasions.
- The public will recognise their vital role in contributing to these outcomes, and volunteer 'experts' will be helped to play a major part in developing knowledge of our wildlife and its role in sustaining life.





# 5 Land and freshwater management



## Outcome

Nature is faring well, and ecosystems are resilient as a result of sustainable land and water management

## Key steps

- Promote an ecosystem approach to land management that fosters sustainable use of natural resources and puts biodiversity at the heart of land-use planning and decision-making.
- Ensure that measures taken forward under the Common Agricultural Policy encourage land managers to develop and retain the diversity of wildlife habitats and landscape features.
- Support 'High Nature Value' farming and forestry.
- Put in place the management necessary to bring Scotland's protected areas into favourable condition and improve the ecological status of water bodies.
- Ensure that biodiversity and ecosystem objectives are fully integrated into flood risk management plans, and restore wetland habitats and woodlands to provide sustainable flood management.
- Restore and extend natural habitats as a means of building reserves of carbon and to help mitigate climate change.
- Provide clear advice to land and water managers on best practice.

## Introduction

Protection, management and enhancement of nature are three pillars for sustainable land and water management. This chapter points to ways in which we can manage ecosystems better.

## Developing a strategy for Scotland's land and freshwater

Scotland's *Land Use Strategy (2011)*<sup>13</sup> promotes the sustainable use of land and water through the integration of land use policies, aimed at securing multiple benefits. It recognises the diverse roles of nature, and urges the adoption of an 'ecosystem approach' in planning and decision-making. The strategy provides a starting-point for public bodies to work together and with businesses at landscape scales.



## Pressures on the uplands

There are growing demands on land in Scotland, and these are keenly felt in parts of the uplands, where there are conflicting demands for livestock grazing, forestry, field sports, renewable energy developments, recreation and peatland restoration. Wind turbines and associated tracks can disturb upland habitats and birds, while small hydro-schemes can impact on the ecology of stream and associated habitats. Contributing to the environmentally desirable aim of a 'low-carbon economy', these developments have a key role to play in shaping the future of the uplands.



On more productive agricultural land, market forces, technological developments and certain policies encourage farmers to increase productivity. If this intensification results in a loss of wildlife it is unsustainable. Wildlife and semi-natural habitats are an integral component of some of the most intensively managed landscapes, where they help maintain ecosystem services like pollination and water purification, critical to successful agricultural production.

## Best practice and accreditation

By incorporating biodiversity objectives into best practice standards and accreditation schemes we can help raise the general standard of management.

- The *UK Forestry Standard Guidelines (2011)*<sup>51</sup> provide a guarantee that timber and its products originate from woodland managed in a way that supports biodiversity and improves water quality.
- Linking Environment And Farming (LEAF) promotes environmentally responsible farming, helping farmers produce food to high environmental standards in a way that secures a market and may attract a premium.
- Wildlife Estates Scotland demonstrates how sustainable sporting management combined with wildlife conservation objectives can provide multiple benefits for society and rural communities.

On our poorer land there is a trend towards less intensive agricultural use. In response to fluctuating prices and changes in basic support payments livestock farmers in some upland areas have reduced their sheep flocks. In some respects wildlife has benefited from this, but there are indications that the stock remaining are less well managed, and that they congregate in sheltered areas or on the more fertile ground where they still graze and trample vegetation heavily. Crops on in-bye land, which provide food for birds that over-winter or breed in the uplands, has also declined.



## High nature value farming and forestry

- High Nature Value (HNV) farming and forestry makes up a large proportion (around 40%) of Scotland's agricultural and forest areas. 'Extensive' production systems have helped shape Scotland's landscapes, and support much of our special wildlife.
- Extensive cropping and cattle grazing on the sandy plains of the Uists, for example, have given rise to the uniquely rich machair.
- In order to maintain the management practices associated with these systems and their benefits for nature, we need to ensure that there are adequate incentives and rewards for land managers. But we must also have regard to the social and economic structures of remote rural areas that sustain them.

Red deer are an economically important part of Scotland's nature for hunting, food and tourism. In many areas, however, their grazing and browsing prevents the regeneration of woodland and damages upland vegetation and soils. *The Deer Code (2012)*<sup>52</sup> encourages sustainable deer management, balancing commercial and sporting objectives against those of environmental sustainability, and emphasises the need for cooperation between land managers.

## Challenges ahead

Climate change is already affecting Scotland's nature and will continue to do so into the foreseeable future. Healthy and resilient ecosystems can be a key factor in ensuring habitats and species adapt to change.

## Land

Since 2004, funding available for managing biodiversity on farmland, woodland and upland estates has increased under the Scottish Rural Development Programme (SRDP). The priorities for the next programme (2014-20) are likely to include ecosystem restoration, soil and water management, and promoting a shift to a low carbon economy.

The SRDP will be a major source of funding for the *2020 Challenge*. However, the squeeze on public and private finances means there is likely to be less money to invest in wildlife conservation. Clear priorities need to be set and we need to find additional ways to secure a better future for farmland wildlife. We need to consider how new EC directives can be implemented to benefit biodiversity, for instance by promoting integrated pest management and controls for diffuse pollution.

Changes to the Common Agricultural Policy (CAP) will affect how Scotland responds to the biodiversity challenge. We need to use every opportunity available through the CAP reform package to achieve biodiversity benefits, such as:

- taking forward 'greening measures' associated with direct support payments.



- considering appropriate advice and support services for land managers to help yield environmental and biodiversity benefits.
- developing collaborative planning mechanisms to encourage landscape-scale action.

Soil biodiversity plays a key role in maintaining soil fertility and its many ecosystem services (such as providing clean water, nutrient cycling and climate regulation). We need to protect soils from erosion, loss of organic matter, structural damage and pollution to sustain these services.

By restoring and expanding natural habitats we can reduce emissions of greenhouse gases arising from the oxidation and erosion of soil carbon, and we can mitigate some of the effects of climate change by increasing the capacity to lock carbon into soils and vegetation. Upland peat soils contain vast amounts of stored carbon; and SNH will lead demonstration work to restore favourable management of 2,000 hectares of peatlands.

*The Scottish Forestry Strategy (2006)*<sup>53</sup> sets a target to plant 100,000 hectares of new woodland by 2022, which contributes to national carbon sequestration targets. Approximately half of this area is likely to have native trees. Part of the challenge is to determine which types of land are best suited to new planting, but also to ensure that new planting is consistent with other biodiversity objectives.

## Fresh water

The *EC Water Framework Directive (2000)*<sup>29</sup> (WFD) provides the legal framework for protecting the water environment and for the sustainable use of water, with land management playing a key part in this. It poses the challenge of achieving 'good ecological status' for all water bodies. Many of Scotland's rivers and lochs are classed as having good ecological status (compared with only half of these across Europe) but there are still problems arising from nutrient enrichment, physical modifications to water bodies and colonisation by non-native species.

The WFD is put into practice through river basin management plans. The Scottish Government intends to build on this approach as the basis of more integrated land and water use planning across whole catchments. Ecosystem health indicators will be used to identify priority catchments and identify action to tackle problems at an ecosystem scale. The Glasgow and Clyde Valley Green Network Partnership goes some way in demonstrating how this can be achieved.

Creating buffer strips, hedgerows, farm woodlands and wetlands helps to reduce diffuse pollution, and to increase biodiversity. Reducing the runoff of soil nutrients and agricultural waste will benefit aquatic habitats and species, and will help improve the quality of drinking and bathing waters.

Restoring rivers, floodplains and associated habitats to a more natural state should create natural flood storage within catchments. Such measures need to be fully integrated into flood risk management plans by 2015. Similar principles as those applied by *sustainable urban drainage system (2013)*<sup>54</sup> (SUDS) can provide benefits for people and nature at a fraction of the cost of hard engineering solutions.

## Air

Despite significant improvements, air quality continues to have adverse impacts on the environment with nitrogen deposition still at levels which are damaging to sensitive soils, plants and habitats over much of Scotland. Agriculture is the main source of ammonia with emissions coming principally from animal waste and the application of fertilisers. Reducing these emissions is one of the main aims of the Scottish Government's *Farming for a Better Climate (2012)*<sup>20</sup> initiative. Pollutants such as nitrogen oxides, ammonia and ozone can travel great distances and cause damage far from their source, so action is needed both at national and international levels. SEPA will continue to regulate emissions as required by the *EC Industrial Emissions Directive (2010)*<sup>55</sup>.

Continued reductions in emissions from industry and the transport sector will lessen air pollution pressure on ecosystems and their wildlife. Scottish Government and local authorities promote greener transport to help reduce nitrogen deposition. Better nutrient budgeting on farms should reduce nitrogen related eutrophication and reduce farm costs.



## **Key messages from this chapter**

- Land managers, public bodies and communities need to work together to address the challenges facing biodiversity.
- Support and incentives for managing biodiversity need to be better targeted.
- River basin planning should become the basis of a more integrated approach to land and water management across whole catchments.
- Woodland expansion and habitat restoration will benefit biodiversity while serving important social and economic objectives, such as flood risk management and contributing to a low carbon economy.
- More effort is needed to manage arable land in a way that will benefit soil biodiversity and wildlife.
- Land and water managers need to be more aware of the important role nature plays in their business.

## **What will be different as a result of applying the principles in this chapter?**

- Advice about biodiversity will be readily available to land and water managers.
- Land managers will have a clearer understanding of what they can do to sustain nature.
- A greater area of arable farmland will be managed expressly for biodiversity.
- Extensive areas of peatland will be managed to conserve their wildlife, and to improve their capacity for storing carbon.
- The benefits of 'High Nature Value' farming and forestry for biodiversity will be more appropriately reflected in financial support and incentive schemes.
- Native woodland cover will increase and substantial peatland and wetland habitats will be restored
- Deer and habitat management will be more closely integrated to sustain biodiversity.
- There will be an improvement in the state of farmland wildlife conservation.







# 6 Marine and coastal



## Outcome

Scotland's marine and coastal environments are clean, healthy, safe, productive and biologically diverse, meeting the long-term needs of people and nature.

## Key steps

- Adopt a Scottish Marine Plan and develop regional marine plans to aid balanced decision-making in the marine environment.
- Establish a coherent network of Marine Protected Areas, promoting sustainable use and conservation.
- Collate information on the location and sensitivity of priority marine features, and make this information available to support their protection.
- Achieve good environmental status for Scottish seas.
- Bring Common Fisheries Policy fish stocks to levels consistent with Maximum Sustainable Yield wherever possible, and take account of biodiversity in managing inshore fisheries.
- Implement a rapid-response framework to prevent colonisation of new invasive species in Scotland's seas and islands.
- Improve the monitoring of the marine environment to identify changes and guide progress towards the above outcomes.
- Improve understanding of how coastal ecosystems are likely to adapt to climate change and develop appropriate strategies for coastal zone management.



## Introduction

Scotland's seas support a wealth of marine life, rich in colour and variety. Our coastline and healthy waters support valuable fisheries and internationally important bird colonies. They act as European strongholds for iconic species like the basking shark and support habitats such as cold-water coral reefs.

The marine chapter of the *UKNEA (2011)*<sup>11</sup> describes the range of ecosystem services provided by the diversity of organisms in marine habitats, which support important industries and provide benefits to society. Fish and shellfish supply us with essential foodstuffs. Seaweeds protect coasts from erosion by waves, and provide natural food additives, fertilisers and pharmaceuticals. Marine microbes biodegrade wastes, and are increasingly important in biotechnology. Charismatic animals like whales, dolphins, seals and basking sharks underpin local tourist economies. Coasts and shallow waters help engage people of all ages with the natural environment, and provide a source of health, wellbeing and recreational challenge.



## Muddy sea-beds rich in life

In places where tidal movement and wave action are weak, the seabed is often covered by deep, soft mud. This muddy habitat is amongst the most productive around the coast, with an abundance of species on the mud surface, and thousands of animals living below, every square metre constantly churning and recycling the mud. One of the largest of the burrowers is the Scottish langoustine or 'prawn', *Nephrops*, the target of the second most valuable fishery in Scotland. Without the burrowers, the mud would be a stagnant 'gloop' with little or no life. Scottish waters contain the bulk of the UK's muddy sea-beds, so we have a special responsibility for their care and protection, not least to ensure that they continue to provide their important seafood bounty.

Predicted changes in temperature are likely to affect the distribution of marine species. Rising sea level, exacerbated by storm surges, is already leading to a greater frequency and intensity of coastal flooding, erosion and habitat loss. This adds urgency to the need for effective marine and coastal management.

The principles described in chapters 1 and 4 apply equally to the marine and coastal environments, but the pressing need for a new focus on marine management has already been recognised by the development of Scotland's *Marine Nature Conservation Strategy (2011)*<sup>14</sup>. The outcome identified at the beginning of this chapter is based on the vision of that strategy. It sets out challenging objectives and key steps for achieving these, by a mixture of wider seas policies; such as marine planning, targeted measures for protected areas and species conservation. It will be the main tool for meeting the *2020 Challenge* in the marine environment, so this chapter largely mirrors its demanding commitments.

## Protected marine biodiversity

The *Scottish Marine Nature Conservation Strategy (2011)*<sup>13</sup> explains the approach Marine Scotland and its partners are undertaking to develop a coherent network of Marine Protected Areas (MPAs), with an emphasis on adaptive management. The network will support biodiversity and geodiversity objectives, contribute to measures to achieve good environmental status under the *Marine Strategy Framework Directive (2008)*<sup>30</sup>, and help us meet other international obligations.

Protected areas should represent the best of nature around Scotland's coasts and in our seas. New MPAs will be selected not simply to protect examples of threatened habitats and species, but also to safeguard areas important for the wider marine environment. Some areas, for example, are particularly important for fish populations, including commercially valuable species.

In addition, the *Marine Nature Conservation Strategy (2011)*<sup>14</sup> proposes a system of 'priority marine features' to guide the identification of MPAs and provide focus for marine planning and other activities. The strategy recognises the need to improve our understanding of these special features, which will be protected by a range of mechanisms, including licensing and planning. Knowing where Priority Marine Features (PMFs) are located,

and how sensitive they are, will promote better integration between marine activities and important wildlife. A range of marine habitats and species already receive protection under EC and domestic nature legislation. Voluntary measures, such as wildlife watching codes, will also play an important role.

Invasive non-native species represent a significant threat to our marine biodiversity and industries such as aquaculture. The ease with which they can spread in the marine environment makes them particularly difficult to control. The measures proposed in chapter 4 will help tackle this threat to Scotland's seas.

## **Planning for sustainable use**

A range of sector-based policies and legislation govern the use of the sea. Environmental assessment legislation helps ensure that strategies, plans and projects take account of environmental impacts. However, these different policies have not always been well co-ordinated within an overall system of spatial planning, despite increasing pressures on maritime space.

## **A fundamental principle of the Scottish Government's approach to marine nature conservation is sustainable use of marine resources.**

The new statutory system of marine planning provided by the *Marine (Scotland) Act 2010*<sup>56</sup> is designed to deliver significant improvement to the management of our seas. Plans for each of Scotland's marine regions will provide an opportunity to protect and enhance PMFs, contribute to the management of existing and new protected areas, and enable protection of Scotland's wider seas through coordinated licensing and spatial planning for sustainable development.

The *National Marine Plan (2011)*<sup>57</sup> will help guide the activity of marine industries, to ensure they are sustainable and to direct appropriate developments to the right places. Planners, decision-makers and developers all have a role to play in this process, to ensure the sustainable use of our seas and to support productivity and economic growth. The Scottish Government will work with the European Commission to ensure that sustainability principles are also applied to those fish stocks covered by the Common Fisheries Policy.

## **Involving people and improving understanding**

There is a high level of public interest in the coastal and marine environment, and it is essential to provide opportunities for public involvement. Marine Scotland already takes an inclusive approach to developing policies and initiatives in the marine environment - by involving others at an early stage in the development of proposals; by encouraging the public to get involved; and by active consultation exercises.

Marine policies are assisted at a national level by the Marine Strategy Forum a cross-sectoral group representing Scotland's marine industries and other interests. The Scottish Coastal Forum has a similar role in relation to coastal management.





Marine and coastal biodiversity supports many tourism industries that are economically important to coastal communities. The Scottish Government recognises this and will encourage initiatives aimed at combining improved understanding of Scotland's marine biodiversity with new opportunities for sustainable tourism.

Marine Scotland has published the *Atlas of Scotland's Seas (2011)*<sup>16</sup> as a contribution to UK-wide understanding of marine biodiversity, and funded a new programme of surveys to inform MPA work. Greater effort is needed to improve the monitoring of habitats and species, achieve closer collaboration on surveys and data sharing, and increase our understanding of ecosystems and the services they provide to society. This will be achieved through the implementation of the *Scottish Marine Science Strategy (2011)*<sup>58</sup>, which sets out methods of collaboration and information sharing within Scotland as well as with external partners.

## Coasts

Scotland's coasts are of immense value for wildlife and people. Many species are attracted to our coasts as nursery areas, to breed or to feed in, and many of our tourism and recreational industries are shore and coast based. Many of us live near the coast or take our leisure there. Many coastal communities have traditions intimately tied to the marine environment on which they depend, providing an especially rich Scottish cultural heritage.

The Government and its agencies aim to heighten awareness of the role coastal habitats play in providing natural flood protection, erosion control and in supporting distinctive wildlife. Co-ordinated planning, conservation and management across marine and terrestrial environments will ensure the protection and expansion of some of these habitats. We can begin to achieve this through better linkages between existing legislation and policies, such as flood risk management plans, river basin management plans and shoreline management plans.

## We need to develop a better understanding of the services that coasts provide.

As sea-level rise accelerates, coastal habitats will move inland, except where barriers exist. It may be necessary to breach some man-made coastal barriers so that this 'roll-back' can operate, recognising that this will inevitably mean local loss of land. We need to plan in advance for coastal adaptation, considering the needs of neighbouring settlements, transport infrastructure and facilities, but also taking account of the valuable protection afforded by coastal habitats and landforms that are allowed to adjust naturally. These issues will predominantly be tackled at a local level, through local flood risk management strategies, and will be coordinated at a national level.

### **Scotland's islands**

Scotland has more than 700 offshore islands. This is the largest European island complex by area, with the significant archipelagos of the Hebrides, Orkney and Shetland. Only 99 of our islands have human settlements so many of these islands are undisturbed strongholds for marine and coastal biodiversity. Surrounded by productive seas, they are home to many endemic races and species. They support internationally important feeding and breeding areas for sea birds and marine mammals - providing key refuges for threatened species. Their extensive coastlines, varied and unique habitats, and isolation make them distinct from the mainland in many regards. Islands are particularly vulnerable to pressures such as habitat loss, climate change and invasive non-native species.

The lack of ground-based predators such as foxes, stoats and weasels makes islands safe havens for ground-nesting birds. The large concentrations of birds are particularly vulnerable to predation by invasive alien species and species native to the neighbouring mainland, but not native to our smaller islands. The combination of biodiversity richness, unique features and vulnerability means that Scottish islands need special attention and protection.

## **Key messages from this chapter**

- Scotland's seas and coasts provide rich natural harvests and varied ecosystem services, including climate control, coastal protection, nutrient recycling, health benefits and leisure opportunities, as well as supporting a diverse biodiversity that adds value to local tourist economies.
- Sustainable management of the seas to deliver multiple benefits will be assured through implementation of the Scottish Marine Nature Conservation Strategy and the National Marine Plan.
- Management of the coastal zone will be increasingly challenged by the impacts of climate change.
- Scotland's islands are especially valuable, but vulnerable, havens of biodiversity.

## **What will be different as a result of applying the principles in this chapter?**

- An ecologically coherent network of Marine Protected Areas will protect the best of Scotland's marine nature, promote sustainable use and aid recovery of commercially valuable fish and shellfish.
- An innovative system of marine planning will include all those with an interest in the marine environment to ensure the sustainable management of our seas, coasts and islands.
- Better understanding of the marine environment will help us identify the marine features most in need of protection, and give better advice on marine and coastal management.
- Coasts will be managed to help adapt to pressures from climate change.





# 7 Measuring progress



## Outcome

A framework of indicators that we can use to track progress.

## Key actions

- Put in place a programme of work to measure progress towards the 2020 outcomes, so that we can track progress and deal with problems.
- Work more closely with the growing number of volunteers to develop our understanding of the changing state of nature.
- Develop and support the Scottish Biodiversity Information Forum to bolster the collection and wider use of biodiversity data in Scotland.
- Publish a terrestrial habitat map for Scotland.





## Measuring progress

It is crucial that we are able to track progress towards the 2020 outcomes, and use this information to help us adapt our actions and management as necessary. Some of our aspirations are broad and ambitious, and we need to develop new approaches and broad datasets to measure our progress.

The current suite of Scotland's biodiversity and public engagement indicators will be updated, and where appropriate individual indicators will be modified. New indicators of ecosystem health are being devised and the new *Natural Capital Asset Index (NCAI) (2012)*<sup>12</sup> will be used to measure the extent of, and reasons for, change. This suite of indicators will provide us with a clear understanding of our progress towards the 2020 outcomes, and monitor our contribution to Aichi and European biodiversity targets.

Ecosystem health indicators will need to operate at both national and local scales as they will help determine priority ecosystems for restoration. They might cover the quality of soils, water and habitats, extent of semi-natural land, an index of connectivity, a measure of diffuse pollution, the presence or absence of functional groups, some measure of species diversity, and, perhaps, a measure of penetration by invasive non-native species.

We will provide descriptions of progress to supplement the indicators, and rapidly identify problem areas. The Scottish Biodiversity Committee is the focal point for reporting on progress. We shall continue to record activities that support biodiversity through BARS (Biodiversity Action Reporting System). We need more partners to use this as it helps to quantify the breadth of biodiversity action across Scotland and the UK. The spatial mapping of biodiversity action also provides opportunities to identify gaps and potential for collaboration.





## Reporting progress against Aichi Targets

The Convention on Biological Diversity sets out five strategic goals and 20 ‘Aichi’ Targets’ (2012)<sup>5</sup>. These provide the international framework within which we can develop indicators of progress. At the European level, this monitoring is undertaken through a set of biodiversity indicators to which the UK contributes. We want to have an additional Scottish component, which will include the current biodiversity and engagement indicators, and new ones to reflect ecosystem health. We will link these to UK indicators where they exist.

We shall therefore develop a new biodiversity indicator framework, setting out the metrics required for informed decision taking and reporting up to 2020. Actions to improve our understanding don’t necessarily start with new data collection but, instead, with making more effective use of results, expertise and resources. By making existing information more accessible we can focus sharply on genuine knowledge gaps. These include assessments of ecosystem health across conservation related European directives as well as benefits for wildlife through programmes such as SRDP. Bringing information together in one place, keeping it up-to-date and making it accessible for use across sectors, policies and purposes, is now being made possible through Scotland’s Environment Web. In this way the results of indicator monitoring will be made available for use in combination with other environmental data across the full spectrum of policy purposes, whether local, catchment or national in scale.

Table 2 shows the relationship between the Aichi Targets, Scottish outcomes from the *2020 Challenge*, and proposed and current UK indicators.

**Table 2. Links between Aichi targets, strategy outcomes and indicators.**

<b>CBD Strategic Goal</b>	<b>Aichi target</b>	<b>Scottish outcomes from 2020 Challenge</b>	<b>Proposed UK 2020 indicator</b>	<b>Current UK 2010 indicator</b>
<b>A. Address the underlying causes of biodiversity loss by mainstreaming biodiversity across government and society</b>	1, (17)	Ch 1 Engaging people	A1. Awareness, understanding and support for biodiversity conservation	None available
	1	Ch 1 Empowering people  Ch 3 Improved health and quality of life	A2. Taking action for nature: volunteer time spent in biodiversity conservation	Volunteer time spent in biodiversity conservation and background information from Defra's public attitude survey
	2, 4, (18)	Ch 2 Valuing Natural Capital	A3. Value of biodiversity integrated into decision making	None available
	4	Ch 2 Efficient resource use	A4. Global biodiversity impacts of UK economic activity/ sustainable consumption	None available

CBD Strategic Goal	Aichi target	Scottish outcomes from 2020 Challenge	Proposed UK 2020 indicator	Current UK 2010 indicator
<b>B. Reduce the direct pressures on biodiversity and promote sustainable use</b>	3, 7, (4)	Ch 5 Sustainable land and water management	B1. Agricultural and forest area under environmental management schemes	Area of land in agri-environment schemes
				Area of forestry land under sustainable management
	6, (4)	Ch 6 Productive and biologically diverse seas	B2. Sustainable fisheries	UK stocks harvested sustainably and at full reproductive capacity
	4, (2, 3)	Ch 2 Sustainable economic growth	B3. Integration of biodiversity considerations into business activity	None available
	10	Ch 1 Ecosystems are restored to good health	B4. Pressure from climate change	Spring index
	8, 10		B5. Pressure from pollution	Air pollution: sulphur
				Air pollution: nitrogen
		Ch 6 Clean and healthy seas		Marine pollution: heavy metals
	9	Ch 4 Wildlife is flourishing	B6. Pressure from invasive species	Extent of invasive species (terrestrial)
				Extent of invasive species (freshwater)
Extent of invasive species (marine)				
8, (5, 14)	Ch 5 Sustainable land and water management	B7. Water quality	Biological quality of rivers	



CBD Strategic Goal	Aichi target	Scottish outcomes from 2020 Challenge	Proposed UK 2020 indicator	Current UK 2010 indicator		
<b>C.</b> <b>To improve the status of biodiversity by safeguarding ecosystems, species and genetic diversity</b>	11	Ch 1 Ecosystems are restored to good health	C1. Protected sites	Total area of protected sites (terrestrial and freshwater)		
				Total area of protected sites (marine)		
				Condition of SSSIs		
	5, (11)		Ch 4 Quality and quantity of our wildlife is improving and flourishing	C2. Habitat connectivity	Connectivity of woodland and neutral grassland (context only)	
	5				C3. Status of rare and threatened habitats	Baseline data for previous article 17 report
	12			C4. Status of rare and threatened species	Previous UK BAP reporting round + background baseline data for previous article 17 report.	
	7, 12, 14, (13)			Ch 5 Sustainable land and water management	C5. Birds of the wider countryside and at sea	Farmland birds
						Woodland birds
						Wetland birds
						Seabirds
	7, 12, 14,			Ch 5 Sustainable land and water management	C6. Insects in the wider countryside	Wintering water birds
						C7. Plants in the wider countryside
	7, 12, 13, 14			Ch 5 Sustainable land and water management	C7. Plants in the wider countryside	Change in plant species richness (enclosed farmland)
						Change in plant species richness (woodland and hedgerows)
Change in plant species richness (grassland and boundaries)						
7, 12, 14, (13)	Ch 5 Sustainable land and water management	C8. Bats (and other mammals of the wider countryside)		Widespread bats		
				C9. Genetic resources for food and agriculture)	Effective population size (sheep)	
13, (16)	Ch 5 Sustainable land and water management	C9. Genetic resources for food and agriculture)	Effective population size (cattle)			

<b>CBD Strategic Goal</b>	<b>Aichi target</b>	<b>Scottish outcomes from 2020 Challenge</b>	<b>Proposed UK 2020 indicator</b>	<b>Current UK 2010 indicator</b>
<b>D. Enhance the benefits to all from biodiversity and ecosystems</b>	14, 15, (4, 6)	Ch 6 Clean, healthy, safe, productive and biologically diverse	D1. Biodiversity and ecosystem services (marine)	Fish size classes in the North Sea (as a measure of capacity to sustain long-term fisheries)
	14, 15	Ch 1 Ecosystems are restored to good health	D2. Biodiversity and ecosystem services (other)	None available

<b>E. Enhance implementation through planning, knowledge management. and capacity building</b>	19, (2, 3)	Ch 2 Valuing Natural Capital	E1. Biodiversity data for decision making	None available
	20	Ch 2 Investing in Natural Capital	E2. Expenditure on domestic and international biodiversity	Expenditure on domestic biodiversity
				Expenditure on international biodiversity

## Working with volunteers and other people to develop the evidence base – citizen science

In Scotland we are very fortunate to have a highly energetic, broad based and skilled volunteer network. Even some of the little known taxonomic groups have specialists carrying out fundamentally important work on their conservation and ecology. Much of this work is curiosity driven, and we applaud and encourage it.

Volunteer enthusiasts predominantly observe nature and are involved in systematic recording of plants and animals. This has given rise to a wealth of knowledge, and enabled us to establish trends and indicators. Several national recording schemes, such as those for birds, plants and butterflies, have become world exemplars. Scotland's Environment Web (SEWeb) lists at least 19 initiatives reflecting and fostering volunteer based monitoring. The website provides advice on how people can get started in wildlife recording. A vital part of this is to ensure habitat and species information is collected consistently, notably through the National Biodiversity Network (NBN) and its marine counterpart, the Marine Environmental Data and Information Network (MEDIN).

**In Scotland we are very fortunate to have a highly energetic, broad based and skilled volunteer network.**

With at least 79,000 species present in our land, fresh waters and surrounding seas, we need priorities for monitoring. The habitats and species of European importance, and those named under EU legislation, are clearly at the top of the list. For many of these we already have indicators that are being monitored across a network of sites through a coherent survey programme.





## Managing the evidence base

Cross-sectoral approaches to information gathering and cooperative working will be promoted through the CAMERAS (Coordinated Agenda for Marine, Environment and Rural Affairs Science) Environmental Monitoring Coordination Group. A Scottish Biodiversity Information Forum has recently been established to guide key discussions between those involved in data collection (predominantly volunteers but also government and the private sector) and data users (predominantly government, but others as well).

Access to reliable, quality-assured information about Scotland's environment and how it is changing is crucial to inform decision-making by government as well as public bodies, businesses and others. We hope that, as we develop the indicators we can use the SEWeb to see these in context, alongside other environmental facts and figures.

## Access to reliable, quality-assured information about Scotland's environment, and how it is changing, is crucial to inform decision-making.

As we have seen in the first two chapters, a growing understanding of the importance of our natural capital can inform good decision-making, for example in development planning and the SRDP. However, the evidence needed to manage our natural capital wisely, and to make the most of the services provided by ecosystems, is incomplete. Therefore, we shall develop a suite of indicators to inform adaptive management and contribute to further reporting on Aichi Targets.

Although we have several excellent atlases showing the distribution of groups of species, ranging from birds, mammals and butterflies to flowering plants, we do not have a comparable atlas for habitats on land (there is an excellent marine atlas of habitats and species). We want to publish a map of Scotland's land habitats based on a pan-European classification (EUNIS-Annex 1). This map (to be completed in 2019) will reflect the great diversity of habitats we have in Scotland and, in time, be used to support surveillance and monitoring. Indeed, this map will become an essential tool in making decisions on planning, policy and land management issues. This is an ambitious proposal, and an appropriate note on which to close the *2020 Challenge* - and to begin a truly challenging piece of work.

## **Aichi Goals and targets**

***Strategic Goal A: Address the underlying causes of biodiversity loss by mainstreaming biodiversity across government and society.***

### **Target 1**

By 2020, at the latest, people are aware of the values of biodiversity and the steps they can take to conserve and use it sustainably.

### **Target 2**

By 2020, at the latest, biodiversity values have been integrated into national and local development and poverty reduction strategies and planning processes and are being incorporated into national accounting, as appropriate, and reporting systems.

### **Target 3**

By 2020, at the latest, incentives, including subsidies, harmful to biodiversity are eliminated, phased out or reformed in order to minimize or avoid negative impacts, and positive incentives for the conservation and sustainable use of biodiversity are developed and applied, consistent and in harmony with the Convention and other relevant international obligations, taking into account national socio economic conditions.

### **Target 4**

By 2020, at the latest, Governments, business and stakeholders at all levels have taken steps to achieve or have implemented plans for sustainable production and consumption and have kept the impacts of use of natural resources well within safe ecological limits.

***Strategic Goal B: Reduce the direct pressures on biodiversity and promote sustainable use.***

### **Target 5**

By 2020, the rate of loss of all natural habitats, including forests, is at least halved and where feasible brought close to zero, and degradation and fragmentation is significantly reduced.

### **Target 6**

By 2020 all fish and invertebrate stocks and aquatic plants are managed and harvested sustainably, legally and applying ecosystem based approaches, so that overfishing is avoided, recovery plans and measures are in place for all depleted species, fisheries have no significant adverse impacts on threatened species and vulnerable ecosystems and the impacts of fisheries on stocks, species and ecosystems are within safe ecological limits.

### **Target 7**

By 2020 areas under agriculture, aquaculture and forestry are managed sustainably, ensuring conservation of biodiversity.

### **Target 8**

By 2020, pollution, including from excess nutrients, has been brought to levels that are not detrimental to ecosystem function and biodiversity.

### **Target 9**

By 2020, invasive alien species and pathways are identified and prioritized, priority species are controlled or eradicated, and measures are in place to manage pathways to prevent their introduction and establishment.

### **Target 10**

By 2015, the multiple anthropogenic pressures on coral reefs, and other vulnerable ecosystems impacted by climate change or ocean acidification are minimized, so as to maintain their integrity and functioning.

## ***Strategic Goal C: To improve the status of biodiversity by safeguarding ecosystems, species and genetic diversity.***

### **Target 11**

By 2020, at least 17 per cent of terrestrial and inland water, and 10 per cent of coastal and marine areas, especially areas of particular importance for biodiversity and ecosystem services, are conserved through effectively and equitably managed, ecologically representative and well connected systems of protected areas and other effective area-based conservation measures, and integrated into the wider landscapes and seascapes.

### **Target 12**

By 2020 the extinction of known threatened species has been prevented and their conservation status, particularly of those most in decline, has been improved and sustained.

### **Target 13**

By 2020, the genetic diversity of cultivated plants and farmed and domesticated animals and of wild relatives, including other socio-economically as well as culturally valuable species, is maintained, and strategies have been developed and implemented for minimizing genetic erosion and safeguarding their genetic diversity.

## ***Strategic Goal D: Enhance the benefits to all from biodiversity and ecosystem services.***

### **Target 14**

By 2020, ecosystems that provide essential services, including services related to water, and contribute to health, livelihoods and well-being, are restored and safeguarded, taking into account the needs of women, indigenous and local communities, and the poor and vulnerable.

### **Target 15**

By 2020, ecosystem resilience and the contribution of biodiversity to carbon stocks has been enhanced, through conservation and restoration, including restoration of at least 15 per cent of degraded ecosystems, thereby contributing to climate change mitigation and adaptation and to combating desertification.



### **Target 16**

By 2015, the Nagoya Protocol on Access to Genetic Resources and the Fair and Equitable Sharing of Benefits Arising from their Utilization is in force and operational, consistent with national legislation.

## ***Strategic Goal E: Enhance implementation through participatory planning, knowledge management and capacity building.***

### **Target 17**

By 2015 each Party has developed, adopted as a policy instrument, and has commenced implementing an effective, participatory and updated national biodiversity strategy and action plan.

### **Target 18**

By 2020, the traditional knowledge, innovations and practices of indigenous and local communities relevant for the conservation and sustainable use of biodiversity, and their customary use of biological resources, are respected, subject to national legislation and relevant international obligations, and fully integrated and reflected in the implementation of the Convention with the full and effective participation of indigenous and local communities, at all relevant levels.

### **Target 19**

By 2020, knowledge, the science base and technologies relating to biodiversity, its values, functioning, status and trends, and the consequences of its loss, are improved, widely shared and transferred, and applied.

### **Target 20**

By 2020, at the latest, the mobilization of financial resources for effectively implementing the Strategic Plan for Biodiversity 2011-2020 from all sources, and in accordance with the consolidated and agreed process in the Strategy for Resource Mobilization, should increase substantially from the current levels. This target will be subject to changes contingent to resource needs assessments to be developed and reported by Parties

## Glossary

**Adaptive management:** management based on regular monitoring, then modifying management to meet agreed objectives.

**Biodiversity:** the totality of life on earth: the variety of species, including the variation within species, the living systems they form, and the natural processes with which they interact.

**Biosecurity:** preventive measures designed to reduce the risk of spreading invasive non-native species, pests and diseases.

**Biosphere Reserve:** a large area of natural habitat, protected under domestic legislation, to meet the criteria of the UNESCO 'Man and Biosphere' Programme.

**Catchment scale:** an entire river catchment.

**CBD:** the UN Convention on Biological Diversity.

**CITES:** Convention on International Trade in Endangered Species.

**Climate change:** long-term changes to climate, caused to a significant degree by human activities that release gases into the upper atmosphere where they trap excess heat near the planet's surface.

**Ecological network:** a system linking ecosystems across geographic areas, taking into account the dispersal ability of the component species of those ecosystems.

**Ecologically coherent:** operating at such a scale, and with sufficient connectivity, to ensure that dispersed ecosystems can continue to function effectively.

**Ecosystem:** a dynamic interlinked complex of plant, animal and micro-organism communities, and their associated non-living environment, interacting as an ecological unit.

**Ecosystem approach:** an approach that encourages the integrated management of land, water and living resources and promotes conservation and sustainable use in an equitable way.

**Ecosystem function:** the natural workings of an ecosystem, which allow it to be self-sustain.

**Ecosystem health:** is the status of an ecosystem including the condition of its natural assets (biodiversity, geomorphology), its functional quality and its capacity to sustain both assets and function in the future (i.e. sustainability).

**FCS:** Forestry Commission Scotland.

**Geoparc:** a geographic area that is promoted, and has at least a measure of informal protection, because of its geological interest and importance.

**Green network:** a network of green spaces contributing to the concept of an ecological network.

**GSPC:** Global Strategy for Plant Conservation, an updated strategy for 2011-2020 with 16 targets.

**IUCN:** the World Conservation Union, an international non-governmental organisation that promotes scientific action for the conservation of wild living resources.

**Landscape scale:** a wide-scale, holistic approach, operating across broad areas of countryside integrating biodiversity conservation with local economic and social issues.

**Low-carbon economy:** an economy that does not rely heavily on the use of fossil fuels.

**Natural Capital:** a value assigned to the state of natural assets.

**Natura site:** a site protected under domestic legislation to protect an area of particular value which meets the criteria of the EC Birds Directive and/or the EC Habitats and Species Directive.

**NEA:** UK National Ecosystem Assessment (2011).

**NICE:** National Institute for Health and Clinical Excellence.

**Peatland:** a wetland ecosystem, such as a bog, fen or mire, covered by a peaty soil formed from the partly decayed remains of plants.

**The Ramsar Convention:** the Convention on Wetlands of International Importance which is an intergovernmental treaty that provides the framework for national action and international cooperation for the conservation and wise use of wetlands and their resources.

**River basin management planning:** a planning mechanism introduced to protect and improve the water environment by setting improvement objectives for each water body.

**River catchment:** the entire land area from which water drains into one river system.

**Social prescribing:** a mechanism for linking patients with non-medical sources of support within the community.

**SAC:** Special Areas of Conservation – are important high-quality conservation sites. They are designated under the EC Habitats Directive forming a network that significantly contributes towards the conservation of specific habitats and species.

**SEPA:** Scottish Environment Protection Agency.

**SNH:** Scottish Natural Heritage.

**SSSI:** Site of Special Scientific Interest – is a site designated under the Wildlife and Countryside Act 1981 as being of special interest for its flora, fauna, geological or physiographical features.

**Sustainable:** capable of continuing into the future without damage to the environment or depletion of natural capital.

**Water Framework Directive:** an EC directive designed to improve the management of surface waters.

**TEEB:** 'The Economics of Ecosystems and Biodiversity' (2008 report to the CBD).



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