

# Applying an ecosystems approach to land use decisions

- approaches and tools

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# Overview

- Policy context – LUS - Principles
- Case studies Carse of Stirling, Regional Land Use Pilots
- Delivery – stakeholder engagement, information and tools

# Land Use Strategy Objectives

Land based businesses working with nature to contribute more to Scotland's prosperity

Responsible stewardship of Scotland's natural resources delivering more benefits to Scotland's people

Urban and rural communities better connected to the land, with more people enjoying the land and positively influencing land use

# LUS Principles for Sustainable Land Use

- a Opportunities for land use to deliver multiple benefits should be encouraged
- d Land use decisions should be informed by an understanding of the functioning of the ecosystems they affect in order to maintain the benefits of the ecosystems services they provide.
- i People should have opportunities to contribute to debates and decisions about land use and management decisions which affect their lives and their future.



# 3 key steps – ecosystems approach

Consider natural systems and how they work

Take account of the services that ecosystems provide to people

Involve people

Information note on applying an ecosystem approach to land use 2011

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# Land Use Strategy pilot projects

## Aim

To pilot a mechanism which uses an ecosystems approach to consider existing and future land uses in a collective and integrated way, with a view to optimising the use of the land, and establishing a means to prioritise or guide decisions about possible conflicting or competing uses of land.

# Pilot project – steps

involve people



gather information – policy, ecosystem services, maps,  
existing mechanisms – flooding, forestry, agriculture



identify issues - challenges and opportunities



consider land use for multiple benefits



develop land use framework tool

# Key elements

- stakeholder involvement: who, when and how
- mapping information: land use in a regional context, trade offs, opportunities
- address local issues/ national issues – local authority and national government
- governance – project team, steering group, experts

# Information

Baseline mapping

Policy mapping

Resource/asset mapping

Identification of constraints and opportunities

# Aberdeenshire interactive tool



## Aberdeenshire Regional Land Use Pilot

*An interactive tool to support land use decision making*

Please read [this page](#) and the information on [Land Use Policy Areas](#) and [Policy Sliders](#) before using the Tool

This is a prototype developed to explore how multiple benefits might be assessed and none of the output represents any recommendations for land use change from The James Hutton Institute, Aberdeenshire Council or the Scottish Government.

This site is designed to help support decisions about **land use change**. Potential uses of the tools are in the areas of catchment management, woodland strategies and the targeting of grant funding.

Effective support for land use change means identifying areas that are appropriate for the proposed change (e.g. woodland expansion) but where this land use change could also either provide other benefits (such as recreation opportunities) or reduce problems (such as poor water quality).

This tool allows the user to explore how land use might change under a medium prediction for climate change when considering a number of policy relevant themes.

**Policy Areas:** There are six policy areas (scenario starting points) accessible by clicking on the buttons at the top of the [tool page](#). These starting points relate to policy areas that are relevant to the Land Use Strategy and are the result of up-weighting certain criteria that are most relevant to that policy area. These are starting points from which the user can explore land cover changes.

**Policy Sliders:** Within each of these policy areas, the user is able to vary other criteria to explore the consequences of changing the weighting (policy priorities) of different sets of criteria on the pattern of land cover. The tool will then illustrate the consequences of this for sediment export, nitrogen retention and carbon stocks at a sub catchment level.

[Further Information](#) on carbon pools (soil, vegetation and livestock) and nitrogen retention and sediment is available by clicking on the link.

The Aberdeenshire Regional Land Use Pilot is an [Aberdeenshire Council](#) project developed with the [James Hutton Institute](#) and funded under the Scottish Government's [Land Use Strategy](#).

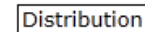
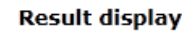
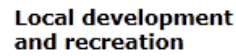


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**Aberdeenshire**  
COUNCIL

## Agriculture and soils





- Services

- ☒ Woodland Expansion
- ☐ Sediment
- ☐ Carbon
- ☐ Nitrogen

Ramsar 

 SSSI 

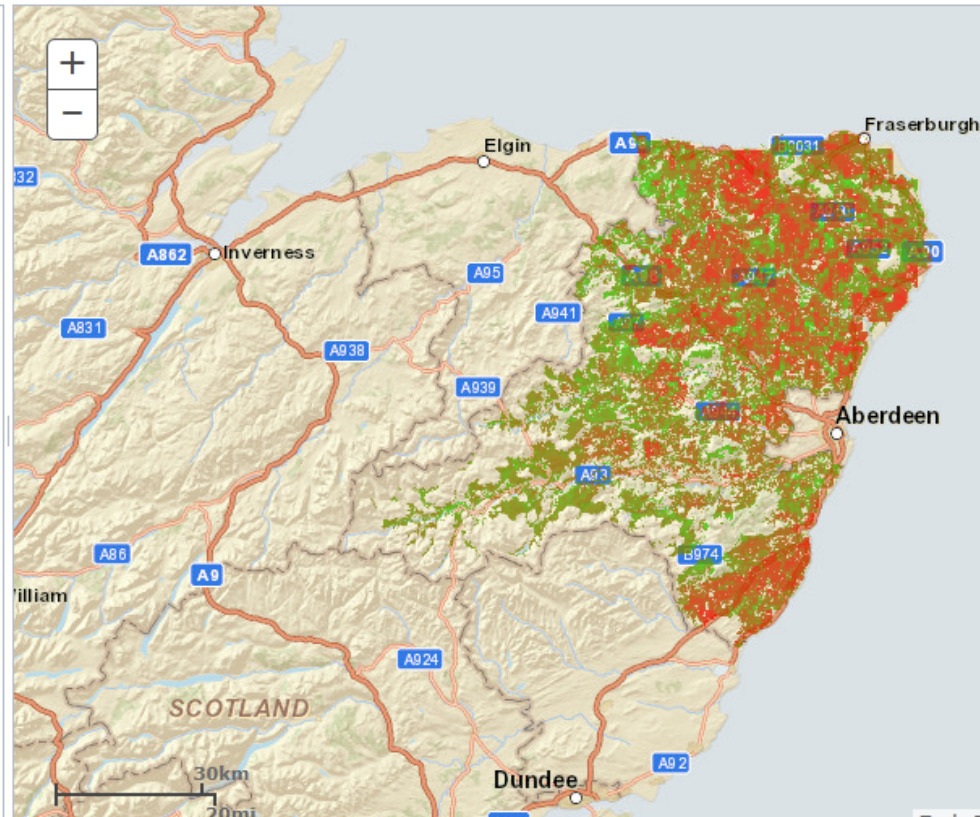
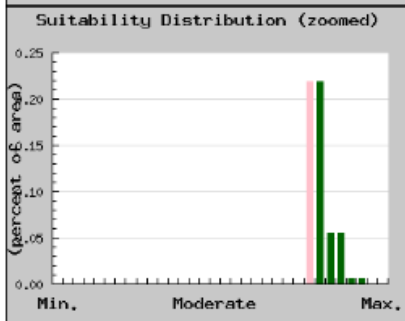
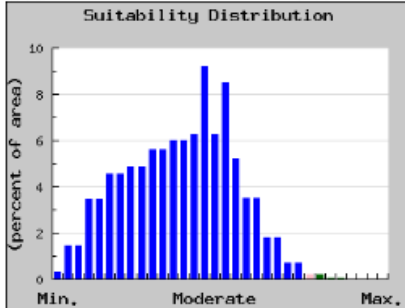
SPA  

SAC

☐ NNR ☒

 LNR 

### Suitability for woodland expansion



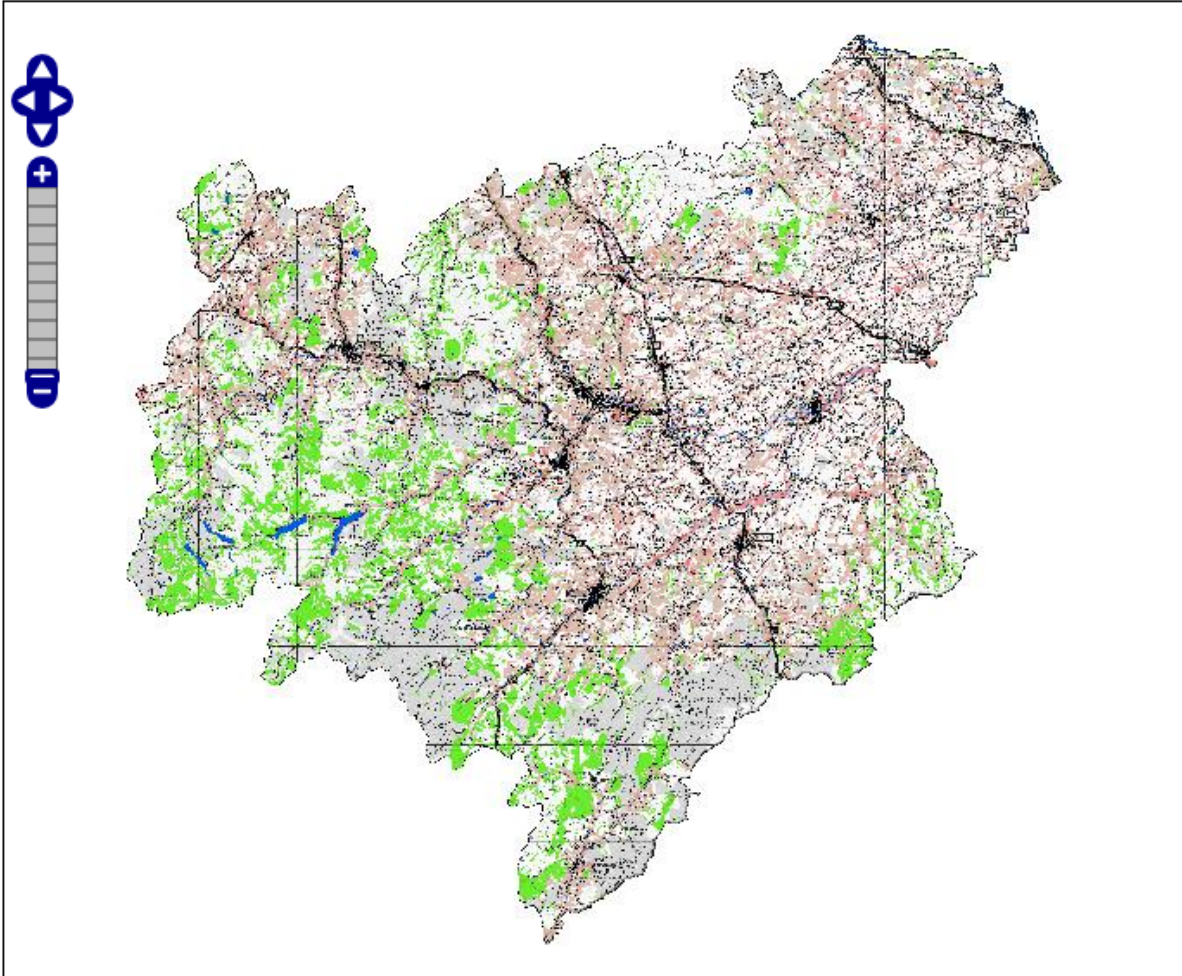
Satellite



# Scottish Borders

## Potential interaction between creating natural flood management (NFM) and agriculture

### Decision Support Map Set 2 - Interaction



### Legend

- Opportunities for NFM on arable land
- Opportunities for NFM on improved pasture
- Opportunities for NFM on other pasture
- Urban and infrastructure
- Rivers, lochs and sea

### Theme to consider:

It is probable that climate change may be adding to the frequency of extreme storm events. Natural flood management techniques help the rivers and surrounding countryside by reducing the speed at which rainfall reaches the rivers. Implementing natural flood management measures in the catchment, builds resilience in the environment to buffer against the effects of climate change.

### What the map shows:

This map shows the interaction between opportunities for carrying out natural flood management measures and current agriculture. Opportunities may be most limited in arable areas where food production is a priority (dark pink), and there may be constraints in areas of high quality grazing (light pink).

### How the map has been created:

The map has been created by combining specific classes of information from the stock maps of agricultural livestock and crops (from the IACS 2013 data) and the opportunities map which shows areas suitable for enhancing natural flood management.

The map is one of a set of 9 maps that explores the current and potential use of land in the Scottish Borders. It is not intended to prescribe a course of action, but rather to act as a decision support tool, highlighting where different options for land use change may impact in these areas.

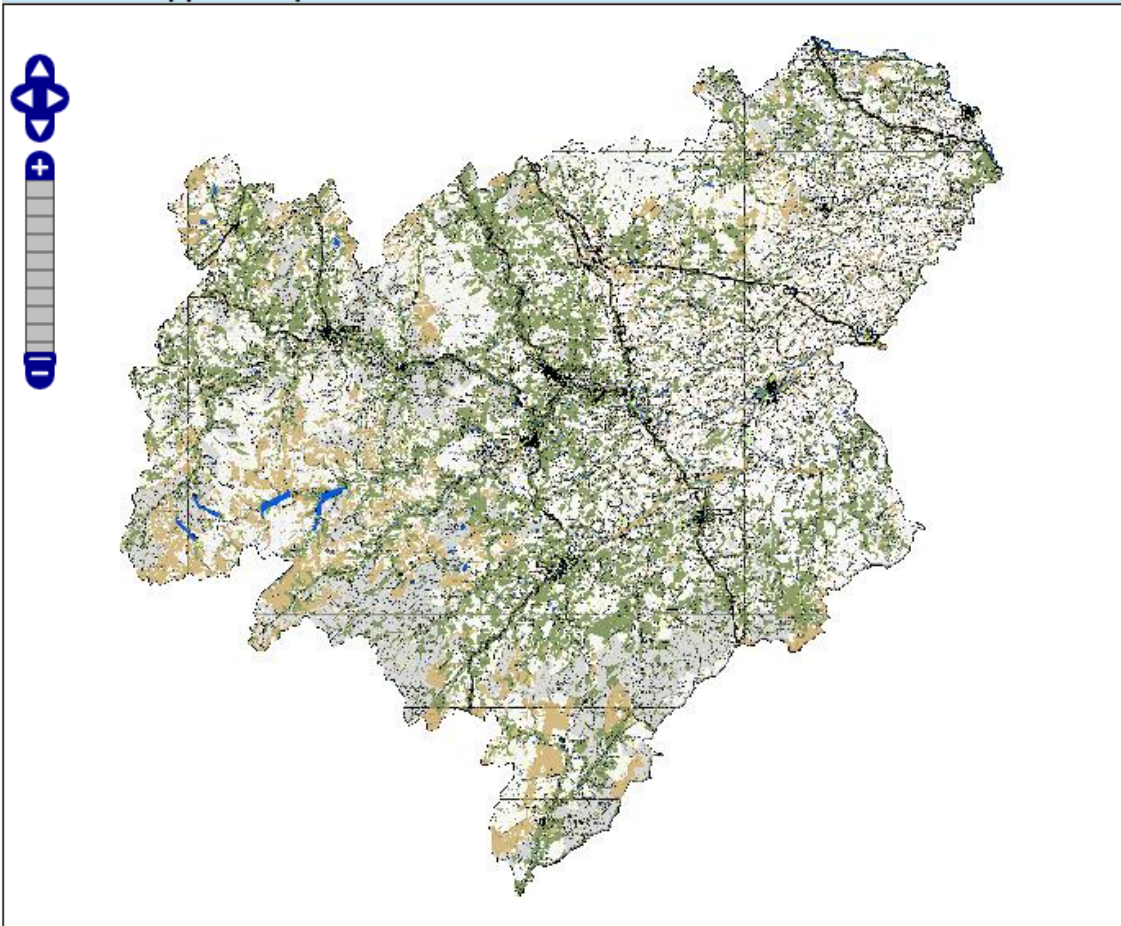
### Rules box:

Key ecosystem service factors	Data used	Example attributes	Displayed
Land currently used for agriculture (Ecosystem service: agricultural goods; livestock and arable)	Provisioning service map 1 of 4 Crop production Provisioning service map 2 of 4 (Land supporting food production (grazing intensity for livestock))	Classes Used – Currently arable Currently improved pasture	Land under consideration
Land helping to mitigate flood risk	Opportunity service map 1 of 7	Land suitable for NFM on arable and	Pink

# Scottish Borders

## Potential multiple benefits of creating natural flood management (NFM)

### Decision Support Map Set 2 - Multi-benefit



#### Legend

- NFM opportunities only
- NFM opportunities multi-benefit with 1 other opportunity
- NFM opportunities multi-benefit with 2 other opportunities
- NFM opportunities multi-benefit with 3 other opportunities
- Urban and infrastructure
- Rivers, lochs and sea

#### Theme to consider:

It is probable that climate change may be adding to the frequency of extreme storm events. Natural flood management techniques help the rivers and surrounding countryside by reducing the speed at which rainfall reaches the rivers. Implementing natural flood management measures in the catchment builds resilience in the environment to buffer against the effects of climate change.

#### What the map shows:

This map shows areas where a land use change to aid natural flood management may provide multiple benefits for other ecosystem services. These include enhanced biodiversity, improved water quality and enhancement of soil carbon.

#### How the map has been created:

The map has been created by looking at where opportunities to enhance natural flood management overlap with opportunities to enhance biodiversity, water quality and soil carbon.

The map is one of a set of 9 maps that explores the current and potential use of land in the Scottish Borders. It is not intended to prescribe a course of action, but rather to act as a decision support tool. This map highlights the other ecosystem services that could be enhanced with a change of land use in these areas.

#### Rules box:

Key ecosystem service factors	Data used
Mitigation of flood risk	<b>Opportunities map 1 of 7</b> Indicative opportunities to promote the ability of the land to retain water, helping to mitigate flood risk
Potential multi-benefits if overlapping with:	<b>Opportunities map 4 of 7</b> Indicative areas with potential to enhance biodiversity and nature conservation <b>Opportunities map 6 of 7</b> Indicative opportunities for improving water quality <b>Opportunities map 7 of 7</b> Indicative opportunities to enhance soil carbon storage

# Scottish Borders stock maps

## **Provisioning service**

Food production – livestock  
Food production – crops  
Timber and woodland  
Renewable energy

## **Regulating services**

Food risk and natural flood  
management  
Water quality  
Carbon storage – soil  
Carbon storage – vegetation  
Sediment input  
Land at risk of erosion

## **Cultural Services**

Non motorised recreation  
Landscape designations  
Historic and cultural heritage  
Field sports

## **Supporting services**

Biodiversity conservation  
Biodiversity resilience  
Pollination



# Sources of information

The Land Use Data directory

Pilots - James Hutton Institute maps and data,  
Environment Systems sourced maps and data, Local  
Authority data

## Land Use Data Directory

**On these pages you will find a basic set of spatial datasets and information on how to access the data.**

### Aimed at Local Authorities

This data directory is aimed primarily at local authorities wanting to develop their own land use frameworks, but also other public bodies, non-governmental organisations, and community initiatives.

### Mapping Land Use

The Land Use Strategy aims to encourage and support sustainable land use. On a regional or local level, this could be achieved by looking at how land is currently being used, what benefits people are getting from the land, and where there are opportunities to increase those benefits. Spatial data can support these approaches by assessing ecosystem services and by identifying the most suitable locations for particular land uses.

### About Ecosystem Services

Ecosystem services are the benefits people obtain from ecosystems. Examples of ecosystem services include **provisioning services** such as food, water, timber, and fibre, **regulating services** that affect climate, floods, disease and water quality, and **cultural services** with recreational, aesthetic, and spiritual benefits. The term 'services' is usually used to encompass the tangible and intangible benefits that people obtain from ecosystems.

More information on ecosystem services and the ecosystem approach can be found below under [Further Resources](#).

### Spatial Datasets

Spatial data can be used to create a composite measure of ecosystem services provision. This data directory identifies a minimum set of key spatial datasets to help inform an ecosystem services assessment, or an ecosystems approach for land use. It also provides information on how to access the data. Any ecosystem services for which there are no obvious datasets available will be highlighted.



# Carse of Stirling

# Carse of Stirling

## Aims

- Identify priority actions within the Project area to deliver improved benefits from nature in a way that integrates public policy objectives and local perspectives;
- Demonstrate the benefits of applying an ecosystems approach to land use, and a way of doing this that is practical and realistic

# Carse of Stirling

- Agency initiated
- Consultant facilitated
- Stakeholder led



# Carse of Stirling

Lessons learned:

Engagement and  
involvement of  
stakeholders

It's about empowering  
communities



# Carse of Stirling



Lessons learned:  
Who benefits?

Think about the  
geographical and social  
distributions of who  
might win or lose.

To engage people  
everyone has to feel  
that they will benefit

# Carse of Stirling

Panel Meeting 1: Introduction to the project and to benefits from the land

Panel Meeting 2: Mapping benefits

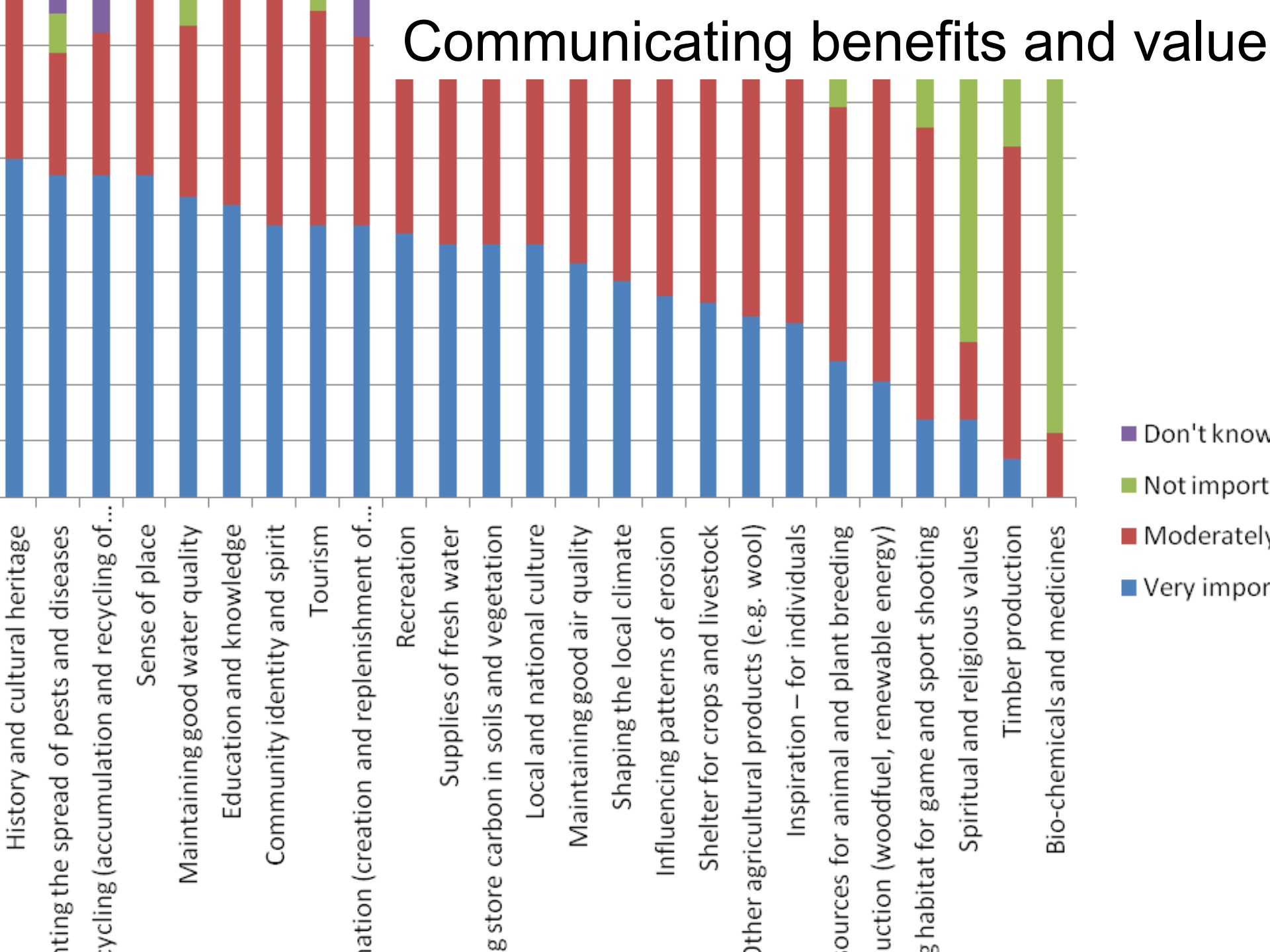
Panel Meeting 3: Past present and future change

Panel Meeting 4: Scenarios for the future

Panel Meeting 5: Vision and action

Benefit	Description
Products we get from the land	
Food	Food products from agriculture, horticulture, collection from the wild
Fibre	Wood, coppice products, animal skins, wool, reeds
Fuel	Biomass, woodfuel, anaerobic digestion, solar, wind
Genetic resources	Animal and plant breeding, gene banks
Biochemicals and medicines	Biochemicals, natural medicines, pharmaceuticals from agricultural and wild species or resources
Ornament	Ornamental items such as plants, flowers, skins, shells, rocks, sands and gravels
Water	Water for domestic, agricultural and industrial use
Regulation of our environment	
Air quality	Contribution to air quality, for example by filtering airborne pollutants
Global climate	Capture, storage and release of carbon
Regional climate	Influence on regional climate – temp, wind, rainfall
Local climate	Influence on micro-climate, for example through shelter
Flood regulation	Influence on patterns of flooding and hazards to life, property and businesses
Erosion regulation	Influence of land use on patterns of erosion by water or wind
Soils	Influence of land uses on current or potential soil quality
	Influence on water quality, for example in terms of the origin and amelioration chemicals

# Communicating benefits and value



# Carse of Stirling

Lessons learned:

People understand the need to make the most of natural assets and the tensions/ trade-offs that this involves







Thank you