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A CO-ORDINATED AGENDA FOR  
MARINE, ENVIRONMENT & RURAL AFFAIRS SCIENCE

## EVIDENCE STRATEGY for RURAL AFFAIRS and the TERRESTRIAL ENVIRONMENT



natural  
scotland  
SCOTTISH GOVERNMENT

# **EVIDENCE STRATEGY for RURAL AFFAIRS and the TERRESTRIAL ENVIRONMENT**

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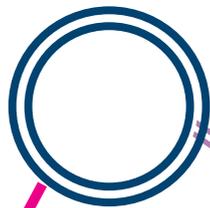
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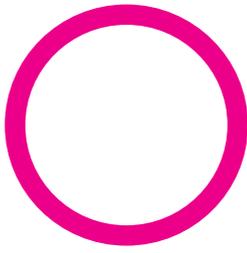
Photographs supplied by Marine Scotland Science, Scottish Environment Protection Agency, Scottish National Heritage, James Hutton Institute and Forestry Commission Scotland



# Vision

Over 2014-2019, CAMERAS will support the Scottish Government priorities through coordinating the production and delivery of evidence from multiple providers in targeted areas within rural affairs and the terrestrial environment.





# Introduction

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The Co-ordinated Agenda for Marine, Environment and Rural Affairs Science (CAMERAS) is a partnership<sup>1</sup> established to ensure that Scotland's marine environment and rural science supports the delivery of the Scottish Government's purpose and priorities.

The Scottish Government's purpose is to focus government and public services towards creating a more successful country, with opportunities for all of Scotland to flourish, through increasing sustainable economic growth.

The Government Economic Strategy (GES) describes how it will deliver this purpose and sets out a number of priorities and opportunities relevant to this evidence strategy, including:

- ◉ Transition to a low carbon economy
- ◉ Key growth sectors in Food and Drink, Energy and Sustainable Tourism
- ◉ Maximising the social and economic opportunities offered by Scotland's rich and diverse natural environment
- ◉ A focus on Place that emphasises the role of communities and recognises the unique features of different parts of Scotland

Effective Government is vital for the delivery of the Scottish Government's Purpose, with the public sector having a leadership role in optimising the use of resources, improving cooperation and aligning their activities to achieve the outcomes desired for the people of Scotland. CAMERAS aims to align and coordinate the scientific activity of partner organisations to make best use of resource and enhance support to Scottish Government policy development and delivery. To deliver this aim, CAMERAS partners have set out their high-level priorities and objectives in the Scottish Marine Science Strategy (2010-15), the Focus on Freshwater Science (2011) and the Scottish Environmental Monitoring Strategy (2011).

## Aims

This CAMERAS Evidence Strategy for Rural Affairs and the Terrestrial Environment (2014-2019) is being developed within the context of increasing constraints on public sector resources. The strategy aims to make best use of resources through:

- ◉ strengthening collaboration and co-ordination between CAMERAS partners in rural affairs and the terrestrial environment
- ◉ improving the delivery of an integrated evidence base to users.

<sup>1</sup> CAMERAS partners include the Scottish Government (Marine Scotland Science, Rural and Environment Science and Analytical Services, Science and Advice for Scottish Agriculture, Forestry Commission Scotland), Scottish Environment Protection Agency, Scottish Natural Heritage, Food Standards Agency Scotland, Scottish Water.

## Scope

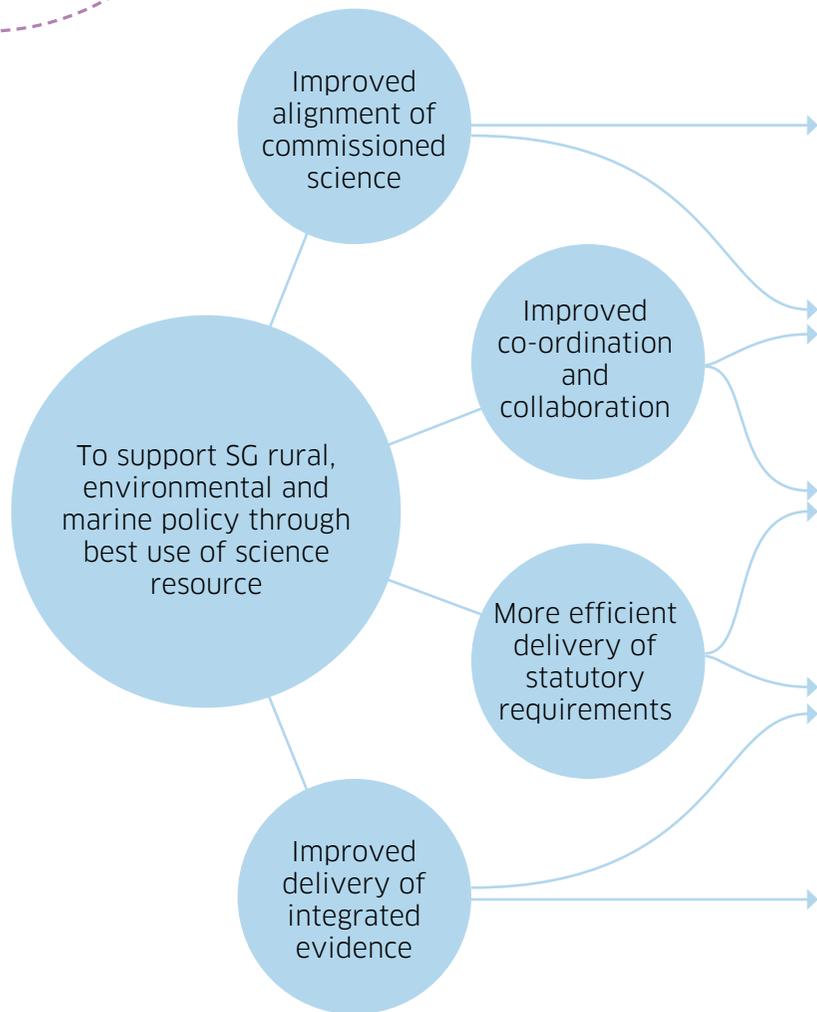
**Evidence:** Is defined here as reliable and robust information that can be used to inform sound decisions in developing and implementing policy. This includes economics, statistics, natural scientific information, social research, analysis, advice, monitoring and surveillance.

**The time-frame:** This strategy aims to improve the delivery of integrated evidence to support policy makers over five years from 2014 to 2019. Implementation will be through development and delivery of evidence plans lasting 6-24 months which will focus on the current evidence needs of users. There will be a rolling programme of evidence plans over the five years, allowing new priorities to be addressed as they emerge.

**The context:** The four CAMERAS strategies are complementary in their focus and approach (see diagram). This strategy complements the Marine and Freshwater Strategies through its focus on rural affairs and the terrestrial environment. The evidence plans and outputs that flow from this strategy will draw on information from a range of sources, including that produced under the CAMERAS Environmental Monitoring Strategy and that provided by RESAS through in-house and commissioned research and analysis. Implementation of this strategy will take account of the actions being taken to deliver the other CAMERAS strategies and will seek to identify areas of potential overlap and synergy.



## Contribution to CAMERAS Objectives from this Evidence Strategy and other CAMERAS Strategies



Setting out  
**High-level Priorities**

Identifying  
**Areas of Common Interest**

Targeting  
**Areas for Joint Working**

Developing  
Mechanisms **for Joint Working**  
and **Data Sharing**

Co-ordinating  
**Knowledge Exchange**



Focus on  
Freshwater  
Science



Scottish  
Marine Science  
Strategy



Scottish  
Environmental  
Monitoring  
Strategy

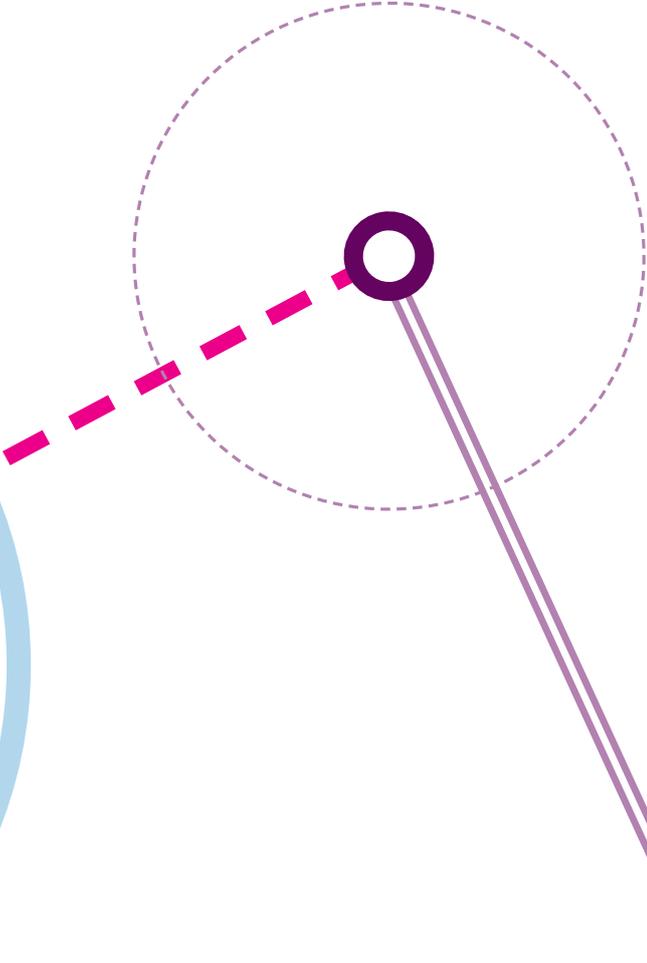


Evidence  
strategy for  
Rural Affairs  
and the  
Terrestrial  
Environment

This strategy seeks to identify evidence needs relevant to multiple CAMERAS partners. It does not seek to be an exhaustive identification of all the priorities of individual organisations, nor does it seek to replace their statutory evidence requirements. Evidence needs that are essential for the delivery of individual partners' operational work will continue to be a core part of their business.

The development of evidence plans in priority areas is likely to identify longer-term research needs. Whilst such research will not be commissioned through this strategy, the needs identified are expected to inform partners' longer-term research plans, including the RESAS Research Strategy for 2016-21.

**Other evidence users and providers:** CAMERAS partners have developed this strategy with Scottish Government policy makers and a number of other users and providers of relevant evidence. There are many organisations in addition to CAMERAS partners, who are important users and providers of relevant evidence and it is essential that these are engaged, as appropriate, in evidence planning.



# High-level Objectives

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The high level objectives for this Evidence Strategy identify the benefits sought for stakeholders involved in the use and provision of evidence on rural affairs and the terrestrial environment in Scotland. This strategy:

1. Identifies CAMERAS partners' shared understanding of the major evidence needs and related drivers for rural affairs and the terrestrial environment that will inform the science plans of CAMERAS partners and other important evidence providers.
2. Will improve access to and co-ordination of evidence for evidence users in targeted areas by:
  - a. Developing a rolling programme of evidence plans that will specify evidence needs and delivery times, identify evidence sources within and outwith CAMERAS, agree where joint working is required and how it will be achieved and identify gaps in evidence provision.
  - b. Delivering the evidence plans through joint and individual working by partners, sharing of expertise, integration of evidence from different sources, addressing gaps in evidence provision and facilitating effective communication between evidence users and providers.
  - c. Developing a mechanism to facilitate joint funding of work by multiple partners where this will assist delivery.
3. Will deliver better value from resources in targeted areas through increased understanding of evidence users' needs, improved joint working and reduced duplication.
4. Will improve knowledge exchange between evidence users and providers in targeted areas by providing a mechanism for communication and developing knowledge exchange skills in CAMERAS partners and other staff engaged in evidence planning.
5. Will develop a pathway that can be used to respond rapidly to unexpected or urgent evidence needs that involve multiple CAMERAS partners.



# Outcomes

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This Strategy aims to help CAMERAS partners deliver the Scottish Government's single purpose and Strategic Objectives. The effective use and delivery of evidence within and across the five themes identified below will contribute to these objectives through four cross-cutting outcomes sought from this Strategy.

**Increased resilience and sustainability** of the natural terrestrial environment, of rural communities, and of the rural economy, through enhancing the environment, reducing existing and intergenerational inequality, reducing greenhouse gas emissions, facilitating adaptation to climate change and minimising threats from other external changes. This outcome will support the development of a Greener and a Fairer Scotland.

**Improved health and well-being** of individuals and communities through reducing diet-related ill-health, increasing the benefits to health derived from the environment, reducing the impacts of extreme events and strengthening communities. This outcome will support the development of a Healthier Scotland.

**Increased innovation and economic growth** that will contribute to the Scottish Government's Purpose, through contributions from developments and discoveries to industry and the economy. This outcome will support the development of a Wealthier Scotland.

**More effective interventions** that will contribute to the Scottish Government's Strategic Priority of Effective government, through co-ordinated improvements to the evidence base for policy development, implementation and evaluation. This outcome will help support all the strategic objectives identified above.



# Evidence Needs in Rural Affairs and the Terrestrial Environment

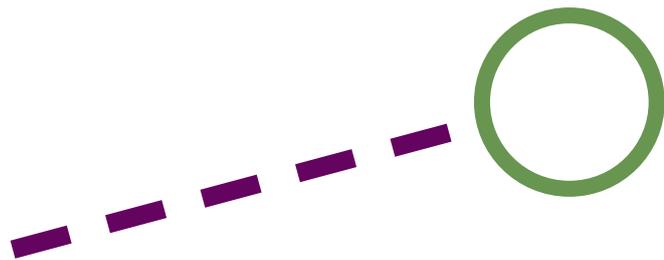
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The evidence needs set out in this strategy were developed through consultation with CAMERAS partners, Scottish Government policy teams and with additional input from a number of other evidence users and providers.

## Drivers of evidence need

The need for evidence to support the Scottish Government's priorities in rural affairs and the environment is driven indirectly by some major external factors. These include climate change, demographic change, technological developments and globalisation, with associated threats and opportunities arising from extreme weather events, price shocks, migration, the need to address global food security and risks from disease outbreaks.

More direct drivers of evidence needs arise from EU, UK and Scottish policies, legislation and targets that seek to address these changes and other Scottish Government priorities. The major indirect and direct drivers of the evidence needs identified in this strategy are summarised in Annex A.



## Evidence needs – five themes

The major evidence needs identified for rural affairs and the terrestrial environment that are relevant to multiple CAMERAS partners have been brought together under five themes. Further detail of the evidence needs under each theme and the outcomes towards which they are directed is provided in Annex A.

### 1. Optimising land use

Scotland's Land Use strategy sets out a long-term vision for integrated land management. Scotland's land contributes critically to the economy, the environment, our sense of Place and community and to our quality of life. This theme is strongly connected to the other four themes in this strategy with evidence needs directed towards supporting integrated, systems-based approaches that contribute to delivery of the Land Use Strategy. Evidence co-ordination important to this theme is also being developed under the **Scottish Environmental Monitoring Strategy**.

### 2. Managing natural resources for multiple benefits

Natural resources include water, soils, biodiversity and the ecosystems of which they are an integral part. Evidence needs are driven by global and local threats to natural resources and by the global, EU and national policy instruments developed to address them.

Evidence is needed to support approaches for sustainable management of natural resources, ensuring their resilience to climate change and other external events and maximising their potential for contributing to the economy and to the health and well-being of the Scottish population. Evidence important to this theme is also being developed under the **Focus on Freshwater Science**, the **Scottish Environmental Monitoring Strategy**, and the **Scottish Marine Science Strategy**.

### 3. Building a low carbon future

The transition to a Low Carbon Economy is a Strategic Priority for the Scottish Government, both as a contribution to environmental sustainability and in order to benefit from the opportunities provided by Scotland's natural resources and expertise. Evidence needs are directed towards supporting the achievement of Scotland's emissions targets (including reducing GHG emissions from agriculture and other rural activities), reducing the carbon footprint of our energy system, increasing resource efficiency and developing a circular economy. It will be essential to make connections to work being delivered under the **Focus on Freshwater Science** and the **Scottish Marine Science Strategy**.

### 4. Making the most of agriculture, food and drink

The food, drink and agriculture industries make a critical contribution to Scotland's economy, landscape and rural communities. Evidence needs in this theme are directed towards increasing the environmental, economic and social sustainability and resilience of these industries and ensuring their continued contribution to the economy and to global food security. Food and drink are important to individual well-being and health, while diet-related ill-health is a major contributor to morbidity and mortality in Scotland. Additional evidence needs in this theme are directed towards reducing inequalities in diet-related ill-health. There are strong connections between evidence needs in this theme and those in Optimising Land Use, Managing Resources for Multiple Benefits and Building a Low Carbon Future.

## 5. Strengthening communities

Building resilient adaptable communities is central to the achievement of sustainable economic growth. This theme is strongly connected to the other themes, with natural resources, the food, drink and land-based industries underpinning the sustainability of rural communities. The main focus of this strategy is on rural areas, with evidence needs being directed towards developing empowered, resilient communities that contribute to individual well-being. An additional important strand is making connections between urban and rural areas. Evidence being developed under the **Scottish Marine Science Strategy** is critical for many remote rural communities and for this theme.

## Making connections

Policy approaches are increasingly holistic and system based, requiring the consideration of synergies and trade-offs between multiple desired outcomes. Evidence needs also cross theme boundaries and the partnership working driven by this strategy offers significant potential for breaking down these boundaries and developing more effective approaches to evidence delivery. The first theme, Optimising Land Use, is identified above as a key connecting theme and other connections are emphasised elsewhere. The need for evidence that will help mitigate and adapt to climate change features within all themes. A key feature of developing effective evidence plans will be the need to cross theme boundaries and to engage partners and use evidence sources from outside CAMERAS.

Figure 1 illustrates how the Evidence Plans aim to facilitate evidence delivery and the outcomes shown.

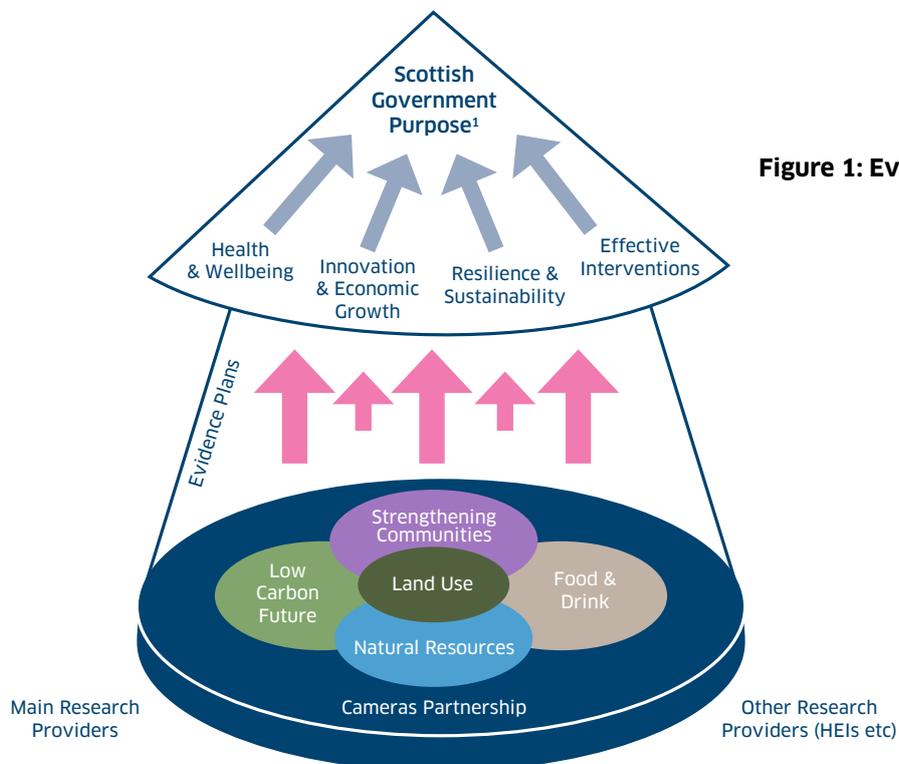
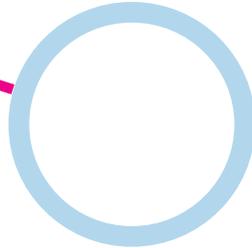


Figure 1: Evidence Plans

<sup>1</sup> The Scottish Government's purpose is to focus government and public services towards creating a more successful country, with opportunities for all of Scotland to flourish, through increasing sustainable economic growth.



## Implementation

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Implementation will be through the development of evidence plans in targeted areas. **The evidence plans** will facilitate joint working between CAMERAS partners and co-ordination with other evidence users and providers. The plans will not cover the full spectrum of evidence needs under the five themes or of any one theme, but will focus on **specific areas** where **joint working** is likely to give the greatest benefits to evidence user and providers. These benefits will include:

- ◉ For evidence users - benefits from the timely production of integrated, multidisciplinary evidence from multiple sources, a clear route for communication with multiple evidence providers and a mechanism that can be used to respond to new or urgent evidence needs that cross CAMERAS partners.
- ◉ For evidence providers - benefits from sharing expertise, improved co-ordination, better connections to evidence users, increased impact and resource saving where duplication of effort is reduced. Identification of evidence gaps will also assist CAMERAS partners in directing resources and identifying future research priorities.
- ◉ For evidence users and providers - benefits from increased numbers of people with knowledge exchange skills who are able to bridge the gap between research and policy.

A rolling programme of evidence plan development is proposed. Eight evidence plans have been prioritised for initial development following consultation with CAMERAS partners, Scottish Government policy makers and other key evidence providers and users. The timescale for delivery will be set out in each plan, but is expected to be 6-24 months. Extension of existing plans will depend on a review of need.

## Initial evidence plan priorities

Priorities were selected by CAMERAS partners and Scottish Government policy makers with input from other evidence providers.

Integrated Land Use
Sustainable food and drink
Impacts of climate change and globalisation on plant health
Catchment Management for water resources
Ecosystem resilience to climate change
Strengthening Communities
Biodiversity*
Natural Capital*
Circular Economy**

\*These two areas of work on evidence needs are being developed by groups set up to deliver the 2020 Challenge for Scotland's Biodiversity and will be linked to this CAMERAS strategy.

\*\*Zero Waste Policy and Zero Waste Scotland are leading an Evidence and Engagement Team on the Circular Economy to co-ordinate the delivery of evidence to support policy.



## Oversight and co-ordination

A Co-ordination Group will be set up to co-ordinate and monitor the development and delivery of the evidence plans and report on progress to the CAMERAS Board. The Co-ordination Group will include a lead from each evidence plan. This group will also facilitate links between the plans, act as a forum for sharing learning and regularly evaluate the priorities for evidence plans, taking into account emerging opportunities.

## The evidence plans

Each evidence plan will initially cover a 6-24 month period, as appropriate to the area. Development of the plan will be the first stage of work and will specify:

- ◉ What evidence is needed, as agreed between users and providers.
- ◉ When specific evidence needs are required and will be delivered.
- ◉ Who will provide what evidence – within CAMERAS and from other sources?
- ◉ How it will be brought together – is additional analysis/synthesis needed?
- ◉ Where the gaps are – and how they might be filled?

Delivery of the evidence needs will continue over the life of the plan, alongside regular review of the plan with policy customers.

## Who will be involved?

Leadership for each evidence plan will be provided by one or two CAMERAS partners, with named individuals responsible for ensuring the plan is developed and that delivery is co-ordinated and reviewed. The evidence plan area should be critical for the lead partners and for the roles of the named individuals.

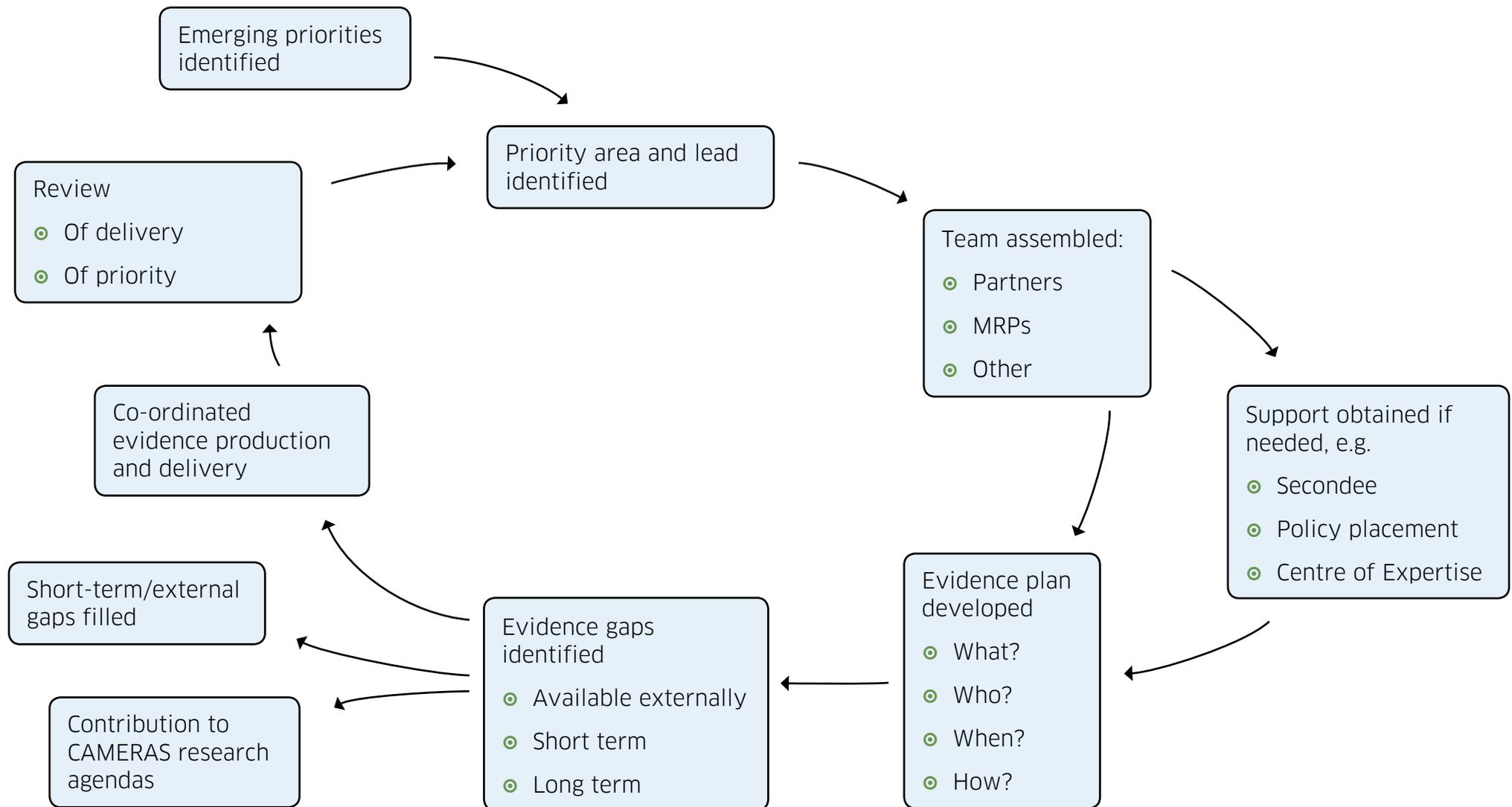
A small team will be formed to develop and deliver the plan. Team members will vary depending on the evidence plan areas and will include:

- ◉ Named individual(s) from the partners involved in the evidence plan area
- ◉ Named organisational contributors from other important evidence providers and users, including industry and other non-governmental end users where appropriate.

Additional support – a number of mechanisms for providing additional dedicated resource to support evidence planning are anticipated. These include secondments, policy placements, short-term appointments, use of existing Centres of Expertise and specific funds contributed by partners for filling key needs for analysis or synthesis that are identified through evidence planning.

## Developing and delivering the evidence plans

A model for the evidence planning process is outlined below. Flexibility and variation is anticipated in the development and delivery of evidence plans in different areas.



# Review and Indicators of Success

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The CAMERAS Board will oversee progress with implementation of the strategy across the evidence plans and will decide on when the strategy requires review.

Indicators of success will include:

- ◉ Views of evidence users – has the delivery of evidence in the targeted areas improved?
- ◉ Views of evidence providers – has communication, joint working and resource efficiency in the targeted areas improved?
- ◉ Specific indicators of success agreed for individual evidence plans.
- ◉ Meeting specific milestones including creation of the target number of evidence plans within the timescales agreed. Additional milestones will be agreed for individual evidence plans.

## Tables of Evidence Needs

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Annex A provides more detail of the areas of evidence need relevant to multiple partners under the five themes (Tables 1-5). The links to the four outcomes this strategy is seeking to support are identified in the left-hand column. The most important direct and indirect drivers of evidence needs are shown for each theme above the tables.

Major evidence users and providers are shown for each area of evidence need. Those shown in Annex A are restricted to CAMERAS partner organisations and other Scottish Government-supported initiatives and organisations. Additional evidence providers and users are expected to be identified and involved during development of evidence plans.

While implementation of this strategy will not involve every area of evidence need identified in the tables, CAMERAS partners can use the information collated here to inform their future science plans and to identify other partners interested in the same areas of work who may be potential collaborators or users of science outputs.



**TABLE 1. OPTIMISING LAND USE**

**Examples of major external drivers of evidence needs**

Globalisation / Technological advances / Population growth / Climate change Biodiversity loss / Increasing pressure on land / Higher and volatile energy prices / Carbon targets

**Examples of major global, EU, UK and Scottish policy interventions driving evidence needs**

EU Common Agricultural Policy	EU Plant Health regime	Land Reform (Scotland) Act 2003	Scottish Forestry Strategy 2006
European Landscape Convention	Landfill Tax	Scottish Adaptation Programme (2013-17)	Land Use Strategy for Scotland (2011)
EU Directive (2011) on Regulation of Plant Protection Products	UK Greenhouse Gas Inventory	Scottish implementation of Common Agricultural Policy	Scottish Soils Framework
EU Animal Welfare Strategy	UK Tree Health Strategy and Biosecurity action plan	Scottish animal health and welfare policy	2020 Challenge for Scotland’s Biodiversity
EU Animal Health Regulation (forthcoming)	Climate Change (Scotland) Act 2009		

Outcomes	Areas of Evidence Need	Providers*	Users*
<p>Sustainable land use that is contributing to the Scottish Economy</p> <p>Scotland as a leader in <b>innovative</b> and integrated land use management</p>	<p>Understanding of the relative (monetary and non-monetary) values of different land uses and outputs from land in Scotland, including landforms, bio- and geodiversity.</p> <p>Development of innovative and integrated systems based approaches to address land use management challenges in rural and urban areas.</p>	<p>JHI SG-RESAS SRUC SNH SEPA FR</p>	<p>SG-RESAS SG-EQD SG-LUB SG-NHM FCS SNH SEPA</p>
<p><b>Sustainable</b> land use that is informed by ecosystem function, <b>resilient</b> to multiple pressures, and managed for multiple benefits</p>	<p>Understanding how drivers acting at different scales (e.g. climate change, demographics, incentives, demand for and impacts of renewable energy) influence land use change and the implications for managing land use to deliver multiple benefits.</p> <p>Understanding of the implications of land use change and management practices on:</p> <ul style="list-style-type: none"> <li>◉ Levels, sources and sinks of pollution/contamination</li> <li>◉ GHG emissions</li> <li>◉ Energy supply</li> <li>◉ Biodiversity, ecosystems and geodiversity</li> <li>◉ Farming and food production</li> <li>◉ Human pathogens and food safety</li> <li>◉ Resilience to flooding and other natural hazards</li> <li>◉ Tourism, amenity land use and landscape</li> </ul> <p>Understanding the drivers influencing land use decision making, attitudes to change and identifying mechanisms to influence these behaviours at appropriate scales.</p>	<p>JHI SASA SG-RESAS SRUC SNH SEPA FR RBGE MRI</p>	<p>SG-RESAS SG-LUB SG-NHM FCS SNH SEPA FSAS SASA</p>

## Annex A – Tables of Evidence Needs

Outcomes	Areas of Evidence Need (Optimising Land use cont.)	Providers*	Users*
<p><b>Sustainable</b> land use that is informed by ecosystem function, <b>resilient</b> to multiple pressures, and managed for multiple benefits (cont.)</p>	<p>Evidence to support land managers, including:</p> <ul style="list-style-type: none"> <li>⦿ practical biodiversity, conservation and ecosystems management measures</li> <li>⦿ identification of sites for and benefits of woodland expansion, agroforestry, flood management and sustainable intensification</li> <li>⦿ use of an ecosystems approach in decision making</li> </ul> <p>Models, tools, data and improved approaches to generate accurate and where appropriate spatial data, for use in analysing various land use change questions.</p>	As above	As above
<p>The land of Scotland contributing to our sense of place, overall <b>health</b> and <b>quality of life</b>.</p>	<p>Understanding the relationships between patterns of land/property ownership, landscape, community structure, well-being, poverty and sustainability.</p>	SG-RESAS JHI SRUC SG-RU SNH	SG-RESAS SG-LTR SG-RU SG-LUB FCS SEPA SNH
<p><b>Effective interventions</b></p>	<p>Evidence to enable an integrated assessment of the impact and influence of previous interventions (CAP, Planning policy, Advisory Services, green stewardship, green infrastructure, biodiversity strategy and duty).</p> <p>Predictions of the impact of policy/strategy reform and evidence to support the implementation of new approaches, including incentives that can encourage land managers to deliver a range of desired benefits.</p> <p>Understanding of the relationship and interactions between related land use interventions and desired outcomes.</p>	JHI SG-RESAS SRUC SNH FR SEPA	SG-ARD SG-RESAS SG-LUB SG-NHM SEPA SNH FCS FSAS

\*Abbreviations listed on p26

## Annex A – Tables of Evidence Needs

### TABLE 2. MANAGING NATURAL RESOURCES FOR MULTIPLE BENEFITS

#### Examples of major external drivers of evidence needs

Globalisation / Technological advances / Population growth / Climate change / Increasing demand for water / Higher and volatile energy prices / Biodiversity loss

#### Examples of major global, EU, UK and Scottish policy interventions driving evidence needs

Stockholm Convention on persistent organic pollutants	EU 2020 Biodiversity Strategy EU Ambient Air Quality Directive (2008)	Air Quality Strategic Framework 2020 Challenge for Scotland's Biodiversity Biodiversity Duty 2004	Land Use Strategy Nature Conservation (Scotland) Act 2004
EU Common Agricultural and Fisheries Policies	GB Habitats Regulations GB Invasive Non-Native Species Strategy (2008)	Wildlife and Natural Environment Scotland Act	Scotland's Sustainable Development Strategy
EU Water Framework Directive	Air Quality Standards (Scotland) Regulations 2010	Water Resource (Scotland) Act 2013 River Basin Management Plans	Scotland's Zero Waste Plan Pollution Prevention and Control (Scot.) Regulations 2012
EU Birds and Habitats Directives, Natura 2000			

Outcomes	Areas of Evidence Need	Providers*	Users*
<p>Realise the full potential of Scottish natural resources to contribute to Scotland's sustainable <b>economic growth</b>.</p> <p>Scotland as a leader in <b>innovative</b> environmental approaches and technologies.</p>	<p>Development of innovative approaches, tools, techniques and technologies for:</p> <ul style="list-style-type: none"> <li>◉ Waste reduction</li> <li>◉ Water technologies</li> <li>◉ Water use efficiency</li> <li>◉ Influencing consumer behaviour</li> <li>◉ Biodiversity and ecosystem management</li> </ul> <p>Development of new techniques and approaches to assess the economic and societal value of natural resources and incorporate these values into decision making.</p>	<p>FR JHI MSS SEPA SG-RESAS SNH SRUC SW CREW DWQR RINH ZWS</p>	<p>FCS MSS SEPA SG-EQD SG-NATRES SG-RESAS SNH SW ZWS DWQR SG-CLIM SG-PAD SG-PHD</p>
<p><b>Sustainable</b> Scottish ecosystems that are <b>resilient</b> to changing pressures and threats.</p>	<p>Collection and analysis of environmental monitoring data for a range of variables in the air, soil, on land and at sea, and development of indicators and proxies for ecosystem health and biodiversity.</p> <p>Understanding the structure, function and services of Scottish terrestrial, freshwater and coastal ecosystems, how the natural environment is changing in relation to various pressures, identifying possible management approaches and developing an appreciation of their wider ecological importance.</p> <p>Understanding the status and trends in Scotland's non-renewable resources that affect land-use and contribute to the Scottish economy (e.g. metalliferous minerals, sand, gravel, limestone etc).</p> <p>Understanding the impacts of climate and other environmental change, including the changing risk to Scottish biodiversity from invasive species, pests and diseases, the ability of various ecosystems to adapt and identification of possible management approaches.</p> <p>Evidence to support the application of an ecosystems approach in Scotland.</p> <p>Monitoring and analysis of risks, presence and impact of invasive non-native species, pests and diseases on non-agricultural plant and animal species (including trees), understanding of potential risk to agricultural species, development of possible approaches to their control.</p>	<p>CREW CXC FR JHI MSS SASA SEPA SG-RESAS SNH SRUC SW RBGE</p>	<p>DWQR FCS MSS SASA SEPA SG-EQD SG-NATRES SG-RESAS SNH SW QMS SG-AHW</p>

## Annex A – Tables of Evidence Needs

Outcomes	Areas of Evidence Need (Managing Natural Resources cont.)	Providers*	Users*
<p><b>Sustainable</b> Scottish ecosystems that are <b>resilient</b> to changing pressures and threats (cont.)</p>	<p>Understanding of the factors (including agricultural and other land use practices) that influence water quality, nutrient flows, sediment, catchment morphology and developing/ providing monitoring and integrated management solutions at appropriate scales. Data on water flows and their spatial variation, minimum flow requirements for effective functioning of water infrastructure.</p> <p>Evidence to evaluate the quality of Scottish soils, their resilience to changing pressures and practices and the impact of poor soil quality on the services they provide.</p> <p>Understanding of the drivers that influence public behaviours that result in environmental improvements.</p>	<p>Cont. as above</p>	<p>Cont. as above</p>
<p>Sustainable Scottish ecosystems and natural resources that are contributing to the <b>health</b> and <b>well-being</b> of the Scottish population</p>	<p>Understanding the impact of, and relationship between, access to ‘blue/ green’ amenities, biodiversity and human health.</p> <p>Understanding which land use practices negatively impact on human health and the mechanisms involved.</p> <p>Assessment of extent and impact of antisocial and illegal activities, understanding of drivers of relevant behaviours and approaches to change.</p>	<p>SEPA SNH JHI FR SRUC RBGE</p>	<p>FCS SEPA SG-LUB SNH SG-PHD SW</p>
<p><b>Effective interventions</b></p>	<p>Assessment of the effectiveness of Scottish public body biodiversity protection measures in support of the Scottish Biodiversity strategy through:</p> <ul style="list-style-type: none"> <li>◉ The impact of CAP, WFD and Forestry policy measures</li> <li>◉ Ecological status of protected species and habitats</li> <li>◉ Biodiversity and ecosystem health indicators</li> </ul> <p>Evidence to help implement and to evaluate the impact and cost effectiveness of policy interventions including:</p> <ul style="list-style-type: none"> <li>◉ Water Framework Directive</li> <li>◉ River basin management plans</li> <li>◉ Water environment restoration</li> <li>◉ Water leakage targets</li> <li>◉ Pollution Control, Waste reduction and Environmental policies</li> </ul> <p>Evidence to support the co-ordination of linked policies (e.g. flooding and other water management policies).</p> <p>Scenarios for the future that consider climate change and other risks, approaches to include risk assessment in decision making and policy implementation.</p>	<p>CREW FR JHI MSS SASA SEPA SG-RESAS SNH SRUC SW CXC RBGE</p>	<p>FCS MSS SEPA SG-ARD SG-EQD SG-NATRES SG-RESAS SNH SW ZWS QMS SASA SG-AHWD</p>

**TABLE 3. BUILDING A LOW CARBON FUTURE**

Examples of major external drivers of evidence needs

Technological advances / Population growth / Climate change / Declining fossil fuel resources / Carbon targets / Higher and volatile energy prices

Examples of major global, EU, UK and Scottish policy interventions driving evidence needs

UN Framework Convention on Climate Change (1992) Kyoto Protocol (1997)	EU Floods Directive (2007) EU Water Framework Directive UK Energy Efficiency Strategy	Climate Change (Scotland) Act 2009 Scottish Climate Change Adaptation Programme (2013-17)	Flood Risk Management (Scotland) Act (2009) 2020 Route map for
EU Monitoring Mechanism decision and EU Emissions Trading Scheme EU Waste Framework Directive	Climate Change Act 2008 UK Greenhouse Gas Inventory Landfill Tax	Low Carbon Behaviours – a Framework for the Future 2020 Challenge for Scotland’s Biodiversity	Renewables in Scotland Renewable Heat Plan Scotland’s Zero Waste Plan (2010) Waste (Scotland) Regulations 2012

Outcomes	Areas of Evidence Need	Providers*	Users*
Low carbon <b>innovations and opportunities</b> that give rise to more sustainable <b>economic growth</b>	<p>Development and evaluation of options for supporting low carbon innovation.</p> <p>Development and evaluation of innovative and cost effective approaches/options for:</p> <ul style="list-style-type: none"> <li>⦿ Waste re-use</li> <li>⦿ Decarbonising transport, heat and energy production</li> <li>⦿ Low carbon business practices</li> <li>⦿ Low carbon infrastructure development</li> <li>⦿ Carbon capture and storage</li> <li>⦿ Exploiting unconventional energy sources</li> </ul>	<p>CREW CXC SEPA SG-RESAS ZWS FR FSAS MSS  SG-LCEER</p>	<p>SEPA SG-EQD SG-RPFCS  FSAS MS SG-LCEER SG-RESAS</p>
Progress towards a more <b>sustainable</b> , resource efficient, circular economy that is <b>resilient</b> to environmental pressures including climate change	<p>Understanding public attitudes and behaviours to moving towards a low carbon lifestyle.</p> <p>Evidence to support options and approaches that will improve energy security, help meet emissions targets and reduce the carbon footprint and environmental impact of the energy and agricultural sectors, including;</p> <ul style="list-style-type: none"> <li>⦿ increasing the contribution of renewables</li> <li>⦿ carbon capture and storage</li> <li>⦿ risks and benefits of unconventional gas</li> <li>⦿ reduction of agricultural losses through disease and waste</li> </ul> <p>Evidence to support transition to a circular economy, including understanding resource flows, developing integrated approaches for waste reduction and recovery, resource efficiency and recycling, new circular business models, e.g. extended producer responsibility, design for circularity.</p>	<p>CREW CXC SEPA SG-OCEA SNH ZWS FR JHI MRI MSS RINH SG-LCB SG-RESAS SRUC</p>	<p>SEPA SNH SG-EQD SG-LCB SG-RP ZWS FCS FSAS MS SG-FDARC SG-LCEER SG-RESAS</p>

## Annex A – Tables of Evidence Needs

Outcomes	Areas of Evidence Need (Low carbon future cont.)	Providers*	Users*
<b>Effective interventions</b>	<p>Evidence for, and analysis of, policy interventions for trade-offs and synergies between economic growth, fossil fuel use and GHG emissions, including improved estimates of GHG emission factors.</p> <p>Evidence for and analysis of trade-offs and synergies in environmental management interventions for carbon management and for biodiversity conservation objectives (e.g. in peatland systems).</p> <p>Development of effective approaches to influence behaviours and encourage transition to lower carbon lifestyles.</p> <p>Evidence to measure policy delivery against targets and to inform targets, e.g. for waste reduction, GHG emissions.</p> <p>Evidence to evaluate the effectiveness and/or distributional impacts of:</p> <ul style="list-style-type: none"> <li>⦿ Waste reduction policy</li> <li>⦿ Climate change policies</li> <li>⦿ Heat mapping</li> <li>⦿ Scottish Sustainable Communities initiative</li> </ul> <p>Development of climate change scenarios and approaches for their use in policy development and managing uncertainty.</p>	CXC SNH SEPA SG-OCEA ZWS JHI MS SG-RP SRUC	SEPA SNH SG-CLIM SG-OCEA SG-RP ZWS MSS SG-LCEER

\*Abbreviations listed on p26

## Annex A – Tables of Evidence Needs

### TABLE 4. MAKING THE MOST OF AGRICULTURE, FOOD AND DRINK

#### Examples of major external drivers of evidence needs

Global trade / Technological advances / Population growth / Climate change / Changing demands for food / Higher & volatile energy prices / Volatile food prices

#### Examples of major global, EU, UK and Scottish policy interventions driving evidence needs

UN Guidelines and standards on agricultural products  
UN Plant Protection Convention  
EU Common Agricultural & Fisheries Policies  
EU Directive (2011) on Regulation of Plant Protection Products.

EU Plant Health Regime  
EU Animal Welfare Strategy  
EU Animal Health Regulation (forthcoming)  
EU Veterinary Medicines Legislation  
EU White Paper on Food Safety and multiple Regulations on Food Hygiene, Food Safety, etc

UK Global Food Security Programme  
Land Use Strategy for Scotland (2011)  
Scottish Forestry Strategy and Implementation Plan  
2020 Challenge for Scotland's Biodiversity  
SG-specific Animal Health and Welfare Legislation

Scottish animal health and welfare policy  
Plant Health (Scotland) Order 2005  
Recipe for Success – Scotland's National Food and Drink Policy 2009  
Fresh Thinking – Scotland Food and Drink Strategy 2010  
Obesity Route Map 2010  
Healthy Eating, Active Living 2008

Outcomes	Areas of Evidence Need	Providers*	Users*
Profitable, productive and <b>innovative</b> agriculture, food and drink industries that contribute to Scotland's <b>economy</b>	<p>Understanding of supply chains, systems and factors affecting performance and profitability in the food, drink and farming industries.</p> <p>Approaches to managing risk from livestock, crop and food-borne disease, including improvements to surveillance and disease control and understanding and managing the influence of emerging pressures such as climate change and land use change.</p> <p>Development and implementation of innovative tools and technologies in the food, drink and farming industries, including: approaches to sustainable intensification, innovations for resource efficiency, food safety (e.g. food preservation and storage), business proficiency, low carbon production, animal and plant disease control, provenancing tools, agricultural diversification, new crops, improved livestock.</p>	JHI MRI MSS RINH SASA SG-RESAS SRUC SG-FDARC SG-AHWD FSAS	MSS QMS SASA SG-FDARC SG-RESAS SG-AHWD FSAS
Scottish agriculture, food and drink industries that are <b>resilient</b> to change and emerging pressures and threats	<p>Evidence to support resilience in the Scottish agriculture, food and drink industries, including:</p> <ul style="list-style-type: none"> <li>◉ Resilience of agriculture to climate change, extreme weather events, declining biodiversity</li> <li>◉ Understanding potential impacts of emerging pressures such as climate change on different sectors of the food and drink industry at relevant scales</li> <li>◉ Surveillance and risk management for notifiable, emerging and endemic diseases of livestock and crops</li> <li>◉ Understanding of and contingency planning for major threats to food security in Scotland, including risks of raw materials shortages</li> <li>◉ Identifying skills gaps in the food and drink industry and addressing age imbalances in farming</li> </ul>	JHI MRI MSS RINH SASA SG-RESAS SRUC FSAS QMS SG-FDARC SNH	MSS QMS SASA SG-FDARC SG-RESAS SG-AHWD FSAS SNH SG-PHD

## Annex A – Tables of Evidence Needs

Outcomes	Areas of Evidence Need (Agriculture, Food and Drink cont.)	Providers*	Users*
<p>Scottish agriculture, food and drink industries that are <b>sustainable</b> in the long term and contribute to food security</p>	<p>Definition and improved understanding of economic, social and environmental sustainability in a Scottish context.</p> <p>Understanding of relationships and trade-offs between factors affecting food security (including sustainability, resource use, waste, supply systems, accessibility of healthy diets, demand) and between food security and other desired outcomes such as profitability, productivity and animal welfare.</p> <p>Evidence to help improve the sustainability of Scottish crop and livestock systems, including approaches to sustainable intensification, to improving livestock health and welfare, to reducing the impacts of crop and livestock disease, to understanding the role of biodiversity in delivering low-input food production systems, to understanding risks to livestock from low-level pollutants, to understand risks arising from raw materials shortages.</p> <p>Evidence to improve understanding of how agricultural systems and management practices can deliver other benefits, such as biodiversity conservation (e.g. High Nature Value farming), water quality, recreation.</p>	<p>Cont. as above</p>	<p>Cont. as above</p>
<p>A <b>healthy</b> and sustainable diet accessible to all</p>	<p>Evidence to support the development of options to improve health benefits from food across all price ranges.</p> <p>Improved understanding of factors affecting food insecurity and dietary health in Scotland, including consumer behaviours.</p> <p>Evidence to reduce diet-related ill-health, including improved understanding of prevalence, causation and management of risks from the food supply chain.</p>	<p>FSAS JHI RINH SASA SG-RESAS SNH</p>	<p>SG-PHD SG-FDARC SG-RESAS FSAS QMS SASA SNH</p>
<p><b>Effective interventions</b></p>	<p>Evidence to evaluate the effectiveness, influence and impact of policy interventions including:</p> <ul style="list-style-type: none"> <li>◉ The agri-food package of EU public health legislation</li> <li>◉ CAP</li> <li>◉ Measures to reduce fat and salt in foods</li> </ul> <p>Evidence (including possible tools and incentives) to help the public sector support the agri-food industry and the delivery of multiple benefits, including sustainable use of land and natural resources, production of healthy food, sustainable rural communities.</p> <p>Evidence to support policy interventions to improve dietary health and reduce food insecurity.</p>	<p>JHI MSS RINH SASA SG-AHWD SG-RESAS SRUC FSAS SG-ARD SG-FDARC SNH</p>	<p>MSS SASA SG-AHWD SG-ARD SG-FDARC SG-RESAS FSAS SNH</p>

**TABLE 5. STRENGTHENING COMMUNITIES**

**Examples of major external drivers of evidence needs**

Globalisation / Technological advances / Population growth / Climate change / Demographic change / Inequality / Changes in rural industries

**Examples of major global, EU, UK and Scottish policy interventions driving evidence needs**

EU Floods Directive 2007	Architecture and Placemaking Policy for Scotland (2012)	Community Empowerment and Renewal Bill	Water Environment and Water Services (Scotland) Act 2003
EU Common Agricultural Policy	Scotland's Sustainable Development Strategy	Low Carbon Behaviours – Framework for the Future	Flood Risk Management (Scotland) Act 2009
EU Common Fisheries Policy	Land Reform (Scotland) Act	Tourism Scotland 2020	Reservoirs (Scotland) Act 2011
UK Welfare Reform	Regeneration Strategy	Good Places, Better Health Strategy	2020 Challenge for Scotland's Biodiversity
The Local Government in Scotland Act 2003 – Community Planning		Scotland's Obesity Route Map 2010	

<b>Outcomes</b>	<b>Areas of Evidence Need</b>	<b>Providers*</b>	<b>Users*</b>
Adaptable, <b>innovative</b> communities that contribute to and benefit from sustainable economic growth	<p>Understanding of fragile (local) economies.</p> <p>Evidence to assess relationships between innovations/new industries/local branding/ community capacity and economic performance.</p> <p>Evidence to support the development of improved and innovative infrastructure such as local energy production, broadband access, ecotowns, sustainable and reliable treatment of water and wastewater and housing resilient to flooding.</p>	<p>JHI</p> <p>SEPA</p> <p>SG-RESAS</p> <p>SRUC</p> <p>CREW</p> <p>CXC</p> <p>DWQR</p> <p>MSS</p>	<p>DWQR</p> <p>SEPA</p> <p>SG-EQD</p> <p>SG-RESAS</p> <p>MSS</p> <p>SG-PAD</p>
<p>Communities that are responsive to change and <b>resilient</b> to emerging pressures</p> <p>Effective flood risk management</p> <p><b>Sustainable</b> rural communities that are interconnected with urban areas</p>	<p>Place-based demographic, health, economic and environmental data at appropriate scales.</p> <p>Approaches to improving and assessing community resilience, evidence of impacts of community engagement and empowerment on economic and social sustainability.</p> <p>Approaches to improving flood and flood risk management, including monitoring occurrences and defences, drainage and sewer management and integration with other water policies.</p> <p>Understanding the impacts of climate change and climate change adaptation policies at community level.</p>	<p>CREW</p> <p>JHI</p> <p>SEPA</p> <p>SG-EQD</p> <p>SG-RESAS</p> <p>SRUC</p> <p>CXC</p> <p>MSS</p> <p>SG-EQD</p> <p>SG-RU</p> <p>SNH</p> <p>SW</p>	<p>SEPA</p> <p>SG-EQD</p> <p>SG-LTR</p> <p>SG-RESAS</p> <p>SG-RU</p> <p>SNH</p> <p>SW</p> <p>MSS</p> <p>SG-LUB</p> <p>SG-PAD</p> <p>SG-PHD</p>

Outcomes	Areas of Evidence Need (Strengthening Communities cont.)	Providers*	Users*
Empowered, communities that contribute to individual <b>well-being</b>	<p>Methods to measure community well-being and approaches to using well-being in financial and policy decisions.</p> <p>Evidence on delivery of public sector services in remote rural areas and how they can be improved through spreading best practice, community engagement and government intervention.</p> <p>Understanding the relationship between access to green space, people's connection with nature and physical and mental health.</p> <p>Evidence of the impacts of flooding on health and well-being.</p>	<p>JHI SEPA SG-RESAS SRUC FR SG-RU SNH</p>	<p>SG-LUB SG-RESAS SG-RU SNH FCS SEPA SG-PHD</p>
<b>Effective interventions</b>	<p>Understanding the Scottish Government's role in supporting communities to become more sustainable.</p> <p>Developing scenarios for the future of rural areas.</p> <p>Understanding the mid- and long-term impacts of policy instruments including, LEADER, CERB, patterns of land/property ownership on rural communities, identifying those that aid social, geographical mobility and economic growth at the local level.</p> <p>Evidence to evaluate the impact of policy reform (CAP, Welfare) on rural communities and the rural economy.</p> <p>Systems approaches for evaluating multiple policies, multiple outcomes and their impacts and costs.</p>	<p>JHI SG-EQD SG-RESAS SRUC MSS SEPA SG-LTR SNH SW</p>	<p>SEPA SG-EQD SG-LTR SG-RESAS SG-RU SNH MSS SG-LUB SW</p>

\*Abbreviations listed on p26

## Further information – supporting documentation

More detailed supporting documentation that was produced during the development of this strategy can be found on the CAMERAS website.

Detailed evidence needs developed at workshops (workshop report summary): <http://www.camerasscotland.org/cameras-publications>

Drivers of evidence needs (2013): <http://www.camerasscotland.org/cameras-publications>

## Abbreviations

CAP	Common Agricultural Policy
COE	Centres of Expertise
CREW	Centre of Expertise for Water
CXC	Centre of Expertise for Climate Change
DWQR	Drinking Water Quality Regulator for Scotland
EU	European Union
FCS	Forestry Commission Scotland
FR	Forest Research
JHI	James Hutton Institute
MRI	Moredun Research Institute
MSS	Marine Scotland Science
QMS	Quality Meat Scotland
RINH	Rowett Institute of Nutrition and Health (University of Aberdeen)
SASA	Science and Advice for Scottish Agriculture
SEPA	Scottish Environment Protection Agency
SG	Scottish Government
SG-AHWD	SG Animal Health and Welfare Division
SG-ARD	SG Agriculture and Rural Development
SG-CLIM	SG Climate Change and Water Industry
SG-ED	SG Electricity Division
SG-EQD	SG Environmental Quality Division
SG-FDARC	SG Food, Drink and Rural Communities Division
SG-HSR	SG Housing Services and Regeneration Division
SG-LCB	SG Low Carbon Behaviour Change (in SG-CLIM)
SG-LCEER	SG Low Carbon Efficiency and Energy Resources
SG-LTR	SG Land and Tenancy Reform
SG-LUB	SG Land Use and Biodiversity Team (in SG-NATRES)
SG-NATRES	SG Natural Resources Division
SG-NHM	SG Natural Heritage Management Team (in SG-NATRES)
SG-OCEA	SG Office of the Chief Economic Adviser
SG-PAD	SG Planning and Architecture Division
SG-PHD	SG Public Health Division
SG-RESAS	SG Rural and Environmental Science and Analytical Services
SG-RP	SG Renewables Policy Team (in SG-ED)
SG-RU	SG Regeneration Unit (in SG-HSR)
SNH	Scottish Natural Heritage
SRDP	Scotland Rural Development Programme
SRUC	Scotland's Rural College
SW	Scottish Water
ZWS	Zero Waste Scotland

# About CAMERAS

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The Co-ordinated Agenda for Marine, Environment and Rural Affairs Science (CAMERAS) is a partnership initiative between:

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Scottish Government - incorporating Marine Scotland Science, Rural and Environment Science and Analytical Services (RESAS) and Science and Advice for Scottish Agriculture (SASA)

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Scottish Environment Protection Agency (SEPA)

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Scottish Natural Heritage

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Forestry Commission Scotland

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Food Standards Agency Scotland

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Scottish Water

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Its purpose is to align and co-ordinate the scientific activity of the partner organisations to ensure best use of existing resource and enhanced support to Scottish Government policy development and delivery, primarily in the rural, environmental and marine areas.



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[www.scotland.gov.uk](http://www.scotland.gov.uk)

and on the CAMERAS website:  
[www.camerasscotland.org](http://www.camerasscotland.org)

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