

# Defra's Evidence Investment Strategy: 2010-2013 and beyond

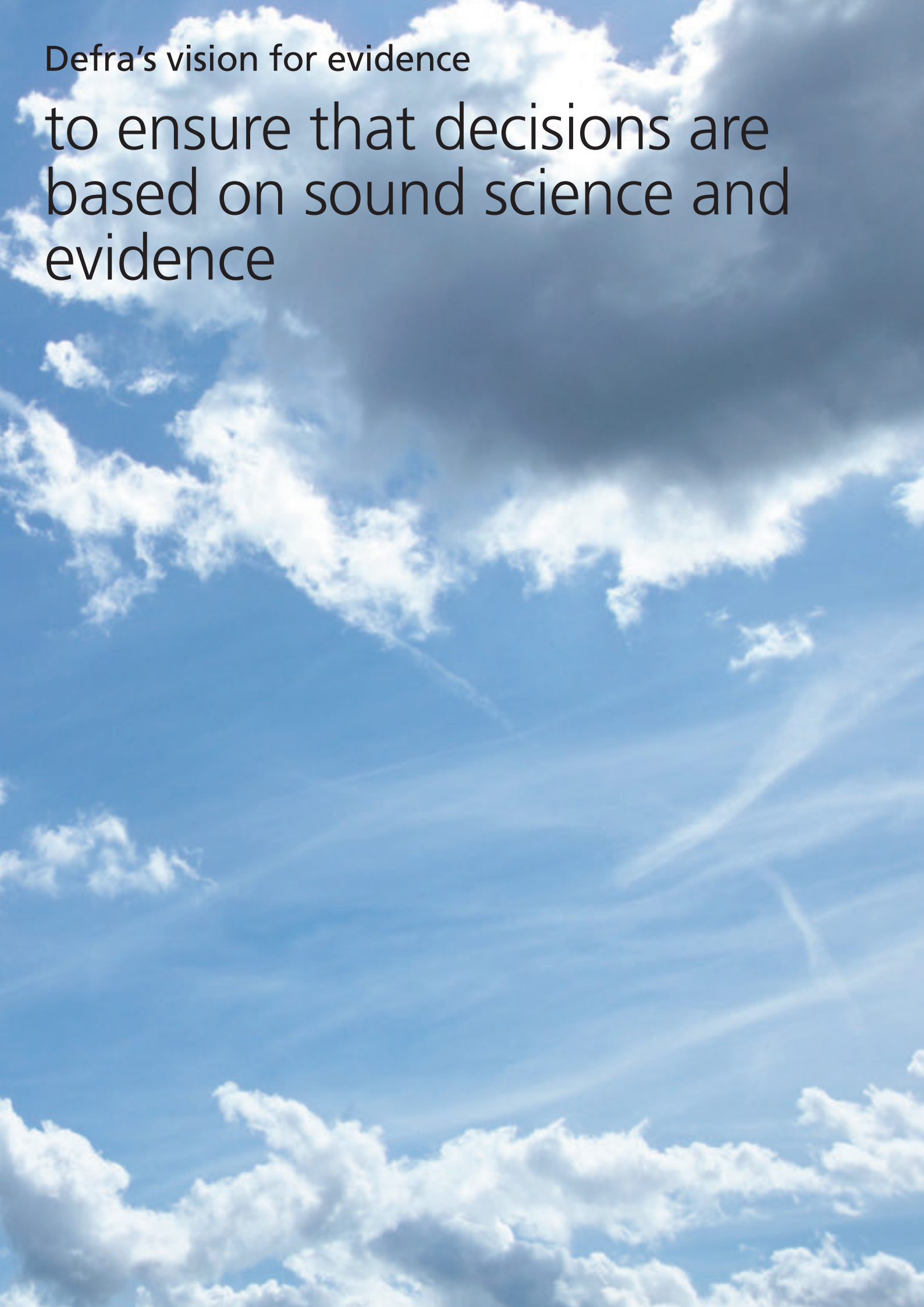
2011 Update

## Annex 2: Defra Evidence Plan Summaries



Defra's vision for evidence

to ensure that decisions are  
based on sound science and  
evidence



# Annex 2: Defra Evidence Plan Summaries

Defra's **Evidence Investment Strategy** identified a need to develop clear links between evidence activities and policy objectives. Each policy programme, ongoing function and hub with a substantial evidence base has developed an *Evidence Plan* to show this 'line of sight'. Evidence Plans are integral to business planning processes and benefits include:

- Maintaining clear links between policy objectives and evidence needs;
- Ensuring best use of others' evidence and partnership opportunities;
- Showing a clear rationale for Defra investment in evidence; and
- Helping prepare for policy evaluation.

Specific issues addressed by Defra policy programmes often require contributions from various evidence-related activities funded across the Department. Evidence Plans for each policy area incorporate these evidence-related activities. As a result, the Evidence Plan reflects the total investment in evidence supporting a particular policy programme, but does not necessarily align with the budget associated with that programme on the Defra finance system.

One page summaries of all the Evidence Plans, as of April 2011, are provided within this annex. As evidence needs and priorities evolve, Evidence Plans and summaries will be updated and made available on the Defra website. Please refer to the website to obtain the most up to date information.

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# 1. Adapting to Climate Change

## Evidence budget 2011/12

£7,802k

### Policy rationale

The climate is changing and the United Kingdom needs to adapt to changes already happened and changes in the future. The *Stern Review* set out the economic case for early adaptation and the *Climate Change Act 2008* created a duty on government to develop a national adaptation programme. The case for government intervention is information market failures and mainstreaming adaptation in existing government policy frameworks as set out in the Defra Economics Series paper *Adapting to Climate Change: Analysing the Role of Government*. The initial UK Climate Change Risk Assessment (to be laid before Parliament by January 2012) and the Adaptation Economic Analysis will further prioritise policy and evidence needs.

### Evidence needs

Evidence needs have been assessed across Defra through the process of generating the Departmental Adaptation Plan and working with Defra's Evidence Forum. Adapting to Climate Change (ACC), with Devolved Administration (DA) contributions, funds acquisition of:

*Evidence of climate risks, costs and options – ACC leads across government*

- Risks to the UK as a whole (the Climate Change Risk Assessment); costs and benefits of adaptation and policy options (the Adaptation Economic Analysis).

*Advances in fundamental climate science to improve predictions and reduce uncertainties (i.e. Hadley Centre) – ACC leads across government in partnership with DECC*

- Understanding dangerous climate change; long-term wind projections; hazardous events (especially flooding); implications of international emissions agreements; decadal forecasts with seasonal resolution; improved UK regional climate projections.

ACC also influences national and international research budgets covering these areas, e.g. through Living With Environmental Change (generating annual adaptation report cards across 6 Research Councils); the EPSRC Adaptation and Resilience to Climate Change programme (evidence on built environment climate risks); GO Science (Foresight report on international aspects of climate change); and the EU DG RTD and DG CLIMA (the Clearing-House Mechanism (CHM) – knowledge exchange platform). ACC works closely with SEG to coordinate the application of climate evidence across the department.

### Key partners

- Government departments, DAs (incl. WAG as part shared evidence budget) and statutory authorities planning adaptation.
- All Defra delivery bodies and commercial stakeholders.
- DECC (as part of the UK climate mitigation programme).

# 2. Animal Welfare

## Evidence budget 2011/12

£2,435k

### Policy rationale

Animal welfare is a public good. Ministers' commitment to improving the welfare standards of kept animals is clearly stated in the Defra Business Plan. Legislation in relation to farmed animals is set at European Union level and sound evidence is required to influence negotiations.

### Evidence needs

Animal welfare (AW) science is a relatively new discipline and there has been a large increase in research knowledge over the last 15 to 20 years. Defra has played a key role in this and has funded, and continues to fund, projects on welfare on a species/animal basis (poultry, pigs, ruminants, fish, companion animals and gamebirds), and in the cross-cutting areas of welfare at slaughter, during transport and at markets. The outcome of a recent review of Defra-funded animal welfare research can be found at [www.defra.gov.uk/foodfarm/farmanimal/welfare/onfarm/documents/110126-welfare-research-review.pdf](http://www.defra.gov.uk/foodfarm/farmanimal/welfare/onfarm/documents/110126-welfare-research-review.pdf).

Key research needs to be addressed in the coming years are:

#### Climate change

- Research is required into the impact of climate change on the welfare of animal species and breeds kept in the UK.
- Livestock emissions are a significant contributor to greenhouse gases. Links with mitigation and adaptation research in other parts of Defra is important to ensure new climate change strategies have considered implications for AW
- Research into the contribution enhanced welfare can make to reducing the carbon footprint of food-producing animals should be explored, e.g. increased welfare may reduce endemic disease thereby increasing productivity and reducing the carbon footprint per kilogram of food produced.

**Sustainable food supply:** possible increase in the intensity of animal production systems to meet increased food demand. Further information on whether/how high welfare standards can be maintained in these systems is required.

**Knowledge Transfer:** There is uncertainty as to why animal handlers do not adopt changes that have been proven to improve welfare. Social science research is required to understand how best to communicate evidence and effect change in practices.

The Animal Welfare Act 2006 has brought the welfare of additional species under the responsibility of Defra. For some species there is little evidence on their welfare requirements and research is therefore required e.g. Game birds.

### Key partners

This programme collaborates with a large number of partners including the Animal Health and Veterinary Laboratories Agency, Devolved Administrations (incl. WAG as part shared evidence budget), BBSRC, NC3Rs, EU ERA-Net on Animal Health (EMIDA), Non Government Organisations and Industry

# 3. Aquatic Animal Health

## Evidence budget 2011/12

£1,955k

### Policy rationale

To prevent the introduction and spread of serious fish, crustacean and shellfish disease in aquaculture and wild stocks in England and Wales. Aiming to maintain aquaculture health standards and contain the risk of serious disease in the face of increased challenge. Key areas are preparedness, surveillance and control measures. Policy extends to aquatic animals which are not used in food supply to prevent impacts on biodiversity.

### Evidence needs

The evidence funded allows Defra to investigate specific problems, develop policy options, implement solutions, assess their effectiveness and enable future responsiveness to disease outbreaks. Surveillance for exotic and emerging diseases is a key and statutory part of this work. Maintenance of capabilities and resources at Cefas (Centre for Environment, Fisheries and Aquaculture Science) is also a key priority to ensure preparedness for outbreaks. As a growth industry, domestically and globally, aquaculture poses a challenge to evidence needs. Risks are enhanced by growth pressures such as increased imports and variety of species being used.

The **current state of knowledge** varies between specific known diseases. Some research projects on specific diseases have provided the evidence base for policy making on Koi herpesvirus (KHV) and improved the knowledge base on *Gyrodactylus salaris*, a threat to wild salmon and the salmonid industry.

Currently and in the future **evidence is required on:**

- 1) Aquatic Animal Health is unique in that surveillance for **new and emerging diseases** and increased mortalities is a statutory requirement of an EU Directive. The protocols used for studying emerging diseases are established however knowledge on the disease only develops with further research. **Characterisation** of a number of diseases of **finfish, crustacean and mollusc** including **notifiable diseases** and **emerging diseases** are required. Research includes the development of validated diagnostic tests and identification of control measures.
- 2) **Prevention and control of aquatic disease.** The UK is free from several potentially devastating diseases, both notifiable and non-notifiable. For **certain diseases considered a serious threat** to our native stocks; the UK has national measures in place for controlling the movement and import of susceptible species. Research is commissioned to develop a knowledge base for these aquatic diseases through laboratory studies, risk assessments and mathematical modelling to prepare the country for dealing with incursions by aiding detection and contingency planning.

In addition, **statutory surveillance for specific diseases** is undertaken for all the notifiable diseases listed in the EU Directive, plus others for which we currently have additional National Measures.

### Key partners

Devolved Administrations (incl. WAG as part shared evidence budget), Cefas (Centre for Environment, Fisheries and Aquaculture Science), Environment Agency, Institute of Zoology (for amphibian diseases).

# 4. Atmosphere and Local Environment

## Evidence budget 2011/12

Programme: £15,348k (air quality: £10,200k, noise and nuisance: £3,445k, other: £1,703k).  
Capital: £800k

## Policy rationale

The Atmosphere and Local Environment (ALE) Programme addresses policy on air quality, industrial pollution, local environment quality, noise and nuisance, and stratospheric ozone layer protection and the control of fluorinated gases. It also comprises two main evidence streams – air quality, and noise and nuisance. The principle driver for the ALE programme as a whole, and thus the evidence base, is the protection of human and ecosystem health, and quality of life. There is also a strong legislative basis for work on air quality, and noise and local environment quality (as exemplified by litter) is including in the Defra Reform Plan.

## Evidence needs

The level of understanding around the sources and prevalence of air pollution and environmental noise, the atmospheric processes relating to the transport of air pollution, and the impacts of noise and air pollution on human and ecosystem health is relatively advanced, although key uncertainties remain. Evidence needs exist in ten particular areas: air pollutant emissions and projections; prevalence and relative importance of nuisance; atmospheric processes and air pollution transport; effects (human health); effects (ecosystems and crops); climate change interactions; policy effectiveness and interactions; behavioural change and attitudes; valuation; and data freedom.

The current priorities for new evidence work across the programme are:

- Air quality: Improving projections; gaining a broader understanding of the health effects of air pollutants (led by Department for Health); gaining a greater understanding of public “valuation” and response to air quality impacts; and the monetary valuation of air pollution impacts on ecosystems and wider health impacts.
- Environmental Noise: delivery of Noise Mapping under the Environmental Noise Directive, evidence to support the implementation of the National Policy Statement England and undertaking the noise attitude survey.
- Noise and Nuisance: The prevalence and relative public importance of these issues are clear priorities, as is their valuation in monetary terms. There are also key social science questions which need to be addressed around the response to and impacts of nuisance.

Local environment quality: Again, the prevalence of the issues, influencing behaviour and attitudes, and valuation are priorities.

## Key partners

The use of external evidence resources (especially the contractor base and NERC Centres) and linkages to other processes both within Government, Devolved Administrations (incl. WAG as part shared evidence budget) and elsewhere are relatively good although there is clearly scope to strengthen these, particularly in terms of leveraged funding. The use of expert groups is stronger for air quality than for other areas of the programme, although the Interdepartmental Group on Costs and Benefits serves both air quality and noise and nuisance.



# 5. Better Regulation

(Joint programme in Defra and the Environment Agency)

## Evidence budget 2011/12

£200k

### Policy rationale

Reducing and reforming regulation is one of the Government's highest priorities and a central component of the Government's plans to drive sustainable economic growth. The challenge for Defra, as one of the larger regulators in Government, is to ingrain reform principles in the way we develop policy and review existing regulations so they become part of the way we achieve our policy outcomes.

### Evidence needs

Existing regulatory research largely focuses on the design and implementation of regulations. Less effort has been invested in investigating how the existing regulatory landscape can be reduced and reformed. An important starting point to help focus Defra's efforts on regulatory reform is improved information on the regulatory stock for which Defra is responsible and particularly which areas impose high costs to businesses and others. Given the high proportion of Defra regulation that is EU-driven, improved analysis is also needed of the room for manoeuvre within EU legal frameworks.

Reducing and reforming regulation then requires improved understanding of the underlying principles determining when regulation is appropriate and necessary to achieve policy objectives and when other policy approaches are preferable. Analytical approaches are needed to help policymakers think through how different policies complement and interact with each other. Better understanding is also needed of how to develop clear and stable policy frameworks to foster green investment and economic growth more widely.

There will always remain circumstances when regulation is right and necessary to achieve policy outcomes and existing research and policymaking guides generally cover regulation design well. Nevertheless there are some specific subject areas where better evidence is needed (e.g. on micro-businesses and designing policy for effective and efficient compliance). Equally there are some areas where better information is needed on how policies should be implemented, focusing mainly on improving approaches to risk-based regulation.

While some new research will be commissioned, a large focus of the work is to synthesise and refocus findings for the current context, making the transferable lessons accessible and digestible for policymakers. The outputs will mainly be guidance and tools to support and better enable policymakers and analysts in Defra to review the existing regulatory landscape, design policy in line with regulatory reform principles and identify the opportunities for influencing EU reform; and to support the Environment Agency and other regulators in implementing regulations.

### Key partners

All regulators of Defra policy (e.g. Natural England, Local Authorities and the MMO) other government departments (e.g. BIS, HSE and DECC), the European Commission, the Federation for Small Businesses, the CBI and other business representatives, research councils (e.g. ESRC and EPSRC) and research networks (e.g. SNIFFER, SKEP and IMPEL).

# 6. Biodiversity

## Evidence budget 2011/12

£3,955k

### Policy rationale

Biodiversity supports vital ecosystem services and has intrinsic value. Protecting biodiversity is one of Defra's top priorities. Key international policy drivers are the Convention on Biological Diversity's Strategic Plan 2020, the anticipated EU Biodiversity Strategy and the EU Habitats and Birds Directives. The Natural Environment White Paper (NEWP) and a new biodiversity strategy for England will be published in 2011, setting out a new policy framework.

### Evidence needs

67% of the evidence budget is spent on domestic and international biodiversity, 24% on wildlife management and 9% on invasive non-native species. Current investment focuses on ongoing assessment of status and trends in biodiversity, understanding and addressing threats to biodiversity and quantifying the role and value of biodiversity. Future priorities for funding will reflect new and existing European and international commitments as encapsulated in the NEWP and new England Biodiversity Strategy. There will be an increased emphasis on developing policy solutions for conserving biodiversity, embedding biodiversity into other sectors of decision making, creating an enabling environment and quantifying the role and benefits of biodiversity to society.

Priorities include:

- critical gaps in monitoring of species and habitats;
- economic and social values of biodiversity and link with ecosystem services;
- impacts of climate change and ecosystem-based adaptation and mitigation;
- options for improving site and ecological connectivity;
- crime prevention and mitigation measures for protected species;
- mobilising biodiversity data to support local decision making and policy-relevant research;
- robust, policy relevant biodiversity indicators, with reliable data supply;
- a UK strategy for global biodiversity research;
- biodiversity overseas in areas of high UK strategic importance or responsibility, including UK Overseas Territories;
- evidence needs relating to access and benefit sharing for genetic resources;
- support for an Intergovernmental Platform for Biodiversity and Ecosystem Services
- surveillance, risk assessment and control measures for invasive non-native species; and,
- humane control methods for wildlife pests.

### Key partners

Biodiversity Programme delivery partners (JNCC, NE, EA and FC); Fera and RBG Kew; Devolved Administrations and country agencies, DECC, DfID and FCO; NERC and LWEC; EU Research Programmes (e.g. BiodivERsA ERA-Net); voluntary and business sectors.

# 7. Bovine Tuberculosis

(TB Programme + Veterinary Science Team)

## Evidence budget 2011/12

£12,407k

### Policy rationale

Bovine TB is a statutory disease in cattle and has been subject to a compulsory control scheme based on skin test and slaughter of reactors, meat inspection and milk pasteurisation since 1950. The area affected by bovine TB has spread from isolated pockets in the late 1980s to cover large areas of the West and South West of England and Wales. In 2009, over 25,000 cattle were slaughtered for TB in England. The cost to Government of controlling bovine TB in England was over £63 million in 2009/10 (excluding R&D).

### Evidence needs

We know that TB is spread by the movement of infected cattle between herds and by infection between cattle and badgers. Our current TB surveillance and control regime in cattle is not preventing the spread of TB to clean areas and the incidence of disease in endemic areas appears to be increasing. We recognise that our tests are not sensitive enough to detect all infected cattle and that there is a significant reservoir of the disease in badgers which has hampered the success of a control programme based solely on cattle. Culling badgers has been shown to reduce the number of herds getting infected in the culling area but also to slightly increase the number of herds getting infected just outside culling areas. This is known as the perturbation effect and is caused by remaining badgers ranging more widely following the break-up of their social groups after culling.

Our current priority areas of investment in evidence are in developing and licensing an oral badger vaccine, development and licensing of an injectable BCG cattle vaccine (possibly including a "booster" vaccine) and an associated DIVA test to differentiate between infected and vaccinated animals. We are also trying to improve our diagnostic tests to better detect TB infection in cattle and badgers. In addition we are using cattle surveillance data to better understand the epidemiology of the disease and to assess the impact of different control options at the veterinary, social and economic levels. We also fund the study of the ecology of badgers to understand how TB spreads through badger populations.

We will continue to invest in these priority areas in 2011/12.

### Key partners

Researchers at the Veterinary Laboratories Agency and the Food and Environment Research Agency and in other Universities in the UK. Animal Health and the Meat Hygiene Service (now part of the Food Standards Agency). Our colleagues in the Welsh Assembly Government, Scottish Government and Northern Ireland Executive, as well as researchers and government officials in Ireland and New Zealand.

**Note:** Research budgets are managed on behalf of England and Wales, however the current priorities of Defra indicated above do not necessarily reflect the priorities of the Welsh Assembly Government although we endeavour to work closely together where possible.

# 8. Chemicals and Nanotechnology

## Evidence budget 2011/12

£2,406k (2010/11 ratio: Chemicals: nanotechnology: CBRN = 10:2:1)

## Policy rationale

The remit of Chemicals and Nanotechnology (CN) to manage the safe production and use of **chemicals** and **nanomaterials** (primarily through EU REACH Regulations) and ensure the nation can recover quickly from a chemical, biological, radiological and nuclear (**CBRN**) incident. Development of policy options for appropriate controls and for incident recovery requires understanding of the nature and properties of chemicals and CBRN materials in the environment, the risks posed (including to human health) and measures of the effectiveness of such controls/options.

## Evidence needs

**Chemicals:** Whilst a large amount of research has been conducted on potential detrimental effects of chemicals on human health and/or the environment, a range of uncertainties still exist, particularly on how chemicals behave once in the environment; whether and how they accumulate, mix and react with other substances and organisms; and what their longer term cumulative effects may be. Areas of focus of the programme have included work on substances which **p**ersist in the environment, **b**ioaccumulate in living organisms and are **t**oxic (PBTs); **P**ersistent **O**rganic **P**ollutants (POPs); substances which are **C**arcinogenic, **M**utagenic or toxic to **R**eproduction (CMRs); and **e**ndocrine **d**isruptors (EDs). As organisms are exposed to multiple rather than single chemicals, there will be increased attention within the programme on ways of assessing the effects of chemicals in mixtures. Work within the EU on this issue presents a key policy driver for this work and CN programme activity on ED chemicals. Work in these areas remains a future priority, alongside work on new POPs substances (levels, fate and behaviour in the environment and emission inventory development). Development of new non-vertebrate test methodologies for input into OECD test batteries to assist in the reduction of animals required in testing also remains a priority for the future.

**Nanotechnology** is a rapidly growing, emerging area, with many uncertainties surrounding the impact of manufactured nanomaterials (NMs) on humans and the environment. CN has supported methods development work on exposure assessment and hazard evaluation, in partnership with industry (LINK PROSPECT project) and the research councils (through the Living With Environmental Change partnership). A methodology to calculate the monetary value of economic, environmental and societal benefits of nanotechnology is also being developed. A 2009 review of existing and current research on the environmental and human safety of NMs has delivered a snapshot on progress and an indication of gaps in knowledge. CN is also contributing to collaborative international efforts (primarily through OECD) to prioritise those NMs currently available, or close to market, which pose a higher potential risk to human health and the environment. The Defra-chaired Nanotechnology Research Strategy Group (NRSG) is also used to identify research priorities, for example in the areas of environmental fate, behaviour and effects of NMs, covering a subset of 'priority' nanomaterials (e.g. High Aspect Ratio Nano structures; nanosilver; metal oxides). We will continue to build on current collaborations, particularly on LINK PROSPECT, EEHI and the NERC-led Environmental Nanoscience Initiative (ENI) in order to provide information on the fate and behaviour of NMs in the environment.

**CBRN:** Defra CBRN actively participates in a cross-government science and technology programme established to strengthen the UK's ability to respond to CBRN incidents and based in the Office for Security and Counter-Terrorism (OSCT) in Home Office, including through project managing OSCT-funded contracts where there is a key Defra interest e.g. environmental sampling; decontamination and specific Defra policy areas of animals, water, and waste. CBRN evidence budget is currently co-funding the production of a recovery handbook for chemical incidents. Priorities for new funding are environmental sampling, decontamination and agri-terrorism (EU FP).

### **Key partners**

In order to help avoid duplication, realise synergies and maximise vfm, we collaborate extensively, including with other government departments and agencies, devolved administrations (incl. WAG as part shared evidence budget), research councils, industry, EU MS (through FP) and the OECD.

# 9. Climate Change Mitigation for Agriculture and the Food Chain

## Evidence budget 2011/12

£9,245k

### Policy rationale

The Climate Change Act commits the UK to reducing its Greenhouse Gas (GHG) emissions by at least 80%, below 1990 levels, by 2050. It is therefore vital that all sectors of the economy, including agriculture, achieve the necessary GHG reductions. Working in partnership with key stakeholders, the purpose of the policy programme is to develop policies and initiatives that will promote and deliver the necessary GHG reductions from this sector in a cost-effective and sustainable manner.

### Evidence needs

We have two overarching and complementary workstreams: i) To assist the development and implementation of an industry-led GHG Action Plan and supply chain approaches for achieving emissions reductions from agriculture ii) Assessment and development of existing and novel policy instruments and frameworks towards the implementation of measures for cost-effective reduction of GHG emissions.

Both have overlapping evidence needs, one area of which is the improvement in the accuracy of the agriculture inventory, this will enable us to better capture the positive action that farmers are taking to reduce emissions. The assumptions underlying existing projections of activity in the agriculture sector need to be updated, this is required to enable the evaluation of the cost-effectiveness of future initiatives to reduce GHGs. In addition, much is dependent on the extent to which farmers will choose mitigation measures. The factors underlying such choices are complex although the barriers to uptake are increasingly well understood. Our immediate and future evidence needs are therefore summarised in no order of priority as follows:

1. Improved characterisation of current farm activities and projections for associated GHG emissions to develop a more accurate agricultural GHG inventory and enable review of industry progress in reducing GHG emissions
2. Lifecycle analysis of the environmental, economic and social benefits and undesirable impacts of practices that reduce agricultural GHG emissions
3. Further scoping of new approaches and technologies to mitigate GHG emissions from farming and how to reduce or eliminate undesirable impacts of existing technologies or systems
4. Improved understanding of the drivers for existing farming practice, what motivates farmers to change their practices including policy and supply chain incentives and barriers and how advice can be most effectively delivered to facilitate change.
5. An assessment of the impact of existing and future agricultural policy scenarios (e.g. CAP budgets and policy instruments, nitrates action programme, water framework directive, ammonia ceiling limits) on GHG emissions from the English (and UK) agriculture sectors

### Key partners

Industry representatives from all parts of our farming sector and food supply chain, environmental organisations, research councils, Devolved Administrations (incl. WAG as part shared evidence budget), Department of Energy and Climate Change, Committee on Climate Change, Technology and Strategy Board, Agricultural and Horticultural Development Board and its sector bodies, Defra's agencies.

# 10. Crops

## Evidence budget 2011/12

£7,276k

### Policy rationale

The Crops Hub covers generic policy on arable, horticultural crops and organic farming. It directly supports Defra's Business Plan Priority 1 (*Support and develop British farming and encourage sustainable food production: Help to enhance the competitiveness and resilience of the whole food chain, including farms and the fish industry, to ensure a secure, environmentally sustainable and healthy supply of food with improved standards of animal welfare*). Also providing a source of continuity and expertise, we are responsible for managing and adapting the Common Agricultural Policy market regimes for key crops with the aim of reform supporting a more sustainable, competitive, profitable and market-orientated production. Crops Hub is also responsible as Competent Authority for the UK for the development and implementation of the production and control system for organic standards and for the maintenance of significant elements of the domestic legislative framework underpinning agriculture.

### Evidence needs

We draw on an evidence knowledge base which underpins applied research and knowledge transfer on agricultural and horticultural crops (for food or non-food uses) in the UK. This focuses on improving productivity and yield, and protection against pests, diseases and weeds. A holistic (and integrated) approach to crop production takes account of environmental sustainability, climate change and competitiveness issues, such as reducing waste, better water use, integrated pest management and crop storage solutions. R&D priorities include: crop genetic improvement; integrated pest management (IPM); optimising inputs, resource use and product quality. Many current projects are being conducted collaboratively with industry. There are also ongoing economic and global pressures on farm businesses to consider. We therefore draw heavily on economic and statistical analyses to underpin decision-making on market management measures, understanding of the economic state of the sectors and policies which contribute to the continued move away from traditional support towards greater industry self-sufficiency, business management and competitiveness. We also act as a two way conduit for sharing statistical and markets information between Defra and industry, which contributes essential work in providing good data to enable those in the industry to make sound business decisions. We use all elements of the evidence base to synthesise a broader understanding of the economic, social and environmental aspects of crop production.

### Key partners

We work with a wide array of partners including AHDB (HGCA, HDC, PCL), Technology Strategy Board, BBSRC, the Devolved Administrations (incl. WAG as part shared evidence budget), Tenancy Reform Industry Group (TRIG), UK Organic Certifiers Group (UKOCG), FERA, PGRO, EU collaborative network in integrated pest management.

# 11. Disease Mitigation and Control

## Evidence budget 2011/12

R&D £2,253k. Surveillance £3,784k

## Policy rationale

Zoonoses are any disease or infection that is naturally transmissible from vertebrate animals to humans. Zoonotic diseases can have a major adverse effect on human health, animal health and welfare, and result in significant costs to the economy. Compliance with existing and future EU legislation for the monitoring and control of some of the major zoonotic infections is a key policy outcome for the Zoonoses policy area. Defra is the Competent Authority for coordinating implementation of such legislation in the UK which aims to protect public health and support sustainable food production

## Evidence needs

The current state of knowledge indicates the need for on-going surveillance and research to monitor and reduce the contribution of diseases in animals to the human zoonotic disease burden in Great Britain. Key zoonotic diseases are *Salmonella* spp., *Campylobacter* spp., Verocytotoxigenic *E. coli* and *Brucella*. The evidence programme consists of both surveillance activities (to monitor existing, new and emerging zoonoses and implement appropriate risk management measures) and R&D (to identify potential hazards to human health and cost-effective measures to reduce risk from zoonotic organisms). The programme funding also acts to ensure that specific scientific expertise, that Defra may need draw on, is maintained in the UK.

The output from the 2007 review of the R&D programme can be found at [www.defra.gov.uk/evidence/science/publications/documents/fbz-review.pdf](http://www.defra.gov.uk/evidence/science/publications/documents/fbz-review.pdf). Specific evidence needs identified through this review and through risk assessment, ongoing research and other national and EU wide information sources include:

- Determining how best to communicate zoonoses control to farmers in a way that effects behavioural change.
- Better understanding of the risks of infection with VTEC O157 on Open Farms, effective interventions, and guidelines on how to minimise risk
- Further work to identify cost-effective interventions to reduce *Salmonella* levels in pigs, including work towards an effective vaccine.
- Improved surveillance and targeted research to identify effective on-farm intervention measures for control of *Campylobacter*.
- Investigation of new and emerging zoonotic organisms to determine potential impact on human and animal health e.g. monophasic *Salmonella* strains.

## Key partners

Partners in this highly collaborative programme include Animal Health, Devolved Administrations (incl. WAG as part shared evidence budget), FSA, BBSRC, Dept. of Health, HPA, EU ERA-Net on Animal Health (EMIDA), the European Commission, Global Animal Health Research Co-ordination (STAR-IDAZ), Industry, and the Microbiological Safety Food Funders Group (MSFFG).



# 12. EU Agriculture and Budget Strategy

## Evidence budget 2011/12

£1,266k

### Policy rationale

The UK, through the EU Agriculture and Budget Strategy programme, aims to influence the future of the Common Agricultural Policy to deliver a farming industry which is internationally competitive without reliance on subsidy or protection, rewarded by the market for its outputs, environmentally-sensitive, socially and ethically responsive, and non-distorting of international trade and the world economy.

### Evidence needs

UK objectives on reform of the CAP are set by reference to the need for improved value for money, and the need to support delivery of wider Departmental and Government objectives through better targeting of the funding available. Much of the relevant evidence on agricultural issues and impacts is therefore commissioned by other policy programmes, in particular work aimed at understanding environmental impacts of the agriculture industry and the links with production; and evidence on the barriers to improving underlying competitiveness.

The key CAP-specific evidence requirement is for robust and prompt analysis of existing instruments, of emerging options for change, or of ideas we put forward in the negotiations, by in-house economists and others. Particular priorities include strong theoretical understanding of the economic impacts (in particular, costs) of current patterns of subsidy and an improving understanding of the likely impacts of change. The key investment is therefore the analytical resource represented by the economics teams specialising in CAP reform, farming performance and agri-environment issues. This analytical resource depends in turn on the availability of robust underlying data, either from key Defra agriculture statistics products, or in the form of EU-wide information (mainly Eurostat).

Emerging issues include not just ideas that UK Ministers will wish to press for in negotiations, but also alternative ideas that we need to assess and understand in order to develop a negotiating response. Particular issues on the horizon: price volatility, and the impact of different possible public interventions to manage it; likely behavioural responses to withdrawal of subsidy, and environmental and other impacts; design and potential impact of CAP instruments to encourage investment in improved competitiveness; economic impact of measures aimed at improving the market position of producers; and the impact of CAP instruments on EU GHG emissions, and design of options to encourage mitigation, or adaptation.

Decisions on domestic implementation of CAP options are primarily for the Rural Development Plan for England programme and the Farming for the Future programme respectively, and are heavily dependent on effective delivery of robust scientific, statistical and economic evidence.

### Key partners

OECD, AES, various universities, research institutes and consultancy firms.

# 13. Exotic Disease

## Evidence budget 2011/12

£12,596k

### Policy rationale

The Exotic Disease Policy Programme has the policy objective of decreasing the likelihood of exotic disease incursions and managing the impact of any incursion with a view to minimising it. It covers policy for England, though it works very closely with devolved administrations (noting that research investment is on behalf of both England and Wales), as any disease situation is likely to have cross-border implications.

### Evidence needs

The programme is supported by research and surveillance evidence for all the major exotic notifiable diseases, through projects carried out by our key partners. The programme also relies on international evidence of exotic disease outbreaks throughout the world. This information allows us to monitor and evaluate the spread of exotic diseases and learn from other countries on how to handle them.

The evidence programme supports initiatives to further our understanding around specific disease issues, but also supports thematic areas of capability that are cross cutting in nature. The research supported is directed toward the development of improved disease control tools and furthering our understanding of the behaviour of diseases, how they spread and what our current and future threats may be. Thus underpinning the policy objectives of disease prevention and control.

Current investment focus is on the major notifiable diseases, including Foot and Mouth Disease, Bluetongue, Avian Influenza, Rabies and Classical Swine Fever. It is however recognised that a balance needs to be maintained in supporting our capability to respond to these evolving pathogens (and the dynamic nature of the threat they present) and being best placed to meet the challenges posed by new and emerging diseases.

There has been a change of focus on the Government's approach to dealing with exotic disease outbreaks from preparing for a disease outbreak to ensuring future risks of exotic disease outbreaks are minimised through best practice and behavioural change. We have identified a need for more social research as there is relatively little known about farmers and public attitudes to exotic disease control issues and the broader impact of control strategies on the activities of the rural community and rural economy. It is also envisaged that there will be an increasing need for further input from economists for cost benefit analysis in relation to control measures and the use of vaccination to control some exotic disease outbreaks.

### Key partners

This is a highly collaborative programme with a large number of partners including Devolved Administrations, the European Commission, Animal Health, Veterinary Laboratories Agency, Veterinary Medicines Directorate, and Institute for Animal Health, Food Standards Agency, Food and Environment Research Agency and Local Authorities. There is a trend towards more collaborative working between the major funders in this area. National co-ordination being supported by the Animal Health Research Funders Forum and international co-ordination by the EMIDA ERA-Net and Global Animal Health research co-ordination network (both of which are led by Defra).

# 14. Farming Elements (within Farming and the Food Chain)

## Evidence budget 2011/12

£8,891k

### Policy rationale

The farming elements of the FFC Programme are at the heart of delivery of the three DEFRA Business Plan priorities, in particular the objective to *support and develop British farming and encourage sustainable food production*. This will be achieved by action to deliver outcomes and influence behaviour change at the local, national, European and bilateral and multi-lateral international levels.

### Evidence needs

The current state of knowledge indicates that farming must increase productivity to meet future population growth while improving the positive/reducing the negative environmental impact of its practices. Overarching and strategic evidence needs are to understand:

- the environmental impacts of agriculture and develop a toolkit of actions to reduce the impacts of agriculture on the environment
- the socio-economic implications of these actions
- the best ways to elicit changes in practice across the sector to increase competitiveness and productivity
- trade-offs and interactions with other policy areas (e.g. air quality, water, soil biodiversity, etc).

A considerable knowledge base is developing on improving the environmental footprint of farming. Continued research is needed to devise integrated farm management approaches that deliver environmental benefits whilst being productive and economically viable. With the joining up of the FFF Programme and the work of the Food Policy Unit, the requirements for the FFC Programme will focus on Defra's three long-term evidence challenges identified in the Evidence Investment Strategy: Climate change, sustainable food supply and protecting ecosystem services.

Projects under the new Programme will have both cross-cutting and unique evidence needs. These are reflected in the evidence priorities for the four Farming and Food Science (FFS) programmes: Sustainable Farming Systems and Biodiversity, Sustainable Water Management, Agriculture and Climate Change, and Resource Efficient and Resilient Food Chain. Economic, statistical, operational and social research projects support the competitiveness/productivity evidence needs of the FFC Programme including: Farm Business Survey, Performance Indicators (ACE Observatory), cross-cutting policy analysis and associated costs/benefits of potential approaches to leverage behaviour change. Building on existing knowledge of the motivations and behaviours in farm businesses and developing workable Big Society mechanisms will help the Programme meet future food, environmental and climate change challenges by informing changes in farming practice, reducing regulatory burdens and looking beyond government for solutions to problems.

### Key partners

This Programme is highly collaborative with partners both within and outside Defra including relevant FFG and ERG policy and evidence teams, Env. Agency, FERA, DA's (incl. WAG as part shared evidence budget), EU and International initiatives, the Technology Strategy Board, and the farming industry.

# 15. Floods

## Evidence budget 2011/12

£4,089k

### Policy rationale

Flood and coastal erosion risk present a very real threat. Flooding can be devastating for individuals and local communities. Climate and socio-economic changes could lead to a dramatic increase in damages due to flooding over coming decades. This policy programme aims to find alternative ways of managing flood risk and responding to the very real concerns of those at risk.

### Evidence needs

Defra's evidence programme for Flood and Coastal Erosion Risk Management (FCERM) for England and Wales builds on a significant body of existing evidence comprising independent reviews, legislation, datasets and R&D amongst others. Our research remains pivotal to tackling the challenges of local flooding, land management and socio-economic development along with our need to understand the impacts of climate change, our adaptation options and ensuring we respond effectively when flooding does occur. As well as in-house analytical activity, a jointly-commissioned evidence programme is delivered together with the Environment Agency and is organised in four themes:

**Strategy and Policy Development:** Covering areas of national strategic interest, priorities include; work to meet requirements of the Flood and Water Management Act (eg in the categorisation of small reservoirs; rationalisation of flood risk plans); work to understand how coastal adaptation should be funded in future; work on surface water risk modelling; and work to understand how flood risk data is understood and used and consequently how the localism agenda can be realised for flood risk management problems.

**Modelling and Risk:** Developing tools for risk assessment and decision-making, priorities include; hydrological research (including confidence assessment methods and tools); guidance on modelling approaches for blockages and debris; provision of evidence for flood hazard mapping; and options for benchmarking of beach models using hindcast data.

**Sustainable Asset Management:** Addressing the planning, design, construction and maintenance of assets, priorities include; understanding the use of roads as surface water exceedence pathways; generating the evidence for guidance on reservoir conduits; and understanding the issues arising with eroding coastlines and the impact on historic and recent landfills.

**Incident Management and Community Engagement:** Developing effective flood incident management systems and understanding social effects of flooding, priorities include; development of tools to effectively communicate flood risk to the public; improving the evidence base on motivational aspects of behaviour change; improving and further evaluating the 'Grid to Grid' flood forecasting model; improving forecasting and warning for surface water flooding; and evaluating and capitalising on improvements in rainfall forecasting and warning.

### Key partners

Environment Agency, Devolved Administrations (incl. WAG as part shared evidence budget), Local Authorities, Highways Agency, Department for Communities and Local Government, Living with Environmental Change programme, National Flood Forum, Met Office, Flood risk communities.

# 16. GM Policy and Regulation

## Evidence budget 2011/12

£242k

### Policy rationale

Defra has a statutory role in regulating the deliberate release of GMOs to the environment under EU Directive 2001/18/EC.

### Evidence needs

A case by case science based approach is taken to assess the safety of each GMO application before authorisation for marketing or trial release. A substantial evidence base is required to support regulatory risk assessment and to underpin the UK policy position on European regulation. Defra funds research to support these evidence needs for England and Wales.

The cultivation of GM crops around the world continues to increase (GM crops accounted for 10% of the worlds arable area in 2010). Only two GM crops are currently commercially cultivated in the EU, neither of which are suitable for the UK.

Current evidence investment aims to:

- improve understanding of the impacts of commercial cultivation of GM crops elsewhere in the world.
- determine options for post market monitoring of GM crops
- address remaining evidence gaps to inform policy on the coexistence of GM and non-GM crops.

As the technology continues to develop, new regulatory challenges with associated evidence needs arise. Such developments include the modification of new organisms, new traits or new breeding techniques. Related evidence needs are emerging in relation to GM medicines, new approaches for understanding the impacts of GMOs in ecosystem contexts, and post market monitoring.

In the future GM crops of interest to UK farmers may be approved for cultivation in the EU. Ahead of any cultivation a strong evidence base will be needed to inform the measures put in place to enable coexistence of GM and non-GM crops. A large body of evidence is available to support policy on coexistence, but further evidence may be needed on the economic impacts of proposed measures.

### Key partners

Food Standards Agency, Health and Safety Executive, Food and Environment Research Agency, the Advisory Committee on Releases to the Environment.

# 17. Landscape and Outdoor Recreation and Inland Waterways

## Evidence budget 2011/12

£182k

### Policy rationale

**The Landscape and Outdoor Recreation Programme:** This Programme leads on the Coalition Government Commitment (Departmental Priority) to “launch a National Tree Planting Campaign”; leads for Defra on the commitment to “introduce a new designation to protect green spaces of particular importance for local communities”; and contributes to the commitment to “introduce measures to protect wildlife and promote green spaces and wildlife corridors”.

**The Inland Waterways Programme:** Inland waterways contribute to a wide range of national, regional and local priorities. The potential contribution of individual waterways to delivering policy objectives, for example around water quality and biodiversity is well documented, but there has been no cohesive view of their wider contribution. Research will be concluded this year to establish the generic value of a well used network in terms of urban/rural regeneration, tourism, social inclusion, the environment, health promotion and heritage preservation etc. needed to demonstrate the wider value of the waterways when formulating policy. BW's inland waterways will move to the New Waterways Charity (NWC) in 2012. An evaluation framework will be needed to consider the wider public benefits delivered by the NWC, and to underpin a review in 2014/15 of the progress and achievements of the NWC prior to the planned transfer of EA navigations to the NWC.

### Evidence needs

**The Landscape and Outdoor Recreation Programme:** Much of the evidence we need is being provided by other programmes within Defra, or is more appropriately funded by external partners. Key areas of evidence need include:

1. *Public opinion regarding important features of landscapes*
2. *Public perceptions of landscape change and management*
3. *Likely impacts of climate change on valued landscape features*
4. *Potential management responses to landscape change*
5. *Assessing the value for money of the National Forest*
6. *Landscape quality indicators*
7. *Valuing landscapes and recreation*

**The Inland Waterways Programme:** There has been little evidence available about the value of the inland waterways to policy areas and the wider economy. Defra has funded research to develop a methodology to enable the wide range of benefits derived from inland waterways to be identified and evaluated in a consistent manner. This will now be used to inform the case for the transfer of the EA navigations into the NWC and what different levels funding of the NWC will deliver in terms of public benefits.

### Key partners

Key organisations for liaison and potential joint working include:

**Landscape:** Natural England, Forestry Commission, Forest Research, National Parks Authorities, Landscape Institute. Though the scope of the work is England-only, issues such as climate change affect the whole UK, so there is value in working with Devolved Administrations.

**Waterways:** British Waterways, Environment Agency, English Heritage, Natural England, Local Authorities, Welsh Assembly Government. The geographic scope of this work covers England and Wales.

# 18. Livestock

## Evidence budget 2011/12

£3,415k

### Policy rationale

The Livestock Policy Teams in the Hub cover generic livestock policy on dairy, beef, sheep, pigs, poultry and eggs and are key contributors to the Defra Business Plan's first priority of supporting and developing British farming and encouraging sustainable food production by enhancing the competitiveness and resilience of the various livestock product supply chains. The policy is underpinned and governed by the livestock articles of the Single CMO Regulation – Council Regulation (EC) No 1234/2007. The rationale for Government intervention is to catalyse the transition of a state supported industry (more acute in the dairy, beef and sheep sectors) to one that is self-reliant, innovative, competitive and profitable with better environmental management throughout the supply chain. This evidence plan contributes to the priorities of the Welsh Minister for Rural Affairs and Welsh Assembly Government policy needs, particularly CAP Reform.

### Evidence needs

In response to Defra's Business Plan and the priorities in the Evidence Investment Strategy and the Foresight report 'The Future of Food and Farming', the strategic level long-term evidence challenges for the Livestock Hub are:

1. creating a clear evidence-based rationale for policy that focuses on UK production (what is the state of the industry? how has it changed over time / what are the trends? what is the future direction of the industry, the barriers to competitiveness and sustainable intensification?);
2. understanding the contribution to improved economic resilience of the industry and sustainable production from prioritised prevention / management of critical threats to animal health and welfare; and
3. improving understanding of greenhouse gas and other emissions from farming; the scope for reductions through different management options and the implications for producers and competitiveness.

The Livestock Hub's evidence needs are broad and in relation to 2 and 3 above draw on work being done elsewhere in Defra's Food and Farming Group. In particular they cover:

- understanding of better methods and production systems (including through genetic improvements) to enhance competitiveness and ensure a secure and environmentally sustainable supply of livestock products;
- economic and statistical information on the financial health of the various livestock sectors;
- consumer trends to inform policy in areas such as country of origin labelling or sensitivity to novel issues such as cloning and large intensive units; and
- sampling to assess effectiveness of implementation of EU Equine Identification Regulation and therefore protection of human health across EU.

### Key partners

The Devolved Administrations; VMD; the UK Plant Genetics Resources Group; the National Standing Committee on Farm Animal Genetic Resources; AHDB (EBLEX, DairyCo, BPEX and Hybu Cig Cymru); and the Technology Strategy Board.

# 19. Livestock – TSE and Animal By-Products

## Evidence budget 2011/12

£16,265k

### Policy rationale

The UK has experienced serious animal disease outbreaks such as bovine spongiform encephalopathy (BSE) and foot and mouth disease virus (FMDV) with serious consequences for human health (BSE only) animal health and the economy. Defra needs to protect against future disease outbreaks and maintain adequate surveillance whilst ensuring that animal health controls to prevent these diseases are proportionate to the risk and are based on sound scientific evidence.

Transmissible Spongiform Encephalopathies (TSEs) include BSE in cattle, which is a known risk to public health, and scrapie in sheep and goats, which is not known to pose a risk to public health. The UK BSE epidemic peaked in 1992, cost Government over £5 billion and resulted in a ten-year trade embargo. The incidence of BSE has now declined to very low levels. Defra's Business Plan priorities include encouraging sustainable food production and protecting against the risk of animal diseases. Defra is responsible for negotiating and implementing EU rules for the control and eradication of certain TSEs and for the control on the disposal of animal by-products.

The policy rationale is therefore (i) to protect human and animal health, and (ii) to ensure that controls are proportionate and based on sound scientific advice and risk assessment.

### Evidence needs

Evidence needs include statutory TSE surveillance as required under Regulation (EC) No.999/2001, and research and development. Current priorities for research and development are centred around:

- improving our understanding of the biological nature of TSEs and their significance to human or animal health,
- developing control methods proportionate to the TSE risk,
- ensuring preparedness to detect and evaluate new or unusual TSEs,
- assessing any changes in risks to human or animal health as a result of potential deregulation of controls on animal by-products, and
- supporting the development of alternative methods for use and disposal of animal by-products.

### Key partners

This is a highly collaborative programme with a large number of partners including the Veterinary Laboratories Agency and Animal Health, Devolved Administrations, Medical Research Council, the Biotechnology and Biological Sciences Research Council (BBSRC), the Department of Health, the Foods Standards Agency, the European Commission, EFSA (European Food Safety Authority), industry groups, WRAP (Waste and Resources Action Programme), and NNFCC (National Non-Food Crops Centre).



# 20. Marine

## Evidence budget 2011/12

£29,993k (approx 40% R&D and 60% monitoring)

## Policy rationale

The UK's seas are an important resource, providing us with valuable economic, environmental and cultural benefits. They are also home to many important species and habitats. However, the seas are not a limitless resource and increased pressures and the potential conflicts between different uses are threatening the sustainability of the marine ecosystem. Defra's Marine Programme aims to achieve the UK Vision for clean, healthy, safe, productive and biologically diverse oceans and seas, through the delivery of key policy instruments and a sound evidence base.

## Evidence needs

Progress towards achieving the UK Vision is dependent on having a robust evidence base. Evidence is made up of both research and monitoring.

Our marine research is focussed on improving our understanding in four key areas:

- Human pressures, including fishing, hazardous substances, nutrient enrichment and climate change, and how these impact on the marine environment. As well as existing pressures, there is a growing need to assess the impact of new pressures such as offshore renewable (wind, wave, and tidal) and the impact cumulative pressures have on the marine state.
- State of the marine environment, including essential physical, chemical and biological features, and habitat types. Increasing focus is being given to developing descriptors and indicators to help track our progress towards Good Environmental Status (GES).
- Economic and social aspects, including valuing ecosystem goods and services, and identifying key socio-economic drivers and incentives, for example affecting fishermen's behaviour.
- Science for integrated management, including identifying measures to help us achieve our Vision. Effective marine planning needs to draw on a substantial evidence base to balance activities and deliver sustainable development.

Monitoring is the second important contributor to our evidence needs, helping us assess the effectiveness of our management measures as we progress towards GES. *Charting Progress 2* provides the latest statement on the state of our seas, and will be the foundation for future assessments required by the EU Marine Strategy Framework Directive (MSFD).

In meeting our many new challenges we will draw on the substantial body of evidence that has already been assembled, whilst our future monitoring and research programmes will be designed to fill gaps in our knowledge. Strategic areas of interest such as climate change impact, species interactions and natural variability will not be neglected, and will be addressed especially through collaboration with other national and European funders.

## Key partners

Collaboration with other funders is vital in delivering the Marine Programme's evidence needs. In the UK collaboration will be through the Marine Science Co-ordination Committee (MSCC), which is made up of the major funders of UK marine science and their agencies. In Europe collaboration will be through OSPAR, ICES and the Commission's Framework programmes including SEAS ERA-Net.

# 21. Natural Value

## Evidence budget 2011/12

£1,109k (£615k from main NVP, and expected £494k from NEE)

## Policy rationale

The concept of ecosystem services and the value of the natural environment to society and the economy form key themes in the Government's forthcoming/recent White Paper on the Natural Environment. Defra's Natural Value programme therefore aims to increase understanding of these issues and enable action across a wide range of policy and decision makers.

## Evidence needs

The conceptual framework of the National Ecosystem Assessment describes a cyclical system where drivers of change alter ecosystems, which change the services they provide to society, which in turn change human wellbeing and therefore impact (often through policy or market intervention) those drivers. To be able to develop policy in this systematic manner, evidence is required to cover all steps in the NEA conceptual framework. An analysis of current and planned evidence activities suggests further evidence needs under the following themes:

1. **Understanding the economic and non-economic value of ecosystems and the services they provide** – policy-relevant primary valuations, investigating how people value their environment and determining how to make best use of this value.
2. **Resources to enable others to embed an ecosystems approach in policy and decision making** – using new resources in the context of different delivery mechanisms and institutions, and dealing with uncertainty in decision making.
3. **Public engagement and behaviour change** – understanding what motivates continuing community involvement in projects and policies, and how to link communities, data and experts effectively.
4. **Impacts on ecosystems, their resilience and sensitivity** – the influence of changing drivers and pressures on ecosystem service delivery in different systems.
5. **Management of ecosystems and the services they provide** – investigating multiple service delivery and how it is affected by physical location and governance.
6. **Linkages/interactions between ecosystems and the services they provide** – examining the structure, function, management and interaction between different systems and how cumulative impacts result in service delivery on different scales.

## Key partners

The NVP is a Defra Network programme, and so this evidence base is shared with EA, NE, and FC, working closely with JNCC and policy programmes across Defra. The research is also relevant to Wales Assembly Government as part of the shared evidence budget. The NVP will collaborate closely with LWEC and monitor and influence other external funders (e.g. other Government Departments, Europe) to increase the relevance of their work to the programme.

## 22. New and Re-emerging Diseases, Endemic Diseases and Enhanced Surveillance Methodology

### Evidence budget 2011/12

£8,972k

### Policy rationale

Animal disease can cause serious social, economic and environmental damage, compromise animal welfare and threaten human health. Although many diseases are known, new diseases continually arise and can have devastating effects, as seen with BSE and VTEC (verotoxigenic *E coli*). Early detection of new or unexpected diseases (e.g. re-emergence of diseases believed absent or eradicated) and improved preparedness, such as alternative treatments for pathogens likely to develop resistance, are needed for the effective management of these threats.

### Evidence needs

Continuous monitoring is needed to ensure the early detection of new or re-emerging diseases, allowing a rapid response and thus reducing their impact on society. It also enables the UK to meet its commitments under EU and international law. Improved surveillance methods and strategies are needed to maximise the efficiency of detection with reducing resources. New or re-emerging diseases may result from the introduction of pathogens from abroad due to globalisation in trade or the domestic evolution of disease-causing agents, including drug resistance. New and re-emerging diseases often bring with them many unknowns thus requiring research to assess the threat and develop improved detection or control methods. Improved control methods and strategies are also needed for many endemic disease-causing agents to reduce dependence on antibiotics or other chemotherapeutic agents, and the environmental imprint associated with livestock.

Current priorities for evidence relate to:

- The early detection and assessment of and the tools to enable a rapid response to new and re-emerging animal-related threats.
- More efficient surveillance systems allowing Defra to meet its statutory requirements and provide early warning of changing disease situations, while reducing costs to government.
- Improved methods for the detection and control of animal disease-related threats, supporting a competitive and sustainable livestock sector and wider society interests. Areas of importance include viral diseases of poultry, gut health in pigs and poultry, respiratory diseases of pigs and parasites of ruminants.

### Key partners

This programme involves a large number of partners including the Devolved Administrations, BBSRC, the European Commission, funding bodies across Europe through the EMIDA ERA-Net and partners globally through the STAR-IDAZ global network.

# 23. Pesticides

## Evidence budget 2011/12

£4,619k

### Policy rationale

The programme includes policy and regulatory activity to assess and manage potential health and environmental risks. Effective regulation of pesticides protects human health and the environment from potential harmful effects; it also boosts consumer confidence to the benefit of British industries.

### Evidence needs

In recent years, the R&D programme has collected much information to develop the pesticides assessment process and implement the EU Thematic Strategy for the Sustainable Use of Pesticides. There is a continuing need to develop this work to influence and keep up with developing requirements of the EU regulatory process.

Non-R&D evidence relates to four main areas: monitoring **pesticide residues in food**; **Pesticide Usage Surveys**, which collect quantitative and qualitative data on pesticides used in agriculture, horticulture and food storage; the **Wildlife Incident Investigation Scheme**, which investigates cases of harm or risk to wildlife where pesticides may be involved; and the **analysis of pesticide formulations**, to check that pesticides on sale are in line with the product formulations approved.

Priorities for future R&D work include:

- Developing the health risk assessment, including monitoring and epidemiological data to reflect new application technologies and techniques.
- Analytical chemistry – improving the methods used for food residue or wildlife monitoring programme and in formulation analysis.
- Evidence to support policy implementation of the EU thematic strategy on the sustainable use of pesticides and related EU legislation.
- Resistance – evidence supporting the development of resistance management strategies to support secure and sustainable crop production.
- Evidence to help reduce reliance on conventional chemical pesticides by developing novel alternative technologies.
- Environmental fate and behaviour – to provide the evidence to enable the use of appropriate and validated exposure assessment models.
- Ecotoxicology – evidence to support the regulatory risk assessment and on wider ecosystem issues associated with the sustainable use of pesticides.

Priorities for developing the non-evidence work will build on the R&D in support of analytical chemistry development and other work to identify and deliver improvements in cost-effectiveness and efficiency of the monitoring schemes.

### Key partners

The Health and Safety Executive lead this work on behalf of Defra. Key partners include bodies carrying out monitoring work, research contractors, research funding bodies in the UK and EU and Devolved Administrations.

# 24. Plant Health, Bee Health and Plant Varieties and Seeds

## Evidence budget 2011/12

£9,237k

### Policy rationale

**Plant Health** aims to prevent the introduction and spread of quarantine pests of plants and to ensure the availability of healthy planting material. **Bee Health** aims to achieve a sustainable and healthy population of honey bees for pollination and honey production. **Plant Varieties and Seeds aims** to encourage improvements in plant varieties and maintain seed quality.

### Evidence needs

Generally, 80–90% of our evidence investment is non-R&D and 10–20% is research.

**Plant Health:** evidence is derived from pest risk analyses on specific pests, supported by surveillance and monitoring activities and by research. Priorities and needs for future evidence investment include: developing and utilising better methods for assessing economic and environmental impacts within pest risk assessments; understanding and influencing behaviours that deliver policy outcomes; developing risk-based targeting of inspections and approaches and tools that support early detection of pest incursions or outbreaks; developing effective intervention strategies (eradication, containment, control, waste disposal); supporting taxonomy and classification underpinning plant health. Investment in these areas will develop and implement policy to prevent the entry and spread of non-native plant pests that threaten crops and environmentally-important plants and habitats.

**Bee Health:** surveillance and monitoring provides evidence on the incidence or status of notifiable endemic pests and diseases, exotic threats, and how beekeepers are managing serious endemic pests and diseases; apiary inspections provide evidence related to colony losses and the health of bees. This is supported by research on factors influencing pest and disease spread and on husbandry strategies. Future priority needs include: approaches for identifying and assessing exotic threats; detection and diagnostic methods; optimal eradication, containment or management strategies informed by a better knowledge of pest and disease biology; improving our understanding of the contribution that honey bees make to pollination. Investment will ensure that beekeepers effectively manage their bees and achieve a sustainable and healthy honey bee population for pollination and honey production.

**Plant Varieties and seeds:** the evidence needs in support of the regulatory regime primarily concern adaptation of the variety testing system for traits contributing to reduced fertiliser and pesticide use, drought tolerance etc. Current performance testing is market focused, funded almost entirely by breeders, and it is not obvious how it can or needs to be changed, for example to assess nitrogen use efficiency. This evidence need links to the wider context of Defra's research programme covering Sustainable Farming for genetic improvements, particularly to bridge the gap between fundamental research and the development of new varieties that address food security and environmental issues.

### Key partners

We will work with other funders/programmes in: Defra; Fera; Forestry Commission; Devolved Administrations; other Member States; the EU; other Government Departments; Research Councils; and with respective industries and stakeholders.

# 25. Rural Communities

## Evidence budget 2011/12

£2,104k

### Policy rationale

Government is committed to ensuring that rural people, businesses and communities are treated fairly in all Government policies, programmes and spending decisions. Defra has a strategic role as Rural Champion across Government, including Defra Ministers, to identify rural priority areas and oversee their pursuit. This role is centred in the Rural Communities Policy Unit (RCPU) and must be underpinned by an evidence base which provides an oversight of the socio-economic and to some extent environmental conditions, trends and performance of rural England.

### Evidence needs

The rural evidence programme priorities for 2011 will be formalised when the new RCPU policy teams are in place and immediate and long term evidence needs have been assessed, evaluated and specifications developed. Broad evidence priorities that have been identified to date are as follows:

- Quarterly rural economy monitoring bulletins (recession/recovery)
- Developing and updating the rural and urban settlement based definitions for the 2011 Census (partnership project with Department for Communities and Local Government, the Office for National Statistics and the Welsh Assembly Government)
- Development of a suite of rural social, economic and environmental (where relevant/required) indicators monitored on a regular basis.
- 'Support a strong and sustainable green economy' specific actions from the business plan: access to high speed broadband in rural areas and fuel costs
- Ministerial priorities: housing, broadband, fuel poverty, transport and services (post offices, pubs and shops) all have evidence gaps.
- Big Society and localism, evidence support for policy developments relating to these and achieving a fair outcome for rural communities. Specific focus on developing intelligence and understanding of what, why, where and how local action is providing solutions for rural communities (inc. barriers to developing solutions). The funding of intelligence capture through ACRE will provide Defra with great insight into this.
- Rural economic development and building the green economy. Engagement, monitoring and evaluation of impacts of new structures and funding (Local Enterprise Partnerships and the Regional Growth Fund) and business support arrangements.
- Wellbeing monitoring (work with ONS) to develop a better understanding of the rural perspective of these.

### Key partners

Work with other Government bodies to identify the most relevant rural evidence requirements (e.g. CLG, DECC and WAG), and with a number of other bodies with rural interests and expertise including ACRE, RSN (Rural Services Network) and academic institutions.

# 26. Rural Development Programme for England

## Evidence budget 2011/12

£2,851k

### Policy rationale

The RDPE aims to improve the competitiveness of agriculture and forestry, improve the environment and the countryside, improve the quality of life in rural areas and encourage diversification. Environmental goods and services have been reduced by developments in modern farming practice and a key policy response to this change is Environmental Stewardship (ES).

### Evidence needs

Out of a total RDPE spend commitment of £3.7 billion, £2.9 billion is committed to ES. The scheme has the following objectives: wildlife conservation, maintenance and enhancement of landscape quality and character, protection of the historic environment, promotion of public access and an understanding of the countryside, and resource protection, with secondary objectives of flood protection and conservation of genetic resources. In 2008 climate change was added as an overarching theme. Evidence is required to support delivery of these objectives.

An Annex to the RDPE Evidence Plan provides a more detailed breakdown of the ES evidence needs, summarises the evidence that already exists for ES or is being gathered, and highlights where there are gaps in our evidence base in addressing the high level questions. The evidence gaps can be grouped into the following main categories covering monitoring and evaluation (M&E) and research and development (R&D) and are shown below (with main themes in parentheses):

- Effectiveness of current interventions (advice, training and information, monitoring process, resource protection, Upland Entry Level Scheme, targeting, multi-functional options, ES, Biodiversity Action Plan (BAP)).
- Informing EU/National Agri-environment policy (Common Monitoring and Evaluation Framework (CMEF), scheme outcomes, farmer attitudes, scheme scope, public attitudes, other countries' agri-environment schemes).
- Reporting EU and National targets/objectives (CMEF, BAP, SSSI, Natura 2000).
- Research to improve scheme design and delivery (multi-functional options, appropriate intervention/ effectiveness, socio-economic impacts, scale and distribution of interventions, climate change adaptation and mitigation, historic environment, biodiversity, flood mitigation).

Whilst it is clear that much evidence gathering and analysis of ES performance has been done, there are still many substantial gaps that remain to be filled. The gaps identified should inform the future direction of the R&D and M&E programmes.

### Key partners

RDPE is a wide-ranging and cross-cutting programme with an appropriately large number of partners including NE, EA, FC, English Heritage and the Research Councils, especially through LWEC. Close links are also maintained with the Devolved Administrations, SNH, CCW and JNCC. The ES research programme covers the needs of England and Wales.

# 27. Soil Protection

## Evidence budget 2011/12

£1,690k

### Policy rationale

Soil is one of the fundamental natural resources on which society depends for a range of essential ecosystem services such as food production, carbon storage and water infiltration. However, soils have degraded over the last 200 years, including as a result of industrial pollution and intensive agricultural production, and are likely to be further impacted as the climate changes. The Soil Programme aims to ensure that soils, including agricultural soils and peat, are used sustainably and their ability to provide services in the future is effectively protected. To support this policy work, efforts continue to be focused on building and strengthening the evidence base.

### Evidence needs

The Soils R&D programme concentrates on addressing significant evidence gaps to inform policy development. Current priorities for research include the better protection of agricultural soils; the role of soils in mitigating and adapting to climate change; soil carbon and peatlands (including restoration); and dealing with our historic legacy of contaminated land.

Further evidence to ensure that soils are managed sustainably, are protected and are not detrimentally impacted by anthropogenic impacts is needed, particularly in light of the changing pressures on the soil such as climate change and a growing population. Of particular importance is the very limited evidence on how soil degradation impacts on the soil itself (rather than off-site impacts, for example on the sedimentation of water courses) and the ecosystem services that it provides.

Climate change has the potential to adversely affect soils. However, we need a better understanding of the potential impacts of climate change on soils (and therefore specific geographical locations or land uses) and what can be done in terms of mitigation and adaptation measures in order to ensure that soils are more resilient and able to function effectively in the future. Understanding how to prevent further carbon losses from soils (including peatlands) and opportunities for land use change or land management practices to permanently increase soil carbon is a current and significant evidence gap that the Programme is seeking to address.

Finally, the impacts (environmental, economic and social) of contaminated land and optimal solutions for sustainable remediation will continue to be important within the Soil Protection research programme.

### Key partners

Soil research in the UK is important to a range of organisations, with which Defra continues to work closely through the Soils R&D Forum for research funders and other interested parties. These organisations include the Devolved Administrations and Defra delivery bodies such as Natural England, the Environment Agency and the Forestry Commission. Research Councils, including NERC and BBSRC, will also continue to be key partners in addressing research evidence needs.



# 28. Strategic Evidence

## Evidence budget 2011/12

£6,307k (excludes evidence budgets for the Environmental Statistics Service as these are incorporated into other evidence plans)

## Policy rationale

Evidence is vital to policy making in Defra, as recognised in the Department's Business Plan. This function supports the management of evidence at a departmental level: managing strategic relationships with funding partners; guiding Defra business areas to ensure that we meet current and future needs within increasingly constrained resources, while maintaining appropriate quality standards; ensuring evidence policies in Defra remain current, relevant and appropriate.

## Evidence needs

The Evidence Investment Strategy identified the need for more emphasis on interdisciplinary work and integration of evidence across Defra programmes; more collaborative working with other funders; and a clearer line of sight between evidence investments and policy. We are implementing these recommendations. Strategic Evidence collects, interprets and communicates information on evidence activities within Defra and beyond, in order to:

- Support and challenge the business SROs, so Defra can access the best evidence, quickly and at low cost, where possible with partners – this includes overseeing evidence plans and cross-cutting/strategic activities;
- Support the Management Board and the Chief Scientific Adviser (CSA) on strategic and cross-cutting investment decisions;
- Develop the expert community in-house and outside, to marshal resources efficiently; and
- Join up with partners to lever funding and share resources.

Strategic Evidence uses this information to provide input to strategic planning, ministerial and CSA briefings and a wide range of information and consultation requests (e.g. from the Office of National Statistics, Select Committees, Government Office for Science etc).

Some of these objectives are delivered primarily through the provision of programme resources to business areas, e.g. via the Strategic Evidence and Partnership Fund, which provides 'pump-priming' funding for policy teams to pursue evidence projects aimed at developing partnerships or testing novel approaches whilst leveraging external funds. Others are delivered primarily by deployment of our in-house specialist resource, e.g. the strategic overview of evidence activities and internal/external capabilities, or the provision of expert advice and tools (including economic, statistical, social research, operational research and data expertise).

## Key partners

Partners include the wider Defra Network, Research Councils, other Government Departments, Devolved Administrations, European Union.

# 29. Strategy Unit

## Evidence budget 2011/12

Strategy unit is a significant user of evidence.

## Policy rationale

Defra's Strategy Unit provides a number of functions to the department:

- Generating new ideas and strengthening Defra's analytic capacity
- Enhancing Defra's strategic capability
- Delivering flexible, strategic, ministerial and departmental support

As such it provides high quality, highly flexible and strategic resource and advice to the senior decision makers in the department. SU projects throw up gaps in the evidence base of various policy areas which may need addressing long term and spot cross-cutting opportunities for analytical solutions to long standing issues.

## Evidence needs

The Strategy Unit draws on the widest available research and evidence to identify analytical or evidence gaps relevant to cross-cutting policy or upcoming priorities for the Department and support strategic analysis. The Unit's evidence needs change rapidly and depend on the problem under investigation. For example, the unit has drawn heavily on economic and wider social sciences to analyse evidence supporting the transition to a Green Economy, supporting the conceptualisation of the Big Society, understanding and measuring social impacts, the development of the Green Investment Bank and other areas of policy.

Strategy Unit work largely encompasses fast paced project work which typically has shorter timescales than other Defra projects. The knowledge base and evidence needs are therefore largely driven by issues that have been identified as important to the strategic direction of Defra. Given this type of function Strategy Unit identifies research to commission and deploys analysts within the unit (economists, social researchers and strategy analysts) to gather the cutting edge thinking on the subject in question. Strategy Unit analysts are users of evidence and maintain strong networks and awareness of the evidence at a birds eye yet comprehensive level to allow for quality and detailed outputs which can inform decisions on needs for cross-cutting policy and evidence.

The evidence on which Strategy Unit draws and bases its analysis includes: academic research (including access to specialists), grey literature (NGOs, pollsters and consultant reports), liaison with other government departments (maintained through cross-Whitehall networks) and Defra's own research and analysis (both commissioned and 'in house').

## Key partners

The core of the Strategy Unit function is identifying future policy needs and making connections between Government Departments and Devolved Administrations which in turn can identify where there is capacity to lever funding and share resources. Maintaining links to the Strategic Evidence Programme and the wider research community highlights Defra's evidence priorities and works to influence the agendas of other funders.

# 30. Sustainable Consumption and Production

(Now part of the Green Economy and Strategy Directorate)

## Evidence budget 2011/12

£5,466k

### Policy rationale

There are many environmental and social impacts (e.g. resource depletion, climate change, pollution, economic growth, labour rights) which arise from the production and/or consumption of products and services in the UK. Many of these impacts arise outside the UK but arise directly from UK consumption. The SCP Programme exists to reduce the negative impacts and enhance the positive impacts through working with business and consumers. This particularly supports the Coalition Government's priority to "Support a strong and sustainable green economy, resilient to climate change".

### Evidence needs

Much natural science and economic analysis has already been undertaken, both nationally and internationally, in-house and externally, looking into the production and supply processes of goods and services that have the highest impacts over their life cycle. These form the focus of the Policy work into priority product impacts. Defra has also been developing an internationally respected social research evidence base to help us to understand and investigate the links between people's environmental attitudes, values, current behaviours and motivations and barriers.

Currently evidence investment is in 4 key areas:

- SCP measurement methods
- Sustainable products, services and materials (including energy using products)
- Business, economy and the environment
- Understanding and influencing behaviour

These areas continue to meet the Coalition Government's priorities and therefore those of the new Green Economy Programme. However several areas are prioritised within them in order to enable the Programme to generate and influence the policy frameworks that will allow business and consumers to move towards a greener economy. These are:

- Evidence on the UK's reliance on, and the impacts of, critical raw materials, especially those essential to the transition to a green economy.
- Increased understanding of how consumers use products and services in order to identify how best to influence individuals and communities to adopt more sustainable behaviours and lifestyles (e.g. through piloting and testing different intervention methods).
- Increased understanding and effective interventions for changing business behaviour, both in the UK and within global supply chains meeting UK demand for goods and services.

### Key partners

While our evidence does not critically depend on others, working with WRAP, the EA, DECC, the EC, research partnerships such as LWEC and Research Councils as appropriate will allow us to identify where evidence already exists, use resources most effectively and disseminate evidence findings to where they can be used for maximum impact. We also work with the Welsh Assembly Government as part of the shared evidence budget.

# 31. Sustainable Development

## **Evidence budget 2011/12**

£167k – SDU is also a big user of other evidence budgets such as Sustainable Consumption and Production and Sustainable Behaviours.

## **Policy rationale**

Good progress has been made in the last 16 years since the first UK Sustainable Development strategy was published. However, sustainable development goes beyond being considered as a 'green' issue, and thus needs to involve all government departments in its implementation. The Coalition Government has committed to a package of measures designed to mainstream the SD approach both in policy-making and in the way we run our operations and procurement.

## **Evidence needs**

The SDU funds knowledge exchange in the form of the Sustainable Development Research Network (SDRN). This consists of a network of more than 2,000 individuals in both the private and public sectors that have an interest in sustainability. A review of the SDRN carried out in early 2010 recommended continuation of the network, along with some changes to ensure the research carried out meets government policy needs. The SDRN has published some notable and influential reports, including "Motivating Sustainable Consumption" and "Environmental Citizenship and Pro-environmental Behaviour".

In February 2011, the Deputy Prime Minister and Environment Secretary announced a commitment to mainstreaming sustainable development across Government through an ambitious package of measures. Defra's SDU will be central in delivering this across Government, with Cabinet Office oversight. It is intended that the SDRN will provide a sound evidence base and a selection of case studies which can be used in guidance for policymakers.

In addition to the SDRN evidence base (mainly social research), and if funding allows, there is a good case for the development of a package of user-friendly tools and guidance which can be easily mapped to both the policy and evidence cycles to ensure that decision-makers take account of social, economic and environmental factors when developing policy. This will need to be done in the wider context of the newly-established Green Economy Programme.

## **Key partners**

Sustainable Development Research Network

Defra's Centre of Excellence (Sustainable Behaviour Unit)

LWEC network, Devolved Administrations (mainly the Welsh Assembly Government)

# 32. Sustainable, Secure and Healthy Food Supply

## **Evidence budget 2011/12**

£3,108k

### **Policy rationale**

The greatest challenges facing food systems are climate change, global food security and health. These global multi-faceted issues require a joined up, whole food chain approach, across government, businesses and wider society in order to deliver a sustainable, secure and healthy food supply.

### **Evidence needs**

This evidence programme covers the whole food chain, from primary production through to manufacturing, retail and distribution and the consumer with a post farm-gate focus. It addresses the overarching challenges to increase competitiveness in the food and drink sector; maintain the security and resilience of the food supply; reduce negative environmental impacts on the food supply chain; reduce waste generation; and increase socio-economic benefits of food production and consumption to promote the availability and uptake of quality, healthy food.

The evidence base supporting policy and technological innovation to address challenges on growth, competitiveness, food security, resilience, resource efficiency, and sustainable production and consumption is under-developed and is therefore reflected in the future needs of the research Programme. In order to secure a whole food chain approach, this work will join up with a number of other Programmes.

These evidence priorities will build on existing research and innovation activity which includes: increasing resource efficiency (energy, water, waste); improving raw material quality; reducing environmental and social impacts of food production and consumption; and identifying risks to the food supply. Furthermore, the programme will seek to understand how food can be produced and sold in the most sustainable manner. Understanding behaviours and practices across the whole food chain, will form part of this work. Research supporting sustainable consumption will also address consumer confidence in food, including food authenticity, as well as society's engagement with food production and sustainable healthy diets.

As the food consumed within the UK is set within the global context, future evidence needs will embrace climate change adaptation, water scarcity, demographic and social change and the impact of these on food consumption, food systems and global trends.

### **Key partners**

The programme coordinates evidence activity with the Waste and Resources Action Programme (WRAP), Biotechnology and Biological Sciences Research Council, Food Standards Agency, Department of Health, Technology Strategy Board and Scottish Executive, Welsh Assembly Government (as part shared evidence budget), food industry, knowledge transfer networks and will contribute to coordination activities including the Global Food Security Programme and EU joint programming and Framework research initiatives on food security, agriculture and climate change, sustainable food production and consumption

# 33. Veterinary Medicines and Antimicrobial Resistance

## Evidence budget 2011/12

£2,462k

### Policy rationale

The VMD's policy aims are to protect public health, animal health and the environment and promote animal welfare by assuring the safety, quality and efficacy of veterinary medicines and ensuring their continuing availability. The rationale for funding veterinary medicines research is to underpin an effective authorisation and control system. This is to minimise as far as possible threats to animal health and welfare but also to protect those using or coming into contact with veterinary medicines either directly or through residues in food. Potential impacts of veterinary medicines on the aquatic and terrestrial environments are also a key focus. Effectiveness of some veterinary medicines can be compromised by the development of resistance which can stop medicines being effective in treating disease. AMR is one area of major concern, and policy on AMR is currently jointly led by VMD and Defra (all responsibility to soon be transferred to VMD). AMR will continue to develop and spread. Policy aim is to minimise the speed this occurs and alleviate the consequence of untreatable diseases (in people and animals) developing. Once a specific type of resistance has developed it is almost impossible to eradicate. Therefore AMR is an important challenge since both human and animal health is at risk of being compromised.

### Evidence needs

The five principal objectives of the veterinary medicines R&D programme are to:

i) replace or reduce animal testing in the development and manufacture of veterinary medicinal products; ii) find appropriate methods to assess potential impacts on terrestrial and aquatic environments arising from the use of veterinary medicines; iii) effective residue testing methods to comply with national and EU statutory requirements; iv) develop science-based strategies to minimise the development of resistance to veterinary medicines to ensure continuing availability; and v) devise appropriate methods to better understand the long-term health effects on man and animals coming into contact with veterinary medicines.

AMR surveillance and R&D is focussed on five main areas: i) developing appropriate tools for AMR detection and characterisation; ii) investigating of how mutations/acquired resistance develop and are transferred so possible control strategies can be identified; iii) scientifically informing qualitative risk assessments so proper AMR risk management can be undertaken; iv) identifying AMR genes and/or host bacteria and their spread/transmission so new resistance types and emerging trends can be identified promptly and appropriate mitigation measures instituted where needed; and v) investigation of possible options for prevention and control.

### Key partners

Key veterinary medicines partners: CVMP/ EMEA, Codex Alimentarius, MHRA, RUMA, RCVS, BVA, VLA, academia, independent experts on VPC and VRC. AMR is a highly collaborative programme with a large number of partners including Defra/VMD, VLA, SAC, AFBI, Devolved Administrations, FSA, BBSRC, DH & HPA.

# 34. Waste and Resources

## Evidence budget 2011/12

£2,870k

### Policy rationale

The key elements for action in the **Waste Strategy 2007** were to incentivise efforts to reduce, re-use, recycle and recover energy from wastes. It focussed on the materials, products and sectors which had the greatest scope for improving environmental and economic outcomes.

### Review of Waste Policies (launched July 2010)

To ensure we have the right policies to achieve an overall aim of, 'working towards a zero waste economy', Government is conducting a thorough Review of Waste Policies, preliminary findings of which will be published in May 2011. The Review covers all aspects of waste policy and delivery in England.

### Evidence needs

The Waste and Resources Evidence Strategy (2007-2011) was developed to meet the evidence requirements of the WS2007. Since the publication of the strategy, the programme has delivered both new primary research and assembled existing and emerging evidence, to inform a variety of policy areas, including:

- regulation, such as managing hazardous waste and waste exports; emissions (greenhouse gases, health and safety issues)
- waste collection and treatment, including processes (e.g. to support development of anaerobic digestion); the best environmental options for managing key materials
- behaviour and attitudes with relation to waste (including the influence of collection schemes on recycling, and community involvement in waste management)
- waste composition (at point of source and at landfill)
- preventing household and business waste

To meet the evidence requirements of the outputs of the Review of Waste Policies from May 2011, a new **Collaborative Evidence Programme** is being put in place.

The aim of this new programme will be to provide more transparent and systematic management of Waste and SCP evidence provision and use by Defra and its agencies, with consideration of the overlapping needs of other parts of Defra, DECC and the Welsh Assembly Government. The scope of the programme will meet the evidence requirements of the Review of Waste Policies for both policy development, as well as delivery functions as the Review is implemented.

The structures and content of the new programme are currently being developed; details of which will be published following the launch of the Review.

### Key partners

Our key evidence provision partners are WRAP, the Environment Agency, DECC and WAG. We also work with research councils where appropriate (EPSRC and NERC) to co-fund and/or to help develop new areas of research.

# 35. Water Availability and Quality, and Drinking Water Inspectorate

## Evidence budget 2011/12

WAAQ: £3,000k DWI:£940k

## Policy rationale

**Water Availability and Quality (WAAQ):** Deliver the Government's and the Department's policy priorities in the areas of water supply, water quality, and reform of the water industry; supporting British farming and a sustainable food production, enhancing biodiversity and promoting a green economy resilient to climate change.

**Drinking Water Inspectorate (DWI):** To ensure that public water supplies in England and Wales are safe and drinking water quality is acceptable to consumers.

## Evidence needs

The **WAAQ Programme** faces a wide range of science and evidence challenges, covering natural sciences and socio-economics, across which our knowledge varies considerably. Main areas of investment in evidence to date have focussed on how we can influence change towards more sustainable management and use of water and how we can best reduce the impacts of a range of pollutants on the aquatic environment at an acceptable cost.

Sustained investment from Defra and its evidence partners is required to provide the underpinning evidence to deliver our policy priorities. This includes improving our understanding of the reasons why some water bodies are failing to achieve the new environmental objectives of the Water Framework Directive, and what are the most cost-effective actions we can take, with others, to achieve these objectives. More evidence is needed to inform how we can develop new, more holistic approaches to integrated catchment management (including urban water management) that better account for all the pressures acting upon the water environment. This will allow us to develop more 'joined up' and more socially inclusive solutions to protect and improve water quality and availability.

To help society achieve sustainable water management requires an understanding of how we can best achieve a balanced supply-demand regime. This includes understanding the benefits and risks of market reform of the water industry, making use of the most appropriate technology and innovations to enhance supply improve waste water treatment, and reduce leakage, and a better understanding of behaviours to achieve a more efficient use of water. Other key aspects of the water balance equation include the design of a modernised means of allocating water rights, and an improved means of setting and protecting 'environmental flows' (rivers) and 'water levels' (lakes, wetlands and groundwater) to provide the optimum level of protection for aquatic ecosystems from over-exploitation – all of which are dependent on a sound evidence base.

In the longer term, more evidence work is needed to identify the best means to fully incorporate ecosystem service evaluation, flood and drought management, climate change considerations, and behavioural change into all of WAAQ's policies. WAAQ also plans to implement horizon scanning to anticipate new threats to the water environment and water supplies, and to identify new ways to deal with existing and new challenges (from technology to social solutions).



The DWI will continue investing in evidence via the **Drinking Water Quality and Health Programme** to ensure a safe supply of drinking water and proper implementation of legislation; to anticipate any potential risks to public health; to advise Ministers; to support technical audits of water companies; and to provide them with a formal guidance for good practice. DWI will also undertake risk assessments of potential exposure via drinking water to emerging contaminants and support the adoption of risk-based approaches to regulate drinking water; this work will be supported by promoting innovation on the methods of analysis which will also be of value in the event of threats to water supplies. DWI also plans to improve understanding of consumer attitudes towards drinking water quality and their habits in water use.

### Key partners

**WAAQ:** UKWIR, OFWAT, WATER UK, EA, NE, NERC, CEFAS, UKTAG, WATERWISE, CEH, LWEC, WAG.

**DWI:** WHO, UKWIR, WRF, WAG

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