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Science into policy

Taking part in the process

Contents

Foreword	2
Introduction	3
The purpose of this booklet	3
What's in it for me?	3
Will I be supported?	3
The policy-making process	4
What do we mean by policy?	4
Evidence-based policy-making	4
The policy-makers and how they work	4
The legislative process for a UK Government Bill	4
Communicating with government	6
Why communicate with national governments?	6
Which government departments and agencies are particularly relevant?	6
The devolved administrations	6
Ways of communicating with government	6
Formal dialogue	7
Informal interactions, secondments and exchanges	8
Capturing information on economic impact	9
Government involvement with NERC's decision-making bodies	9
Government involvement in research programmes and projects	10
NERC involvement with government advisory committees	11
Responding to consultations	12
Communicating with national parliaments and assemblies	13
Why communicate with national parliaments and assemblies?	13
Which parliamentary bodies are particularly relevant?	13
Ways of communicating with national parliaments and assemblies	14
Individual parliamentarians	14
Parliamentary committees	15
All-Party Groups in the UK Parliament	16
Information offices for parliamentarians	16
Policy-making at other levels	17
Regional and local policy-making	17
European and international policy-making	17
How to influence European and international policy-making	18
Working with and through other stakeholders	20
Ten top tips for communicating science to policy-makers	21
Tools for science-to-policy work	22
Science-to-policy training and 'people flow' opportunities	24
Information sources	26
Index of case studies	27
Glossary	28

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Back cover: Just a few of the people who have helped turn NERC-funded science into policy.
 From top left clockwise: Carol Turley, *Plymouth Marine Laboratory*; Dan Osborn, *Living With Environmental Change*; Daniela Schmidt, *University of Bristol*; Bill Sutherland, *University of Cambridge*; Kathryn Monk, *Environment Agency Wales*; Andrew Pullin, *Bangor University*; Gemma Cassells, *University of Edinburgh*; Faith Culshaw, *NERC/LWEC*; John Rea, *Department for Environment, Food and Rural Affairs*; Emily Shuckburgh, *British Antarctic Survey*; Jonny Wentworth, *Parliamentary Office of Science and Technology*; Anne Glover, *European Commission*; Jacky Wood, *National Oceanography Centre*; Gavin Killip, *University of Oxford*; Rosie Hails and Mike Billett, *both Centre for Ecology & Hydrology*.

Cartoons ©Noel Ford

Foreword

Never have environmental issues been higher on the political agenda.

Growing awareness that our planet is finite, that the population is rising and that a large section of the world is undergoing rapid industrialisation, means that the sustainability of natural resources is now in everybody's mind – in the laboratory, in the board room, in the popular imagination, and in the corridors of power.

This is a time of enormous opportunity for NERC, one of the few organisations with the world-class, relevant expertise to find solutions to these problems. But we can't do it alone – we have to work in partnership, both across disciplines and with policy-makers and influencers. In the next few decades governments and international organisations will make far-reaching decisions on how to manage our planet's resources. To make informed choices they will need the best evidence available.

This booklet is intended to help scientists not only provide this evidence to policy-makers, but also work with them to ensure it has maximum uptake and impact. Engaging policy-makers in science doesn't just mean making research results available. It also means helping them understand the implications and working with them to decide how to respond, and what further research or other activity is needed.

The Living With Environmental Change (LWEC) partnership, launched in 2008, is one mechanism for this kind of engagement. It brings together the UK's leading public-sector research funders with users from the worlds of policy, business and wider society to design and deliver innovative research that addresses the urgent challenges of environmental change. So far, more than 20 partners have invested over £800m in this ten-year commitment, representing an unprecedented degree of collaboration between Government Departments and Agencies, Devolved Administrations and Research Councils.

NERC has a long tradition of making an impact by communicating science to government. For example, we were heavily involved in the decision to delay rebuilding the Thames Barrier by about 40 years, saving the nation very substantial sums of money. NERC has also played an important role in influencing international climate change negotiations, and in ensuring the government is better prepared for natural hazards from space weather and volcanic ash to flooding, storms, wildfires and drought, through the Cabinet Office's Natural Hazards Partnership.

Working with politicians and civil servants can be challenging for scientists, but it also offers big rewards – not least the satisfaction of seeing knowledge move from the lab, field and ocean to make a real difference in the wider world.

We hope this booklet will help a new generation of scientists to take part in the process of making UK environmental policy more effective, and by working better in partnership with policymakers and others to help answer the big questions – like how can we feed 9 billion people, and how do we live in a world that's 4°C warmer?

Duncan Wingham
Chief Executive NERC
June 2012



Duncan Wingham, Chief Executive

Introduction

If we – the Natural Environment Research Council (NERC) community – want our science to have maximum impact and be used to provide sustainable solutions to environmental challenges, we need to communicate it to those who can use it.

NERC's understanding of the environment has significant potential to contribute to better government policy, to help the economy and improve people's lives. Part of our mission is to use our science to benefit the UK, and we expect all NERC-funded researchers to participate in this process of knowledge exchange.

Most environmental science is relevant to policy either in the short-, long-, or very long-term. It can inform policy in a simple and direct way, for example by prompting the development of a specific regulatory tool, or in a more complex way, by supporting broader, more high-level policy development.

The purpose of this booklet

This booklet aims to help NERC staff and NERC-funded scientists to:

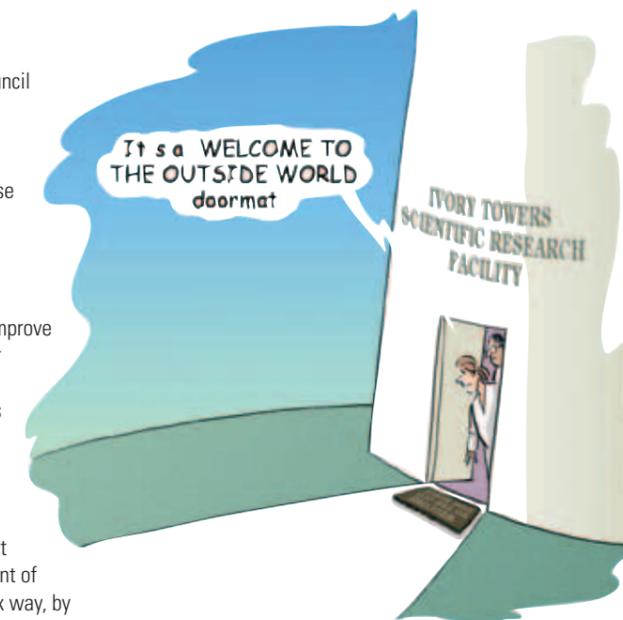
- recognise the relevance of their science to policy-makers and engage with science-to-policy activities from the outset;
- identify opportunities, routes and best practice to inform policy-making, including opportunities to feed into NERC's corporate science-to-policy activities;
- communicate science in an appropriate and accessible way, to the right policy-makers, showing how it fits their needs.

We have used case studies to illustrate the different approaches described, and drawn out reasons for success, where appropriate, as learning points.

The first part of the booklet provides information on policy-making in general and communication with particular policy-making bodies, from the local to the international but with an inevitable focus on the UK level. The second part includes tips and summaries of tools, training opportunities and information sources.

What's in it for me?

Although not all the science-to-policy activities described in this booklet will be appropriate to everyone, we hope you will find some inspiration. We identify where NERC acts corporately (eg in co-ordinating NERC responses to consultations and inquiries – if you are at a Research Centre or represent a major NERC investment, you could contribute to these) but also opportunities for individual scientists at universities to take part in the process.



The principal aim of science-to-policy activities should be to ensure that policy-making is underpinned by sound science, but added benefits might include job satisfaction, kudos and enhanced external awareness, added interest and variety, future funding and collaborative opportunities, and career development.

Please note that NERC's remit does not include lobbying or political activities. Our aim should be to provide information to allow policy-makers to develop and properly assess policy options, not to push a particular line. It is also important to consider who you are representing, and to coordinate with colleagues where possible/appropriate, or where there is a NERC process in place.

Will I be supported?

Some people, especially university academics, may not feel that science-to-policy and other knowledge-exchange activities are properly recognised. However, the government's increasing emphasis on knowledge exchange is gradually changing this culture. Indeed, the Department for Business, Innovation & Skills (BIS) is insisting that the new UK Research Excellence Framework, which will replace the Research Assessment Exercise, should duly reward influence on policymaking.

While maintaining its strong support for responsive research* and continuing to assess applications primarily for their scientific excellence, NERC also asks applicants to provide, as part of their grant applications, a 'pathways to impact' document, explaining how they will disseminate their results. Members of the Affiliate Peer Review College (mainly science 'users') – see pages 9 and 26 – help advise panels whether the activities proposed and funding requested in these plans are appropriate.

'From the development of groundbreaking new treatments to studies that shape public policy and improve lives, the significant economic and societal impact of the UK research base is extremely impressive.'

Universities and Science Minister David Willetts, on the release of a series of reports on the impact of Research Council funding during a speech at Policy Exchange, 4 January 2012.

* Responsive mode funding includes 'blue-skies' research – where scientists put forward their own research ideas. These can often produce unexpected results that can lead to new products or inform government policy.

The policy-making process

Guidelines for policy-makers on using science

In 2010, the government's Chief Scientific Adviser produced revised Guidelines on Scientific Analysis in Policy Making. These address how government departments should obtain and use scientific analysis and advice in policy-making. www.bis.gov.uk/assets/bispartners/goscience/docs/g/10-669-gcsa-guidelines-scientific-engineering-advice-policy-making.pdf

A major concern for policy-makers is the need to assess risk and uncertainty. The issue was investigated in 2006 by the former House of Commons Science & Technology Committee in its inquiry Scientific Advice, Risk and Evidence-Based Policy Making. www.publications.parliament.uk/pa/cm200506/cmselect/cmsctech/900/900-i.pdf

It has also been considered by the Parliamentary Office of Science & Technology. www.parliament.uk/documents/upload/POSTpn220.pdf. This highlighted the different types of risk and uncertainty, the benefits of public engagement, and the guidance that uncertainties should be made explicit and their implications transparently taken into account in decision-making.

A note about case studies

The case studies in this booklet are to illustrate good practice in helping to make the science-to-policy process happen. We hope they will give you ideas of approaches to use. However it's worth remembering that the process is rarely straightforward, and that science is only one input to the policy-making process (social and economic factors often play a more major role) and that because of this, policy-making may not always be based principally on the available scientific evidence. See index of case studies, page 27.

What do we mean by policy?

Policy is a plan of action or a measure developed in response to a perceived need, in order to achieve a particular outcome.

For example, regulatory agencies often provide guidance or establish official rules and procedures (regulations); organisations develop strategies to focus their activities; and governments introduce legislation to achieve a range of social, economic and environmental goals.

Evidence-based policy-making

Government departments increasingly stress the need for evidence-based policy (see for example: <http://archive.defra.gov.uk/corporate/policy/evidence/>), and it's clear that sound policy-making relies upon the government receiving a flow of reliable information from all relevant sectors, public and private.

At the same time, policy-makers and scientists need to recognise that policy may have to be decided in the absence of complete information. Scientists may need to qualify the advice they give, but be ready to form opinions on the possible options.

Policy-making is an ongoing process. Although the details vary, it commonly involves an iterative cycle. Since scientific findings can contribute to the evaluation as well as the initial development and implementation of policy, it is appropriate for scientists to be involved not only early on, but also in reviewing policy and proposing amendments to improve it.

The policy-makers and how they work

For the purposes of this booklet and depending on the context, policymakers include:

- ministers and other parliamentarians, and parliamentary committees
- civil servants in government departments, devolved administrations and agencies
- members of regional assemblies and local authorities
- scientific and political advisors and advisory bodies.

Although policy-makers are advised to refer to the government guidelines on scientific analysis in policy-making (see left), political realities and serendipity also often play significant roles.

Not many policy-makers have a scientific background; some may not appreciate the relevance of science to their work, and most are very short of time. They often prefer to obtain scientific information from secondary sources which digest and simplify complex analyses. They are more likely to pick up your message from a newspaper report (or even Wikipedia!) than from a scientific paper.

You will probably have most opportunity to interact with civil servants or administrators involved in running research programmes and/or developing policy. You might also interact with government science advisors, including Departmental Chief Scientific Advisors. Occasionally NERC interacts directly with ministers.

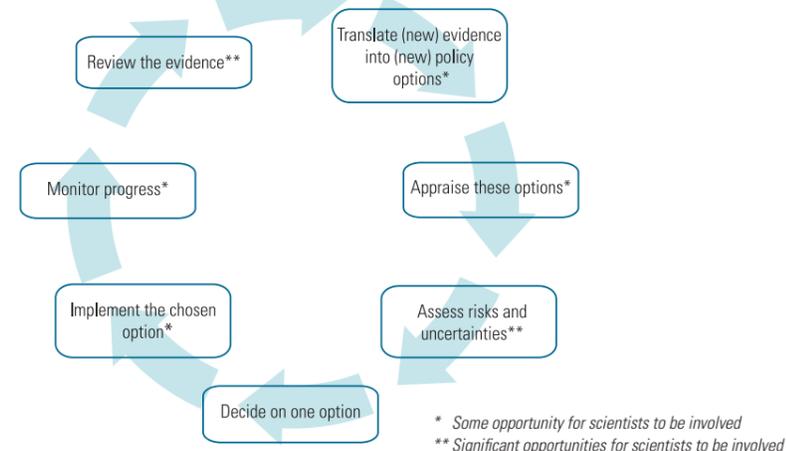
But there are other effective ways of communicating your message and ensuring that when your science is relevant, the right people get to hear about it. The approach you take will depend upon the circumstances. Policy-makers are increasingly acknowledging the importance of ensuring that policy is understood and fully accepted by the public. Scientists should therefore see communicating with the public as an important aspect of translating science into policy. As shown in the next section and in the section on 'Working with and through other stakeholders', there are also many stakeholder organisations with and through which scientists can work to communicate with policy-makers. Often, industry, policymakers and scientists working together will bring about necessary policy changes.

The legislative process for a UK Government Bill

The flow-chart opposite shows the legislative process for a UK Government Bill.

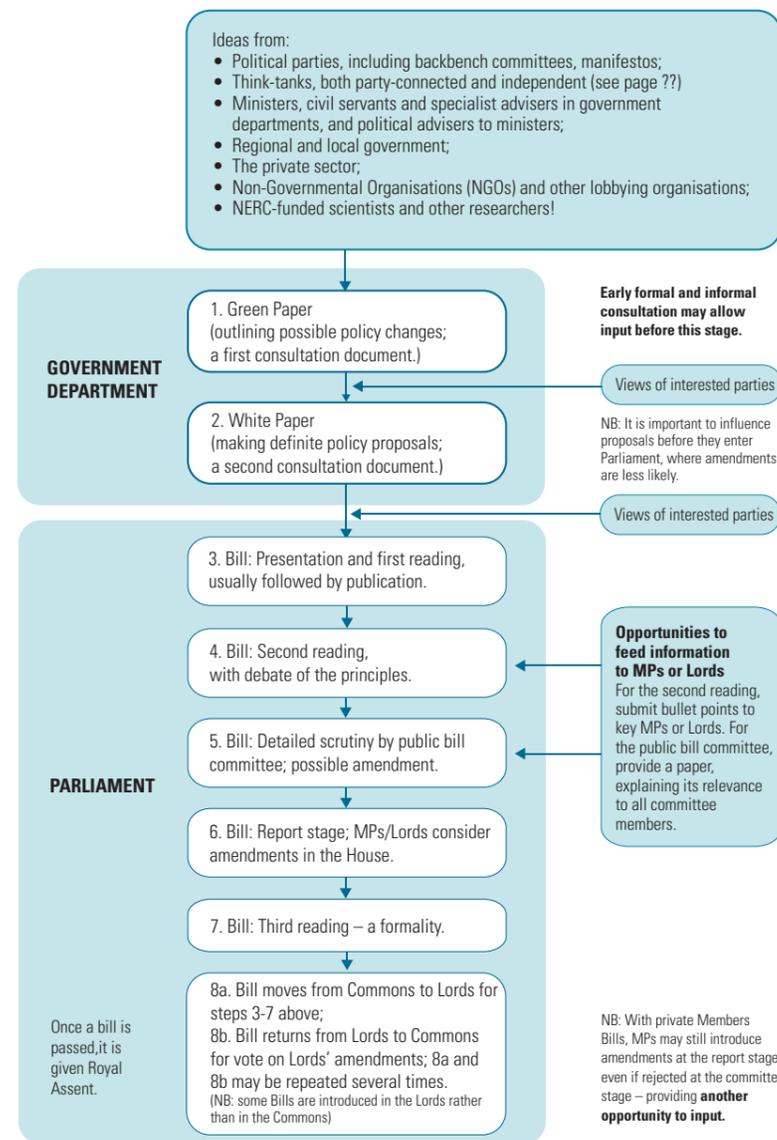
It's easier to influence legislation at the Whitehall stage, i.e. as green and white papers in the relevant government departments, before it reaches Westminster (Parliament). This is why interacting with government, both through formal mechanisms such as consultation responses and high-level meetings, and informal relationships, can be so effective.

The policy-making process



UK Legislation – procedure for a UK Government Bill

Government Bills are only one type of UK legislation. Useful fact sheets on Bills are available at: www.parliament.uk/factsheets



CASE STUDY

Top 25 challenges to UK biodiversity: policymakers and scientists working together to define the questions

Environmental scientists and policy-makers have drawn up a list of the 25 most pressing new issues likely to affect biodiversity in the UK before 2050. It includes issues such as artificial life, nanotechnology; the impact of geo-engineering the planet to mitigate climate change; and the effect of rising demand for biofuels.

The list is the outcome of an innovative two-day meeting funded by NERC involving 35 representatives from government, environmental organisations and academia.

Lead scientist Bill Sutherland from the University of Cambridge explained, 'We are not predicting but just saying what 'might' become important. We can then think about what science we might need in place and at what time, so that we can deal with those issues that are likely to arise'.

The top 25 report containing the list is now being widely used within government organisations. www3.interscience.wiley.com/journal/119392130/abstract

The exercise shows how horizon-scanning could have helped foresee issues that have taken scientists and policy-makers by surprise in the past, such as the public's response to genetically modified crops or the negative effects of policies on biofuels.

Reasons for success:

- The team involved a broad selection of around 450 individuals with ideas on which issues might become more important in the future. They ranged from academics to policy-makers and journalists. Numerous major organisations with an interest in environmental issues participated.
- Instead of asking the question 'why don't policy-makers make better use of science?' the team asked 'what science do policy-makers need?'
- The workshop allowed for face-to-face communication and relationship-building.

Communicating with government

CASE STUDY

Saving the Wandering Albatross: scientists, policy-makers and fishermen working together to find a solution

British Antarctic Survey (BAS) scientists have counted breeding pairs of wandering albatrosses at South Georgia every year since 1972. Over this time the population has halved.

BAS data showed that the problem lay not with a lack of breeding success but with deaths as birds scavenge behind long-line fishing vessels and are caught by baited hooks. Satellite tracking showed that male albatrosses in particular were foraging within the South Georgia Patagonian toothfish fishery during the chick-rearing period.

The Commission for the Conservation of Antarctic Marine Living Resources (CCAMLR), which regulates fishing in the region, decided the birds needed greater protection. BAS scientists worked closely with CCAMLR officials as well as fishermen and fisheries managers to establish the scientific basis for a workable conservation policy.

The results have been a huge success; accidental albatross deaths in the fishery fell from almost 6000 in 1999 to zero since 2006, greatly improving the breeding population's long-term prospects. CCAMLR is now seen as a model for other fisheries commissions, particularly as further tracking of albatrosses has shown that they are still being killed in large numbers when they venture into areas controlled by other authorities.

Albatross populations continue to fall. Small logging devices fitted to albatrosses show that many feed off South America and South Africa where mitigation measures have not been implemented to the same level. Here, bi-catch continues.

Why communicate with national governments?

The uptake of NERC's research outputs into policy-making depends to a large extent on its relevance to the interests of governments. That's obviously not to say that all the research we fund should be geared to those interests.

It is important for NERC to:

- be aware of and contribute to the strategies and policies of relevant government departments, and vice versa;
- discuss opportunities for collaboration on research projects and joint training, and alert departments to the scope for commissioning research from NERC's research centres;
- interact with devolved administrations, which also deal with environmental and other policy areas, as well as Whitehall departments such as the Department for Environment, Food and Rural Affairs (Defra) and the Department of Energy and Climate Change (DECC);
- ensure that governments have easy access to our research outputs.

Which government departments and agencies are particularly relevant?

NERC has a special relationship with our parent department – the Department for Business, Innovation & Skills (BIS). BIS is responsible for developing, funding and managing the performance of the UK's science and research base. It is headed by the Secretary of State for Business, Innovation & Skills, assisted by, among others, the Minister of State for Universities and Science (who has a seat in Cabinet along with the BIS Secretary of State) and the Science and Research Group. We interact particularly with the Science and Research Group, holding update meetings and providing information and briefings. The Science and Research Group sends an Observer to NERC Council meetings.

Within BIS, the Director General, Knowledge and Innovation is responsible for advising on the resources required by the research councils and is a member of

the BIS Management Board. There is also a separate Government Office for Science in BIS, headed by the government's Chief Scientific Advisor (GCSA).

Other government departments generally cover distinct policy areas. These are given on their websites and in their science and innovation strategies. However some science areas may interest several government departments and agencies.

For example, research on biofuels from energy crops is relevant to Defra, DECC, BIS, the departments for Transport (DfT) and International Development (DfID), environmental agencies and local and devolved bodies.

One main department or agency should be responsible for policy-making in the area relevant to your science, but it may be worth establishing contacts with as many relevant stakeholders as possible.

The devolved administrations

The European Union strongly influences environmental policy in the UK, but the responsibility for it in Northern Ireland, Scotland and Wales lies with the devolved administrations. This is true also for transport, agriculture, and regional economic development <http://archive.defra.gov.uk/corporate/policy/evidence>. The Scottish Government has a Chief Scientific Advisor as does the Welsh Assembly Government. The Scottish Government also has a Rural and Environment Chief Scientific Advisor.

In the devolved administrations the science-to-policy process is often more straightforward, mainly because smaller numbers of people/government departments/communities are involved, so it is easier to identify the right person to talk to; lines of communication are more obvious and relationships easier to establish.

Ways of communicating with government

We can communicate our science to government through various routes, both formal and informal. The tables on pages 7-12 provide details.

Formal dialogue

Route and description	Who's involved	Aims	Your participation
High level meetings – regular (usually annual) and ad hoc meetings between NERC and relevant government departments.	NERC Chief Executive and/or directors and knowledge exchange staff; government Chief Scientific Advisors and evidence teams.	<ul style="list-style-type: none"> • To find out about government policy priorities and research requirements; • To inform government about NERC science, processes, contacts and capabilities; • To identify areas and mechanisms for potential collaboration; • To update each other on respective strategies, encouraging reciprocal engagement in their development; • To meet new appointees – eg Chief Scientific Advisors; • To facilitate funding decisions. 	<ul style="list-style-type: none"> • Respond to briefing requests. (Before meetings take place, NERC organisers ask research centre contacts, Swindon Office managers and science theme leaders for agenda items and briefing. Although only high-level strategic issues tend to make it onto the agenda, we can sometimes pursue other items through working-level meetings. We provide feedback to the contributors.)
Concordat agreements and memoranda of understanding – written formal commitments (but not contractual) between organisations to work together, often focussed on specific areas of science.	Universities, NERC or its individual research centres, and government organisations.	<ul style="list-style-type: none"> • To help ensure regular liaison and information exchange about strategies and priorities; • To facilitate international collaboration in specific research areas. 	<ul style="list-style-type: none"> • Explore the need for new MoUs when new opportunities for collaborations arise, especially with international organisations.
Science briefing/seminars in government departments.	Senior NERC scientists and civil servants, occasionally ministers.	<ul style="list-style-type: none"> • To provide relevant up-to-date information on a topic agreed between NERC and the government department; • To inform policymaking and provide evidence for international negotiations. 	<ul style="list-style-type: none"> • Take opportunities to participate, remembering to make your science as accessible and relevant as possible to the audience.

Advice on managing seal populations

NERC has only one statutory duty in the context of providing advice to government: namely, to provide advice on the scientific aspects of the management of seal populations under the Conservation of Seals Act 1970. Every year the Sea Mammal Research Unit – a NERC research centre – submits advice, which is approved by the Special Committee on Seals. The data have been used to identify and define Special Areas of Conservation for seals under the EU Habitats Directive.

CASE STUDY

The Meeting Place – Transformative Change through Collaboration

The UK Energy Research Centre's Meeting Place brings together international experts and stakeholders to develop solutions and further the energy debate. Events are always well attended and highly regarded as collaborative, interdisciplinary and relevant.

Using new facilitative techniques and inviting participants to focus on new modes of inquiry, the Meeting Place has connected more than 6000 people from 35 countries.

Outputs from events feed into national and international decision-making processes through, for example responses to policy consultations and G8/G20 proceedings. They are also used to establish research agendas and to publish reports, peer-reviewed articles, books and other publicity material.

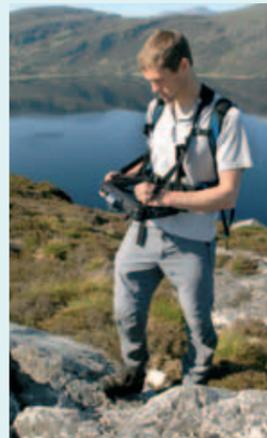


CASE STUDY

Countryside Survey: delivering science to policy-makers

The Countryside Survey, led by the Centre for Ecology & Hydrology (CEH), audits the UK countryside's natural resources. It informs policy by providing reliable evidence about the state of the rural environment.

The Survey has been carried out since 1978, letting us detect subtle changes in the countryside over time. The main partners are NERC and Defra, though others are involved. It addresses the lack of consistent and reliable statistics to gauge the effectiveness of existing policies, and whether new ones are needed.



The survey has significantly influenced both UK and national policy. For example, the 1990 survey's evidence of a 20% loss of hedgerows underpinned discussions leading up to the Hedgerow Regulations of 1997.

The 2007 survey for the first time provides separate reports for England, Scotland and Wales, responding to demand for policy relevant information on individual UK countries.

In 2010 at the launch of the final publication of the Countryside Survey, the Integrated Assessment report, the Environment Secretary, Caroline Spelman, said, 'The UK has some of the best environmental scientists in the world and using their skills we are gathering more information on changes to our land and the effects this has on species and habitats. This survey will help us analyse what effects policy decisions have and where and how we need to take action.' ➡

Informal interactions, secondments and exchanges

Route and description	Who's involved	Aims	Your participation
Informal interactions between scientists and policy-makers – usually by phone or email.	Policymakers and scientists, at all levels.	<ul style="list-style-type: none"> To help policymakers obtain information quickly from scientists they know and trust; To have ongoing two-way interactions at an informal level – this is arguably the most effective science-to-policy route and enhances all other mechanisms. 	<ul style="list-style-type: none"> Scientists often have to be proactive here - policy-makers are so short of time. Building relationships takes commitment and time – benefits are unlikely to appear immediately.
Working-level meetings.	NERC officials and key contacts in government. Also researchers on collaborative or commissioned research projects involving government departments.	<ul style="list-style-type: none"> To find out about the latest government developments and priorities; To help to determine agendas for high-level meetings and to ensure that agreed actions are followed up; To build understanding and trust. 	<ul style="list-style-type: none"> If you're a researcher wanting to inform a government department of your work, it is crucial to identify those few civil servants responsible for the relevant policy area – this is usually much more effective than going straight to the top. Officials five or six grades from the top of a department often provide the first draft of analysis and advice on the relevant policy. Inform them, and you can inform those at higher levels.
Secondments and exchanges – eg NERC policy placement scheme and Royal Society pairing scheme for MPs, Civil Servants and Scientists.	Scientists and policy-makers.	<ul style="list-style-type: none"> To improve science-to-policy links and support evidence-based policy making; To improve understanding and provide training on both sides. 	<ul style="list-style-type: none"> Apply either for a workshadow (up to 1 month) or policy fellowship (up to 24 months) via the NERC policy placement scheme – see page 24 – or for an exchange, apply to the Royal Society scheme.
Events, workshops and exhibits – including annual community events, end-of-programme events and external exhibitions/ events.	NERC staff and NERC-funded scientists, government officials and other users.	<ul style="list-style-type: none"> To create opportunities for networking and developing contacts; To obtain policy-makers' input to NERC strategy development and implementation; To highlight policy-relevant outputs from NERC science. 	<ul style="list-style-type: none"> Attend those events where your science is being discussed and take opportunities to network with relevant users. Encourage relevant policy-makers to attend and arrange to meet them; Ask to display posters of your/your group's work in government departments. Display where people are likely to stop and look, for example a waiting area, and keep them current/link them with other activities.

Capturing information on social and economic impact

Route and description	Who's involved	Aims	Your participation
Capturing information on the impact of NERC science and providing it to government – ie providing information on the economic impact (which includes impact on public policy) of NERC science to BIS via Swindon Office.	Any scientist in the NERC community who has influenced policymaking or whose ongoing science is highly relevant to policymaking can give case studies to Swindon Office, which has to provide evidence of NERC's economic impact to government. Case studies may also be used in meetings with government departments, ministers and in NERC publications to a wide audience.	<ul style="list-style-type: none"> To build up a comprehensive, searchable database of evidence to inform meetings with BIS and other government departments (see Science Impacts Database, page 22); To promote the relevance of NERC science to users; To raise NERC's profile and that of its science/scientists; To fulfil a requirement for government spending reviews. 	<ul style="list-style-type: none"> Give comprehensive information to the cross-council Research Outcomes System (ROS) on how your science has provided advice to government and/or is relevant to environmental policymaking; Provide information directly to the knowledge exchange team in Swindon Office, especially information which isn't captured through ROS – eg that which arises from a collection of projects, or from externally commissioned research.

Government involvement with NERC's decision-making bodies

Route and description	Who's involved	Aims	Your participation
Government representation on NERC Council, Science and Innovation Strategy Board (SISB), Research Centre Boards.	Appointments are through open calls. Council members come from the scientific and user communities, and are appointed by the Secretary of State for Business, Innovation and Skills. SISB members participate as individuals rather than representatives, but NERC aims for a good balance across public and private sectors and science areas. See www.nerc.ac.uk/about/work/boards/ . Research centre boards and advisory committees reflect main stakeholder interests.	<ul style="list-style-type: none"> To communicate policy needs and science information; To raise awareness, encourage joined-up thinking and avoid duplication. 	<ul style="list-style-type: none"> Alert your government contacts to these opportunities, especially those who you think would represent their user community well, are influential, have a 'big picture view', and are supportive of translating NERC science into policy.
NERC Peer Review College.	Annual calls are made for full and affiliate members of the Peer Review College. Government staff may be full members if they have strong scientific expertise, but are more likely to be on the affiliate college, which is mainly made up of policymakers, business and third sector users.	<ul style="list-style-type: none"> To obtain the 'user view' on our knowledge exchange scheme applications; To engage science 'users' in judging pathways to impact plans in grants – these need to identify potential beneficiaries of the research (often policy-makers) and dissemination methods. 	<ul style="list-style-type: none"> Alert government contacts to these opportunities, also those in other public and third-sector organisations.



➡ The report tested new ways of combining Countryside Survey data with other datasets to understand how ecosystem services respond to human pressures. It quantified certain ecosystem services for the first time, including pollination, clean freshwaters and soil carbon uptake, as well as modelling 'what if' scenarios. This was used to make an important contribution to the UK National Ecosystem Assessment (2011), by developing scenarios showing how ecosystems could be affected over the next 50 years depending on what emphasis is given to environmental sustainability or economic growth.

The 2007 survey supports policy in areas including:

Biodiversity: evidence on habitats lets policy-makers assess trends in and threats to biodiversity, and the results of policy interventions aimed at meeting the UK's biodiversity targets.

Natural environment: better understanding of the dynamics and distribution of ecosystem services will help in developing ecosystem based approaches to policy.

Water resources: information is helping policy-makers develop plans to implement the EU Water Framework Directive.

Urban development: the Land Cover Map provides a consistent database of built-up land, which helps policy-makers understand the impact of urban development on ecosystems and minimise future environmental damage.

Climate change: the survey is the main source of information for the land cover/land use change component of the National Inventory of Greenhouse Gases.

CASE STUDY

The state of UK seas

NERC scientists contributed to the Defra report 'Charting Progress 2: The state of UK seas'. This report will help ensure the UK meets national and international environmental targets.

'In 2012 the UK has to produce an initial assessment for the EU Marine Strategy Framework Directive,' says Professor John Huthnance of the National Oceanography Centre (NOC). 'The UK has also set itself the goal of "clean, healthy, safe, productive and biologically diverse oceans and seas".'

Under the Marine Strategy Framework Directive, EU member states need to achieve 'good environmental status' for their marine waters by 2020.

Scientists from NOC, Plymouth Marine Laboratory (PML), Scottish Association of Marine Science (SAMS), the Sea Mammal Research Unit (SMRU) and the British Geological Survey (BGS) provided input to the report. Reviewing existing evidence, researchers found changes in ocean processes such as higher air and sea temperatures, increasing acidity caused by dissolved carbon dioxide, and rising sea levels. Many of these changes are driven by climate change and could affect marine wildlife and coastal communities.

The sea supports much of the UK economy. Fisheries contribute £204 million per year; sea-based leisure activities contribute over £1.2 billion, and the oil and gas sector £37 billion. Yet all of these may harm wildlife and habitats, and reduce productivity of the seas around the UK.

Government involvement in research programmes and projects

Route and description	Who's involved	Aims	Your participation
Government involvement in NERC research programmes – ie representation on NERC programme executive boards, advisory committees or assessment panels.	NERC staff or contractors setting up research programme management/ advisory structures often appoint users, eg government representatives such as department or agency staff (from either science or policy areas). For very large investments, several users may be needed to ensure that the 'user voice' and 'big picture view' aren't marginalised.	<ul style="list-style-type: none"> To help ensure coherence of the individual projects in a research programme, and their policy relevance; To obtain advice on government needs and perceptions of scientific issues; To help set policy-focussed objectives and ensure they're adhered to throughout the programme; To identify key policy-making contacts; To help in shaping the nature of the outputs; To encourage principal investigators (PIs) on projects to follow up policy-maker interest identified at the outset; To ensure programme workshops have a policy-focussed element; To obtain advice on public engagement and dissemination of outputs. 	<ul style="list-style-type: none"> Consider whether you need someone with the appropriate scientific background and/or policy experience; The Dod's Civil Service Companion (see page 27) provides biographies of civil servants and information on department organisation, agencies, non-departmental public bodies and regional and devolved government bodies. Government department websites can also be useful; Ask NERC's Knowledge Exchange team for help in identifying government contacts; Use these opportunities to build up relationships with government; also to inform NERC of evidence of impact (see page 22, Science Impacts Database).
Government-commissioned and partnership research – ie a government department or agency commissions research to meet a specific policy need	A government department and a research supplier, eg university department or research centre.	<ul style="list-style-type: none"> To produce evidence to inform specific policy needs; To give sustained policy advice in long-term programmes (long-term arrangements are preferable, especially as policy impacts tend to be long-term) To provide appropriate and accessible outputs; Partnership research jointly funded by NERC and the government helps create mutual awareness where there are clear goals. However, watch out for narrowing research agendas and intellectual property rights and commercialisation issues. 	<ul style="list-style-type: none"> Note that: <ul style="list-style-type: none"> – policy-maker involvement in the pre- and post-commissioning process helps scope the science or problem and the delivery or interpretation of results; – it is important to respond quickly to policy-makers' needs, so building flexibility into the programme can be helpful, but shouldn't jeopardise long-term objectives. Look out for relevant government calls for tender.

NERC involvement with government advisory committees

Route and description	Who's involved	Aims	Your participation
Membership of a government advisory committee.	Individual scientists, usually appointed on the basis of their individual expertise rather than as representatives of an organisation. Expert panels are sometimes set up at short notice in response to an emergency situation and these may include NERC scientists. An example is the Natural Hazard Working Group, set up by the then Government Chief Scientific Adviser Professor Sir David King, following the Indian Ocean tsunami in December 2004. Individuals were invited to join (a case of 'it's who you know'), but for non-emergency panels and advisory groups, places may be advertised.	<ul style="list-style-type: none"> To ensure NERC science is fed into government advice; To provide advice to the government in emergency situations. 	<ul style="list-style-type: none"> See the list of all Defra's delivery bodies including advisory non-departmental public bodies at www.defra.gov.uk/corporate/about/with/delivery/a-z/; Consider applying for membership of relevant committees: appointments (also to other public bodies) are advertised at: www.publicappts-vacs.gov.uk/; It's sometimes possible to invite oneself onto a committee. It obviously helps to be an acknowledged expert relevant to the function of the committee, or at least to belong to an organisation with a good reputation. This is one reason why NERC is keen to raise its profile and the profile of its institutes, especially among non-scientists, and to promote the use of its science.
Providing science input to an advisory committee.	Individual scientists and organisations. Many advisory committees welcome contributions from interested parties; a contact name is usually given on the website. Some groups also hold occasional open meetings.	<ul style="list-style-type: none"> To provide key scientific input to the advisory process. 	<ul style="list-style-type: none"> Keep track of relevant advisory committee activities and contact them if you have relevant scientific information which may help.

NERC's role in providing emergency advice to government

Route and description	Who's involved	Aims	Your participation
Direct request from government to NERC and/ or proactive offer of expertise and advice from NERC to government	Government Chief Scientific Advisors, NERC Chief Executive, directors and scientists in research centres, scientists on expert panels	To provide urgent advice, and offer expertise and capability as needed to respond to an emergency situation e.g. volcanic ash cloud, earthquake or animal disease	Feed in relevant advice to expert panels as needed. See above for information on membership and providing input to advisory committees.

Which committees have NERC members?

NERC scientists are members of numerous UK advisory non-departmental public bodies. Examples include the Advisory Committees on Hazardous Substances and on Pesticides, the Air-Quality Expert Group, and the UK Biodiversity Research Advisory Group.

Alan Jenkins, Science Director of CEH's water programme, is chair of the UK Inter-Departmental Committee on Hydrology – as well as being Hydrological Advisor to the UK Government.

Professor Rosemary Hails MBE of CEH is chair of the Natural Capital Initiative and a member of the Advisory Committee on Releases to the Environment.

CASE STUDY

Foot and mouth disease

In response to a government request during the national emergency caused by the outbreak of foot and mouth disease in 2001, BGS offered its services and was called on to provide, often at extremely short notice, information critical to decisions about sites for burning and burying carcasses. These site-specific reports dealt with the potential risk to groundwaters, and were provided to the Environment Agency, the Scottish Environment Protection Agency (SEPA), the Ministry of Agriculture, Fisheries and Food and the Army.



CASE STUDY

How NERC supported the national response to the Iceland eruption and ash cloud in 2011

NERC research was central to assessing the threats posed by volcanic ash from the Eyjafjallajökull volcano eruption in 2011. NERC scientists from the National Centre for Atmospheric Science (NCAS), BGS and universities all provided crucial advice to the Scientific Advisory Group for Emergencies (SAGE) and liaised with Icelandic authorities.

The scientists were involved in the detail of the response, assisting the daily briefings of the Civil Contingencies Secretariat and with colleagues in SAGE developed scenarios and the case for including volcanic eruptions in the UK National Risk Register.

Data collected in NERC-supported aircraft informed new industry standards on ash tolerance, leading to the Civil Aviation Authority's decision to reopen UK airspace after six days of closure, each day costing the industry \$400m in lost revenue.

CEH also provided evidence to Defra that chemical contamination of food and fodder from ash was too low to endanger the health of people or livestock.



Responding to consultations

Route and description	Who's involved	Aims	Your participation
<p>Responding to government consultations. The steps leading to a government Bill often involve consultation (see flow-chart on page 5). Government departments and agencies sometimes produce policy proposals accompanied by regulatory impact assessments examining different options.</p>	<p>Individuals (including academics), centres, and NERC as a whole.</p> <p>Where an issue is directly relevant to NERC's high-level strategy and objectives, or affects several of NERC's components, Swindon Office aims to consolidate a response using input from relevant centres and/or other parts of NERC.</p> <p>On some cross-council issues, Research Councils UK submits a consolidated response using input from all the relevant research councils.</p>	<ul style="list-style-type: none"> To ensure the consulting organisation is aware of relevant scientific information; To influence developing policy. 	<ul style="list-style-type: none"> If you are a NERC employee, or part of one of NERC's major investments, provide input to a NERC corporate response; If you are a university scientist with other allegiances than NERC; respond as an individual. When responding, state on whose behalf you are doing so; Ask for feedback from the consulting organisation, although detailed replies are rare; study revised versions of documents for signs of change (though attribution may be unclear, especially if several consultees gave the same input).
<p>NERC consultations.</p>	<p>NERC/centres/stakeholders etc. NERC Swindon Office promotes its consultations widely to its stakeholders, eg via the web. Other parts of NERC – eg science theme leaders or research centres may conduct consultations on individual science areas or plans etc.</p>	<ul style="list-style-type: none"> To take account of user views (as well as scientists') in strategy development and implementation, and organisational changes. 	<ul style="list-style-type: none"> Highlight NERC consultations to contacts you think would provide constructive 'user' input and inform them of other opportunities to feed in their views – eg community events; Respond to the consultation yourself.



Communicating with national parliaments and assemblies

Why communicate with national parliaments and assemblies?

NERC, which is a non-departmental public body, falls under the remit of the Secretary of State for Business, Innovation and Skills, who is answerable to the UK Parliament for NERC's and the other research councils' activities. NERC is required to lay its annual report before Parliament, and relies on UK parliamentary support for the government's proposed science budget allocations. It's therefore in NERC's interest for MPs to be aware of, and keen to support, NERC's activities.

NERC has an interest in parliamentary processes (in the UK and Scottish Parliaments, Welsh Assembly, and Northern Ireland Assembly) because these bodies scrutinise and influence legislation proposed by the government/devolved administration/European Commission. Individual parliamentarians also have some opportunities to propose legislation themselves. It's important that all parliamentarians are properly informed so that they can judge proposals intelligently.

Which parliamentary bodies are particularly relevant?

Contact with **individual parliamentarians** (Members of Parliament (MPs) or Lords, Members of the Scottish Parliament (MSPs), or (Welsh) Assembly Members (AMs)) can be very appropriate, eg if they:

- have a particular interest in our expertise;
- are involved with relevant legislation (eg on a public bill committee);
- are the chair of a relevant select committee or all-party group;
- represent the constituency we're in;
- have asked a PQ about our research or funding, and we want to follow it up;
- would be a suitable speaker or participant at an event.

Ministers are a hybrid species; they have a foot in both the parliamentary and the government camps (Westminster and Whitehall, respectively, at UK level). Interaction with them on the development of policy is as likely to be through the civil service (government department) as through parliament.

Parliamentary committees generally cover the tasks of scrutinising legislation, conducting inquiries, gathering evidence and holding the government or devolved administration to account. There are two main types of committee, those established temporarily to examine specific legislation, and those which exist over the longer term, albeit with a changing membership to conduct inquiries into issues of concern. In the Northern Ireland Assembly, the departmental committees were established also to 'advise and assist' the relevant minister. Where necessary, committees gather evidence from people and organisations outside their respective parliaments, eg to support policy recommendations to government. Details

regarding types of committees in the different parliaments and assemblies are available on their websites.

All-Party Groups (APGs) are informal cross-party groups that have no official status within Parliament. They are run by and for parliamentarians, although many groups involve individuals and organisations from outside Parliament in their administration and activities. They provide a forum for discussion and to raise the profile of and knowledge about particular issues in Parliament, in some cases with the aim of influencing policy.

Information about the nature of All-Party Groups, and a register of them, are available via: www.parliament.uk/about/how/members/apg.cfm. The APGs to which NERC subscribes include Climate Change and the Parliamentary and Scientific Committee (PSC). The PSC facilitates liaison between parliamentarians and scientific bodies, science-based industry and the academic world.

The **Foundation for Science and Technology (FST)** provides a neutral platform for debating policy issues with a science, engineering or technology element. The foundation is not an APG but it organises discussions on relevant issues when parliament is sitting. It publishes a summary report, followed by a longer report in its journal, available on its website. Its meetings sometimes include MPs and ministers as speakers, and others may be present in the audience, so it provides a networking opportunity.

Information offices exist to support members of the UK Parliament, Scottish Parliament, Welsh Assembly and Northern Ireland Assembly. These are, respectively:

- The Parliamentary Office of Science and Technology (POST);
- The Scottish Parliament Information Centre (SPICe);
- The Research Service (RS);
- The Northern Ireland Assembly Research and Library Service;
- The House of Commons Library, Science and Environment section.

POST is an office of both Houses of Parliament, charged with providing independent, balanced analysis of public policy issues related to science and technology. The POST Board of 14 parliamentarians and four external scientists oversees POST's objectives, outputs and future work programme. It produces regular POSTnote briefings and longer briefings, and holds discussion seminars for MPs and Peers. It also has close relationships with the Select Committees, providing advice, analytical and research support. The other UK offices fulfil similar functions for their respective parliaments/assemblies, albeit not specific to science and technology. The House of Commons Library provides research, analysis and information services for MPs and their staff on a reactive basis. Most enquiries are based on constituency issues.



Devin Sands/Parliamentary Copyright

What are Parliamentary Questions (PQs)?

Parliamentarians ask many questions of government ministers. NERC is often asked to contribute to the answers when ministers in BIS, DECC or Defra are involved. Questions commonly ask about the funding of research and training, for example, the expenditure on a particular research area over the previous five years. The answers sometimes require input from NERC's research centres or programmes, and the deadlines can be very tight, especially for PQs that need an oral answer on a specific date (named-day PQs). Please be ready to respond quickly if you are asked for input.

CASE STUDY

The National Hydrological Monitoring Programme (NHMP)

Water resource and flood management in the UK is very expensive and has a high political and public profile. The NHMP was established in 1988 to influence policy by providing impartial and authoritative guidance on extreme hydrological conditions. Its remit was later extended to include identifying and interpreting hydrological trends and documenting extreme events. CEH and BGS jointly operate the NHMP.

The programme made a major impact by engaging with policy-makers and by influencing numerous water management strategies. NHMP contributed to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change.

NHMP's work is overseen by a committee of stakeholders including government departments, UK environment agencies and the water industry. This ensures it provides information that is relevant to policy-makers and other users.

Input to the Pitt Review and applying recommendations

The ferocity of the 2007 summer floods surprised everyone and left vast tracts of England submerged. Thirteen people died, and the floods cost the country £3.2bn. During the crisis, scientists from CEH, BGS and NERC's Flood Risk from Extreme Events (FREE) programme provided essential information to the media and operational services such as the Environment Agency, Defra, and the Met Office. BGS and FREE scientists scrambled research aircraft to survey the affected regions. ➡



Ways of communicating with national parliaments and assemblies

Most of the approaches outlined below could be taken by individual scientists but it would be wise to consult with colleagues to ensure coordination and/or consistent messages.

Individual parliamentarians

Contact approach	Aims	Points to note
Provide information by way of short letters or emails, telephone calls or brief meetings.	<ul style="list-style-type: none"> To engage attention. To share information, eg relevant to particular legislation or a select committee inquiry. 	<ul style="list-style-type: none"> Before contacting parliamentarians, ensure you find out about their roles and interests, eg from parliamentary websites or Dod's Parliamentary Companion (see page 27). Note that changes happen all the time due to elections, by-elections, promotions, reshuffles – make sure your information is up-to-date. Possibly use constituency addresses during parliamentary recess. Keep written communications short, and make clear at the start that you are writing because of their interest/involvement.
Invite parliamentarians to events, eg regional events, end-of programme events, publication launches or the opening of a building.	<ul style="list-style-type: none"> To involve a parliamentarian, possibly as a speaker, at an event. 	<ul style="list-style-type: none"> It is polite to invite the local MP/MSP/AM if others are invited. Plan a reserve speaker in case of last-minute drop-out. In planning, think about timing and location; eg MPs are generally in London from Monday to Thursday lunchtimes, in their constituencies on Fridays; try to get a room in Parliament if in London (possibly ask individual parliamentarians, select committees or POST to sponsor).
Establish and maintain long-term relationships.	<ul style="list-style-type: none"> To maintain mutually beneficial contact, eg parliamentarian may act as an agent for policy-change or increased funding – perhaps asking useful PQs or introducing supportive Bills or Early Day Motions. 	<ul style="list-style-type: none"> Be aware of different agendas. Helping with lower-priority issues may gain you goodwill and trust.
Participate in pairing schemes, eg Royal Society MP and civil servant-scientist pairing scheme.	<ul style="list-style-type: none"> To allow scientists and parliamentarians to experience each other's working environment. 	<ul style="list-style-type: none"> For details see page 24.



Parliamentary committees

Contact approach	Aims	Points to note
Respond to calls for evidence to committee inquiries.	<ul style="list-style-type: none"> To communicate our science (in plain language, but in depth), so that it is included in the evidence base for policy making; To contribute to setting the scientific and policy agenda; To introduce ourselves to individual parliamentarians; To raise awareness of the need for our work; To prompt visits to NERC sites, eg a base of the British Antarctic Survey, or research groups. 	<ul style="list-style-type: none"> Committees accept written evidence from individuals and organisations. If you have something to contribute to an inquiry, please consider whether you should make your contribution individually or through your organisation/institution; Many enquiries are relevant to several NERC centres/investments and multiple research councils, in which case we should liaise and submit a joint NERC or RCUK memorandum. UK Parliament's Science and Technology Committee often expects the seven Research Councils to submit a joint response through RCUK; Electronic press releases are available from some committees, and committee websites usually provide information about meetings and other aspects of specific inquiries, as well as guidance on how to provide evidence.
Develop and maintain good links with committee clerks and committee specialists.	<ul style="list-style-type: none"> To facilitate a good working relationship; To make it easier to obtain feedback on submissions to inquiries; To obtain advance notice of inquiries, and possibly to influence the choice of subjects. 	<ul style="list-style-type: none"> Links can be maintained if you respond helpfully to information requests. Clerks welcome co-operation, and may help by providing feedback on written submissions; Also, clerks and specialists may appreciate receiving conference invitations and newsletters.
Offer to act as an (external) specialist adviser to a select committee.	<ul style="list-style-type: none"> To provide a conduit for expertise from NERC scientists to parliamentarians; To possibly influence the terms of reference of individual inquiries. 	<ul style="list-style-type: none"> Specialist advisers will generally be fairly senior scientists; committees are likely to approach people whom they know, directly or indirectly. The commitment could involve participating in preparatory and public committee meetings and visits.

How do UK parliament select committee inquiries work?

UK Parliamentary select committees (and their sub-committees) are all-party committees of parliamentarians (MPs or Peers) whose main activity is to conduct inquiries into issues of concern. The membership of the Commons committees reflects the party balance in the Commons, and most chairs are elected by their fellow MPs. Members nominated to a committee are members of that committee for the remainder of the session of Parliament. They generally decide their own programmes, and are supported by small secretariats, including a clerk and one or two committee specialists with a relevant research background. External specialist advisers are sometimes called upon – often senior academics. When an inquiry is announced, the area of interest is defined, perhaps accompanied by a list of questions. Witnesses who submit written evidence may be asked to follow it up orally. Committees have the power 'to send for persons, papers and records', and to publish reports containing findings and recommendations for the government's attention. The Government is obliged to respond, and there is often a debate in Parliament. Committees publish the Government response, sometimes with a commentary. NERC is often required to contribute to the Government response (where the committee's recommendations relate to Research Council policies), despite being free to submit evidence independently at the start of the inquiry.



➡ The NHMP published a comprehensive report: *The summer 2007 floods in England and Wales – a hydrological appraisal*. It stated that the floods have 'no close modern parallel for the June-August period' and that summer 2007 was a 'very singular episode, which does not form part of any clearly emerging pattern or long-term trend consistent with currently favoured climate change scenarios.'

BGS and CEH scientists contributed to NERC submissions to *The Pitt Review: Lessons learned from the 2007 floods*, and to the House of Commons Environment, Food and Rural Affairs Committee inquiry into flooding, drawing attention to the NHMP report. The Pitt Review also identified a new hydrological modelling approach developed by CEH as meeting the need for early flood warning across the country.

Implementing the recommendations in the report, CEH's area-wide Grid-to-Grid Model is currently being supplied for use by the Flood Forecasting Centre. It will:

- for the first time, give complete flood forecasting coverage across England & Wales, and maps of indicative flood risk;
- improve and extend flood warnings at a national level to up to five days ahead. If increased lead times reduced the annual costs of river flooding by 5%, this would equate to a cost saving of around £24 million per annum;
- complement existing regional systems targeted at making more accurate forecasts for specific locations.

A note about parliamentary magazines

Some media organisations produce magazines aimed specifically at parliamentarians, eg *Dod's The House Magazine* (weekly) and *The Parliamentary Monitor* (monthly) (see web-link to Dod's information services on page 27) and may offer scientists space – at a price – when they plan to cover a particular subject. It is generally more economical to use your centre's/NERC's press office, but the option might be worth considering in unusual circumstances.

Which UK parliamentary select committees are particularly relevant to NERC?

Select Committee	Remit
House of Commons committees related to particular government departments: DECC; Defra; DFID; BIS; Defence; Communities and Local Government.	To examine the expenditure, administration and policy of their corresponding government departments and associated public bodies.
House of Commons Environmental Audit Committee.	To consider how far the policies and programmes of government departments and NDPBs contribute to environmental protection and sustainable development, and to audit their performance.
House of Lords Science and Technology Committee.	To consider science and technology.
House of Lords EU Sub-Committee B: internal market, energy and transport.	To scrutinise EU documents and policy on energy markets, transport, internal market, research and innovation.
House of Lords European Union Sub-Committee D: Agriculture, Fisheries and Environment.	All aspects of the EU's agricultural, fisheries and environmental policies including climate change.
House of Commons Science and Technology Committee.	To scrutinise the Government Office for Science (GO-Science), a semi-autonomous organisation based within BIS. The committee can examine the activities of any government departments where they have implications for, or make use of, science, engineering, technology and research.

All-Party Groups in the UK Parliament

Contact approach	Aims	Points to note
Attend meetings of relevant All-Party Groups (APGs).	<ul style="list-style-type: none"> To network with other organisations and meet MPs and Peers in a relatively informal setting. 	<ul style="list-style-type: none"> MPs/Peers are usually in a small minority at meetings, and may not stay for the question session. Swindon Office's subscriptions allow one or two people to attend meetings of some APGs, and invitations are forwarded to relevant centre staff.
Offer to give a talk/presentation at an APG meeting.	<ul style="list-style-type: none"> To increase awareness of NERC-funded research among parliamentarians and other interested organisations. 	<ul style="list-style-type: none"> As above.
Establish a new APG.	<ul style="list-style-type: none"> To attract parliamentary interest in a NERC/Research Council concern. 	<ul style="list-style-type: none"> The need and the available support/parliamentary sponsorship would have to be assessed carefully before deciding to do this. There are already a great many APGs.

Information offices for parliamentarians (MRS, POST, SPICe)

Contact approach	Aims	Points to note
Collaborate with information offices to organise events for parliamentarians.	<ul style="list-style-type: none"> To ensure relevance of events to parliamentarians. 	<ul style="list-style-type: none"> Collaboration can be mutually beneficial. POST has collaborated with NERC on agreed topics. It may be able to help with arranging a venue and publicity to parliamentarians.
Participate in the policy secondments for PhD students scheme.	<ul style="list-style-type: none"> To enable NERC-funded PhD students to work in a parliamentary briefing capacity. To apply NERC-funded expertise/training. 	<ul style="list-style-type: none"> Secondments are for 3 months. For further information see page 24.
Register as a potential committee adviser or external research consultant with SPICe.	<ul style="list-style-type: none"> To contribute your expertise to the policy-making process. 	<ul style="list-style-type: none"> See the SPICe website.
Offer to contribute to and review POSTnotes.	<ul style="list-style-type: none"> To contribute your expertise to the policy-making process. 	<ul style="list-style-type: none"> POST asks relevant experts to externally review its briefing notes.

Policy-making at other levels

Local policy-making

Central government looks to its local and regional counterparts to deliver on national priorities. At the same time, those counterparts will have local priorities. Environmental policy-making at the local level may concern issues such as the urban environment, transport, waste management and land remediation. Local authorities sometimes consult on their plans, for example on their local development frameworks and regional spatial strategies, and several have invited parts of NERC to comment.

Local authorities' main purpose is to provide public services like education, health and transport.

Other significant bodies in the context of local and regional policy-making are:

The **Department for Communities and Local Government** is the UK government department for local government and there are corresponding departments in the Scottish Government, the Welsh Government and the Northern Ireland Executive.

The **Improvement and Development Agency for Local Government (I&DeA)**: this is owned by the LGA (see below) and works for local government, encouraging partnerships and the sharing of best practice.

The **Local Authorities Research & Intelligence Association (LARIA)**: established in 1974 to promote the role and practice of research within local government and provide a supportive network for those conducting or commissioning research.

The **Local Government Association (LGA)**: a Westminster-based voluntary lobbying organisation representing local government. Local authorities do not have to join but nearly all those in England and Wales are members.

European and international dimensions to policy-making

Much environmental policy originates at the European and international level. In Europe, new legislation is generally proposed by the European Commission (EC), then scrutinised and decided upon by the Council of the European Union and the European Parliament. The **structure of the European Union (EU) institutions**, and the way the EU makes decisions, are described in a useful booklet available at: http://ec.europa.eu/publications/booklets/eu_glance/68/en.pdf

The UK and devolved parliaments have **opportunities to scrutinise EU legislation** as it is being developed by the European Commission. In the UK Parliament, this scrutiny is conducted particularly but not exclusively through various committees, primarily the European Scrutiny Committee but also the House of Commons' European Committees, and the House of Lords European Union Select Committee. For further information see www.parliament.uk/factsheets (see L11, European Communities Legislation). UK views can also feed in via Members of the European Parliament (MEPs), and through the government's representation on the Council of the European Union.



CASE STUDY

Advising the UN on mercury policy

Originally set up to bring together UK technical experts on mercury, the NERC-funded Integrating Knowledge to Inform Mercury Policy (IKIMP) network, based at the University of Oxford, was asked by Defra to advise on how UK mercury stocks could be stored safely.

The framework IKIMP developed for Defra was seen by a representative of the United Nations Environment Programme, who asked IKIMP to present it to the UN International Negotiating Committee (INC) that aims to introduce a global ban on the use of mercury.

The use of highly-toxic mercury in industry and consumer products is being phased out in favour of less toxic and more environmentally-friendly materials. The IKIMP framework provides guidance on how national governments can safely manage the resulting 'redundant' mercury stocks and identify the options available for long-term storage.

The framework was written following a meeting between academics, policy makers, and representatives from industry and the not-for-profit sector. It was well-received by policy makers, and IKIMP were asked to present it to the European Commission to help establish the European view on mercury ahead of the UN discussions. They then presented it to the first meeting of the INC itself.

According to network coordinator Dr Murray Gardner, 'It has been a great opportunity for disseminating information, working with international policy makers to provide the information they need.'

The inventory has been completed and the review is recognised as the most complete mercury budget for the oil and gas industry of a nation. The report is being used by Defra in current negotiations, and has led to approaches from industry.

CASE STUDY



Unravelling the impact of ozone pollution

The ICP Vegetation programme, managed by CEH, coordinates research on the harmful effects of ozone pollution on European vegetation. New critical ozone levels, specific to vegetation and growing conditions, have been included in UN transboundary air pollution policies.

Ozone pollution in the air can harm large areas of European vegetation, causing leaf damage and reduced root growth, lowering yields and tolerance of drought.

The ICP Vegetation programme investigates the impacts of air pollutants on vegetation. It forms part of the United Nations Economic Commission for Europe Convention (UNECE) on Long-Range Transboundary Air Pollution (LRTAP). Coordinated by CEH, the programme involves scientists in 35 countries.

Knowing the ozone concentration in the air provides only a partial picture of its potential for damage. The gas's impact varies according to the vegetation type – some species take in more ozone through the pores on their leaves than others – and to climate and soil conditions.

Maps that incorporate these factors are better at predicting ozone damage to vegetation than those based on ozone concentration alone. Worryingly, the data suggest that ozone levels in the air are harming vegetation across most of Europe.

Following two international workshops, chaired by Dr Gina Mills of CEH, new critical levels for ozone were set. These have been incorporated into UN air-pollution policy.

How to influence European and international policymaking

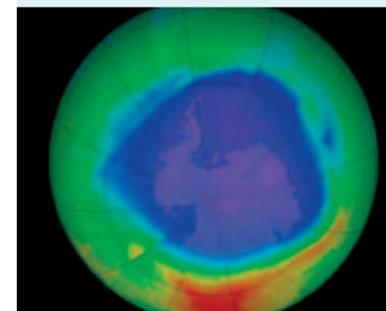
Route	Your participation	Examples and points to note
Policy advice and support via UK government involvement in EU and international policy fora.	<ul style="list-style-type: none"> Briefings for high-level and working-level meetings between NERC and government departments (see pages 7-8); Involvement of Research Centres in research supporting international policy, eg via FCO, DFID. 	<ul style="list-style-type: none"> NERC has strong links with the FCO and DFID: BAS supports the FCO's mission to sustain for the UK an active and influential regional presence and a leadership role in Antarctic affairs, including administrative responsibilities for the British Antarctic Territory. BGS monitors volcanic activity in Montserrat, and the Scottish Association for Marine Science (SAMS) has a long-term commitment to Arctic science; NERC collaborates with DFID on the Ecosystems Services for Poverty Alleviation programme, ESPA, a research programme designed to find ways of managing ecosystems sustainably in the developing world; BGS and CEH have long histories of work in developing countries; BGS acts as an advisor to the UK government and the EC on carbon capture and storage; Many NERC-funded scientists participated in the latest and previous scientific assessments conducted by the Intergovernmental Panel on Climate Change; several key UK authors are given financial support for their IPCC role by the UK government, mainly through Defra; NERC anticipates an equally significant role in the new Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES).
Consultations on EU strategies and legislation – run by UK Government departments and the European Commission.	<ul style="list-style-type: none"> Keep an eye on consultations on the websites of relevant government departments and EC Directorate-Generals. Respond either as an individual or through a NERC response. 	<ul style="list-style-type: none"> The greatest scope for informing EU policy is early on. However, contact with members of the UK Parliament's European Scrutiny Committee (and other similar committees) at a later stage could still be effective; We can also correspond with relevant committees in the European Parliament, and directly with relevant contacts in the Commission. A directory of Commission officials is available at: http://ec.europa.eu/staffdir/plsql/gsys_page_display_index?plLang=EN
Membership of European and international scientific advisory committees, and provision of scientific information/studies.	<ul style="list-style-type: none"> Look out for invitations to apply for membership or to conduct/contribute to studies; Register in the EU Database of External Experts (see link on right); Register on the SINAPSE network – see link on page 26; Alert editors of Science for Environment policy (see page 26) to your publications, where relevant to EU policy. 	<ul style="list-style-type: none"> The European Parliament's Committee on the Environment, Public Health and Food Safety Committee commissions studies relevant to the legislation it is considering; see www.europarl.europa.eu/compar/envi/default_en.htm; The EU has a Scientific Risk Assessment Advisory Structure - covering matters related to consumer safety, public health, and the environment – and there are occasional calls to renew the Scientific Committees and Pool of Scientific Advisors, as well as a standing call for External Experts (http://ec.europa.eu/health/ph_risk/committees/call_expression_en.htm); Science Europe aims to set science agendas for Europe. It is currently considering how it will interact with committees and boards such as the European Polar Board and the Marine Board. <p>Examples of NERC involvement</p> <ul style="list-style-type: none"> United Nations Educational, Scientific and Cultural Organisation Intergovernmental Oceanographic Commission – NERC is UK lead via the National Oceanography Centre; Commission on the Conservation of Antarctic Marine Living Resources – BAS provides significant scientific input via long-term monitoring and survey.

How to influence European and international policymaking cont.

Route	Your participation	Examples and points to note
Research activities and coordination ie scientific research with direct relevance to EC and international policy, eg Horizon 2020, research co-funded with Govt departments; NERC programmes with international partners and international research programmes/project offices, and coordination of policy-relevant research through funding fora.	<ul style="list-style-type: none"> As a Principal Investigator on an EC project you are likely to receive invitations to contribute to EC policy debates. Staff involved in running international science programmes and project offices can play a significant role in bringing relevant science to the attention of policy-makers at that level. Participating in research coordination fora can help to increase the policy-relevance of research outputs. 	<ul style="list-style-type: none"> UNECE Convention on Long-Range Transboundary Air Pollution International Cooperative Programme on Effects of Air Pollution on Natural Vegetation and Crops – CEH is lead organisation; European Network of Freshwater Research Organisations – CEH scientist has chaired; NERC-funded scientists participate in a range of policy-relevant EC projects. European Research Area Networks (ERA-Nets) often have particular policy relevance, eg SPLASH (www.splash-era.net/), the ERA-Net of the EC Water Initiative – NERC participates through the Centre for Ecology and Hydrology; SKEP (Scientific Knowledge for Environmental Protection) ERA-Net aims to facilitate the improvement of science-into-policy processes, and to support evidence-led regulation (http://cordis.europa.eu/coordination/era-net.htm); the Environment Agency participates for the UK; NERC and DFID co-fund the ESPA programme (see page 18); Research funded within the Changing Water Cycle Programme, some of which has been jointly funded in partnership with India's Ministry of Earth Sciences, directly relates to the UK Government's strategic goals for adaptation to, and mitigation of, climate change; Biodiversity and Ecosystem Processes in Human Modified Tropical Forests includes work in partnership with Brazil. The research will inform policy decisions of governments, forest managers and the agro-forestry industry; NERC supports UK research institutions to host a number of international project offices (IPOs). These include the Global Carbon Project based at the Tyndall Centre for Climate Change Research, and the World Climate Research Programme's Climate Variability and Predictability (CLIVAR) IPO, managed and co-funded by NERC and based at NOC. One of CLIVAR's activities was the largest ever climate model experiment and analysis, which influenced the IPCC's Fourth Assessment report; NERC is a member of the UK Collaborative for Development Sciences (UKCDS), a forum for funders of development science, including research councils, DFID and the Wellcome Trust; The Centre for Ecology and Hydrology is in the Partnership for European Environmental Research (PEER) which brings together public research centres in Europe to encourage interdisciplinary environmental research in support of innovation and informed policy-making for sustainable development.
Secondments/pairing schemes ie opportunities to work in or experience the EU policy-making environment.	<ul style="list-style-type: none"> Look out for opportunities to work as a Seconded National Expert in the EC. See page 25; The Royal Society may organise another MEP-scientist pairing scheme. 	<ul style="list-style-type: none"> Note that the salary of Seconded National Experts usually has to be paid by their normal employer, but the EC provides a living allowance; The Royal Society's MEP-scientist pairing scheme: http://royalsociety.org/training/pairing-scheme/

A note about global agreements

Much European environmental legislation takes account of the need to minimise transboundary environmental effects, for example due to long-range transport of air pollutants. Science underpins global agreements such as the Kyoto Protocol to the United Nations Framework Convention on Climate Change and the Montreal Protocol to eliminate the production and consumption of ozone-depleting chemicals – a direct policy impact following the discovery of the ozone hole by scientists from the British Antarctic Survey (BAS) in 1985.



EU Directives and Regulations

The main forms of EU law are directives and regulations. Directives establish a common aim for all member states, but each state decides for itself how to transpose the directive into national law, and has one to two years to implement it. Regulations are directly applicable throughout the EU as soon as they come into force without further action by the member state.

NERC's International Team based in Swindon Office can help with advice on participation in EU Framework Programmes and other international research initiatives. Contact: international@nerc.ac.uk

The UK Research Office (UKRO) in Brussels has good links with the European Commission and may be able to help with queries regarding research and policy. Register with UKRO for policy updates: www.ukro.ac.uk/

CASE STUDY

Evidence-Based Environmental Management: the use of systematic reviews in policy-making

Vast swathes of often-conflicting environmental research are potentially available to policy-makers, in fact, simply too much to read and take in. So how can they find the most reliable, up-to-date and unbiased information to inform their decisions?

Environmental researchers adapted an approach used in the healthcare profession and, with the help of NERC funding, set up the Collaboration for Environmental Evidence (CEE) based on the Cochrane Collaboration, established in 1993 and inspired by the work of the British epidemiologist Archie Cochrane.

The Cochrane Collaboration makes up-to-date, accurate syntheses of evidence about the effects of healthcare readily available worldwide. Its systematic reviews are the gold standard for determining effective healthcare interventions, and reviews science from a huge number of sources. Without this kind of system, decision-making based on fragments of primary scientific literature is susceptible to bias.

The CEE is an open collaboration that aims to make environmental policy more evidence-informed. It provides guidelines and encourages interdisciplinary teams of scientists to conduct systematic reviews around policy-generated questions. CEE systematic reviews are published in its new open-access journal 'Environmental Evidence' and archived in the Environmental Evidence Library.

Already the CEE has influenced UK government policy on issues ranging from moorland burning to the impact of in-stream structures on salmon populations, and intergovernmental policy on issues such as the effectiveness of Community Forest Management. CEE centres are forming in other countries such as South Africa and Australia and UK government departments such as DFID and Defra are commissioning systematic reviews through the CEE process to inform their policy decisions.

www.environmentalevidence.org

Working with and through other stakeholders

The NERC community can work with and through a range of other stakeholders and initiatives to ensure policy-makers hear about our science. *For example:*

Learned societies

Many NERC scientists are members of learned societies such as The British Ecological Society, the Geological Society of London, the Royal Geographical Society and the Royal Society. These societies often have close links with policy-makers, provide consultation responses and organise events bringing scientists and policymakers together.

Non-governmental organisations (NGOs)

Interaction with some NGOs can be an appropriate science-to-policy approach, as long as NERC's independence is not compromised and we don't get involved in NGO campaigns. NGOs often have a recognised lobbying function, high visibility, wide membership, and may have more direct access to policy-makers than an NDPB such as NERC. They can also help disseminate information to the public and, through this, influence policy-makers. They are often very attuned to public opinion, and may express opinions to policy-makers before NERC would feel it had sufficient scientific evidence. Where evidence suggests that a policy would not be acceptable to the public, public opinion is likely to hold sway.

Some NGOs have a research capability and can be useful partners in research, for example the Royal Society for the Protection of Birds (RSPB) co-funds some NERC CASE students. The RSPB has 'Independent Research Organisation' status and can therefore apply for NERC funding, as can, for example, the British Trust for Ornithology and the Wildfowl and Wetlands Trust.

NERC invites relevant NGOs to participate in events including, for example, as speakers in debates. Members of NGOs may be on NERC committees, including NERC Council, though in this case they are there in their own right rather than representing a particular organisation.

Science Media Centre

This independent organisation works 'to promote the voices, stories and views of the scientific community to the national news media when science is in the headlines' and can therefore help communicate research findings and address controversy in media coverage. See www.sciencemediacentre.org/pages/.

Sciencewise - Expert Resource Centre for public dialogue in science and innovation

This BIS-funded initiative aims to help policy-makers commission and use public dialogue to inform decisions in emerging areas of science and technology. It provides a comprehensive online information resource and a range of support services aimed at policy-makers and all stakeholders involved in science and technology policy-making, including the public. It offers workshops and newsletters, and provides co-funding to Government departments and agencies to develop public dialogue activities. See www.sciencewise-erc.org.uk/cms/about/

Think tanks

The studies, reports and opinions of think tanks, both independent and those connected with political parties, often prompt policy development or change. Their publications can help to highlight areas where policy could benefit from more research, and where existing evidence already suggests the need for new policy. For example, the Institute for Public Policy Research published a working paper on *The New Front Line: Security in a changing world* in early 2008 which analyses the implications for policy of changes in the 'security landscape', including climate change, and this is very relevant to LWEC and ESPA (www.ippr.org/security/publicationsandreports.asp?id=588&tid=2656). Other relevant think tanks include the Centre for Policy Studies and the New Economics Foundation. There could be scope for more interaction with these bodies.

Top ten tips

for communicating science to policy-makers

- 1 Make sure you're speaking to the right person/people – do your homework first! If necessary, 'use people to find people'. The subject must be compelling for the audience, and your message tailored accordingly.
- 2 Always emphasise what you can do for policy-makers as well as asking what they can do for you – explain how your input will take their agenda forward and support their priorities, and vice versa.
- 3 Always prepare for face-to-face communication with policy-makers by having a bullet-point briefing (with headings such as 'issue', 'considerations', 'options and costs') ready, and some high-impact succinct material to leave with them. All communications must be brief and digestible. Any views should be honest and balanced – this will help build trust and ensure that you are seen as a reliable and independent source of expertise in the area. Always acknowledge and identify uncertainties. Check with colleagues in the NERC research community that the messages you are presenting are consistent with theirs.
- 4 Giving ministers options is the best way of getting science into policy. It is better to present four or five options and make points about the pros and cons of each, rather than to say 'you must do this'. This gives the minister scope to make a decision vis-à-vis the policy trends and political acceptability. Options that do not map onto present policy trends will almost certainly be ignored. However, be prepared to form an opinion on the possible options even when information is incomplete.
- 5 Follow up face-to-face contact with a short letter of thanks reinforcing the main points from the meeting and creating the opportunity for future contact.
- 6 Keep contacts information up to date – new policy-makers emerge and people move on all the time. See page 26.
- 7 Be proactive about building relationships - policy-makers never have much time so are likely just to call the scientist they know.

- 8 Long-term relationships with frequent interaction and feedback are critical to building mutual understanding and trust. This works well in devolved, local and regional government; it is harder to achieve in Whitehall and Westminster, although it is important here too.
- 9 Remember the media's influence on policy-makers – MPs read newspapers and listen to the radio.
- 10 Influencing policy is also about influencing pressure groups, think tanks, the public etc, not just government policy-makers. A many-pronged approach can be particularly effective – but remember, NERC's role is to provide information, not to get involved in lobbying (see page 20, NGOs).



CASE STUDY

Rural Economy and Land Use Programme (Relu)

Rural areas in the UK are experiencing a period of change. Relu is a cross-research council collaboration that aims to advance understanding of the challenges caused by this change.

Engagement with policymakers is a core objective. There is public concern over climate change, flood risk, food security and sustainable energy supplies. The programme has responded to various opportunities and contributed to government reviews and policy debates including, for example the reform of the Common Agricultural Policy.

One Relu project, investigating the potential of farm-scale biodigestion, found that small-scale plants could be economically viable on arable and dairy farms. Another looked at the social, environmental and economic impacts of large scale planting of energy crops that are new to the UK. Results are being used by Natural England, Defra, DECC, and the National Farmers Union.

Land and water management is high on the political agenda. Another project modelled the economic implications and potential benefits of implementing the European Water Framework, while yet another provided an overview of international experiences of catchment management. One team has used catchment management in Loweswater to investigate ways in which communities can take control of environmental problems, and another has involved residents in modelling flood management.

The public dimension of animal and plant disease has emerged as another important theme. The Dutch Elm Disease epidemic of the 1970s have proved to be a useful tool in assessing threats from current tree pathogens, and the researchers working on this topic were asked to undertake a review of the government's programme to contain and eradicate the plant disease *Phytophthora ramorum*. Findings from a project looking at livestock diseases suggest that better information for buyers about the health status of herds could play a significant role in reducing the prevalence of common diseases.

Tools for science-to-policy work

Events and workshops

These can be used to disseminate research outputs and gather stakeholders' views. It is often worth dedicating a session at end-of-programme events to the needs of policy-makers, and inviting policy-makers specifically for that session.

External media

The press offices of NERC and its centres use opportunities to highlight NERC science in the national and local press. This can be one of the most effective ways of reaching policy-makers.

Facilitators – translators – science communicators

NERC sponsors science-to-policy/ facilitator roles in some of our research programme management teams, for example the Ocean Acidification programme. Tasks can include: encouraging feedback to users, tailoring research outputs to meet user needs, and assisting project teams in seeking new funding opportunities.

NERC's Urban Regeneration and the Environment (URGENT) programme appointed two facilitators to cover two different regions. One of these facilitators was employed after URGENT finished, funded by the Environment Agency, Birmingham City Council, NERC and the University of Birmingham.

The importance of the science-policy 'interpreter role' was also highlighted in the report: Using research to inform policy: the role of interpretation'. See www.erff.org.uk/documents/2007-03-interpret-study.pdf

NERC's Science Impacts Database (SID)

NERC collates examples of the social, policy and economic impact of its science investments into a

database available on its website. This evidence base of case-study impacts is used for reporting and dissemination purposes, and to highlight the relevance of NERC science to the 'user' community. See <http://sid.nerc.ac.uk/>

Research Outcomes System (ROS) returns

These returns provide material for numerous NERC publications, briefings and case studies, many of them aimed at policy-makers. We include specific questions on 'science to policy' to measure a) how many NERC scientists judge their science to be relevant to policy and in which areas and b) how many of these provide advice to government and in what form.

Both ROS returns and SID help NERC to evaluate the economic impact of the science-to-policy part of its knowledge-exchange work, an important BIS reporting requirement.

Good practice guidelines

NERC has worked with the Living With Environmental Change partnership to develop some good practice guidelines in knowledge exchange, which are now available as an online tool: www.lwec.org.uk/ke-guidelines

These are mainly aimed at those with responsibility for knowledge exchange at the programme or larger activity level, but are a useful resource for anyone who wants to find out different ways of engaging policymakers (and other users) in research and have a sustained two way dialogue which should lead to greater uptake and impact. They are also linked to, and peppered with, examples of what has worked elsewhere.

Publications

NERC's Communications Team and staff in centres produce many publications which can be sent to stakeholders, including the quarterly magazine *Planet Earth*, the brochure *Knowledge Exchange: Sustainable solutions from environmental science*, and a range of briefing notes. See www.nerc.ac.uk/publications/. End-of-programme publications should have a section on (potential) policy applications.

Increasingly, publications are available on the NERC website, including a regularly-updated on-line version of *Planet Earth*. It can be helpful to target publications at specific policymakers – for instance the URGENT programme's digest for local government (see page 26).

Public engagement with research

Policy-making includes an important 'science in society' element, and it is as vital that the public engage with our science as that it is understood by policy-makers themselves. Public engagement can take many forms, providing different opportunities for the public to talk to researchers as well as with the research being carried out; it might include debates, demonstrations, festivals or social networking.

One clear way of bringing people into the scientific process, and ensuring their views are fed into policy development, is public dialogue. This is a three-way process, bringing together members of the public with scientists and policy-makers to talk about a specific issue that could affect their lives.

For example, the 2010 Experiment Earth? public dialogue on geoengineering run by NERC and Sciencewise-ERC

(see case study to the right) sought to explore people's attitudes towards various geoengineering methods that are being considered if efforts to mitigate climate change fail (www.nerc.ac.uk/about/consult/geoengineering.asp). Scientists were invited to join the project steering group, as well as to attend workshops to discuss geoengineering research with members of the public and answer their questions. The public benefited from the opportunity to talk about the issues with scientists, while the scientists gained new ways of looking at their research, as well as insight into how the public think about some of the issues. NERC is using the results to inform research strategy. They have also been widely distributed to policy-makers in the UK and overseas.

Another way of getting the public involved with science and understanding it better is working with schools. Taking science in to schools and making what we do accessible enables engagement from an early age. NERC's research centres and researchers undertake a range of outreach work with schools; for example BAS provides diverse resources for teachers and students www.antarctica.ac.uk/about_antarctica/teacher_resources/information/index.php, and BGS runs the UK School seismology project (www.bgs.ac.uk/education/school_seismology/).

Engagement doesn't stop at learning about NERC-funded research; schools can take part in real experiments. For example, the Conker Tree Science work lets members of the public report their findings, either uploading to a website, or using a mobile phone app, helping researchers collect data from all around the country.

CASE STUDY

Experiment Earth?

Geoengineering is the deliberate modification of the environment to counteract the effects of climate change. Scientists have proposed a range of ideas, which have not yet been tested in the real world and may have ethical and social implications.

The public dialogue, 'Experiment Earth?', consisted of a series of workshops in early 2010. Diverse stakeholders, including representatives from Government and NGOs, were involved. This ensured the process was as fair and transparent as possible, and would affect a range of users.

'We have a responsibility to discuss research plans in potentially contentious area like geoengineering with the public, and to ensure their views and concerns influence research council and government policy-making,' says NERC Project Manager Faith Culshaw.

The results showed that participants did not object to geoengineering in principle, but had serious concerns about some of the technologies discussed. They felt that public dialogue should continue as research progresses. Many said that they enjoyed the process and valued the chance to discuss their views and better understand how research works. They felt it important that the government discuss issues like geoengineering with the public.

As well as influencing two research projects and further public engagement activities, the dialogue was highlighted by the House of Commons S&T select committee's March 2010 report on the regulation of geoengineering, and informed a cross-government statement on geoengineering research published by DECC in September 2012.



Science-to-policy training and 'people flow' opportunities

'Should environmental scientists get involved in policy making? Of course, since good science is at the heart of effective politics. An excellent place for young environmental scientists to start is with schemes such as the NERC/POST Fellowship initiative.'

*Jonathan Butler,
NERC/POST fellow.*

Several training courses are available, some offered by NERC. Secondment and placement opportunities ('people flow') are themselves science-to-policy mechanisms, and should be encouraged where appropriate.

Training courses and best-practice sharing

Training

NERC has run occasional science-policy training workshops, often with other partners such as ESRC, government departments and the British Ecological Society – see www.nerc.ac.uk/using/publicsector/sciencetopolicy.asp. Other organisations offer courses in stakeholder engagement and participatory knowledge exchange (based on the LWEC good practice guidelines, see page 22) – see www.dialoguematters.co.uk/training.asp.

Engaging the public with your research: training course offered by NERC's Communications team, free to all NERC scientists – see www.nerc.ac.uk/press/mediatraining.asp.

Various courses on government, parliament, policy-making are offered by external bodies – for example Parli-Training (www.parli-training.co.uk/), Westminster Explained (www.westminster-explained.com/), and the National School of Government (www.nationalschool.gov.uk/policy/index.asp?tab=2).

NERC's Knowledge Exchange Network (KEN) allows colleagues in NERC's research and collaborative centres, and major programmes, to share good practice in stakeholder engagement and knowledge exchange and plan appropriate knowledge-exchange activities.

Secondment and placement opportunities

These can be helpful for both scientists and policy-makers, and range from shadowing or pairing schemes to longer-term placements. They help scientists and policy-makers understand each other's needs and deadlines.

Ideally, secondments and placements need suitable policies in both organisations which:

- allow flexibility (part-time secondments);
- encourage the take-up of development opportunities;
- reward non-science activities – for example activities which communicate science to policy-makers;
- recognise secondments as beneficial arrangements for both sides, such that a) opportunities are continuously available, with suitable roles identified and created, and b) secondees return to their original employer and are given a suitable role;
- ensure contact throughout secondments;

- ensure that knowledge and understanding gained by the returning secondees is disseminated throughout the organisation.

NERC policy placement scheme:

www.nerc.ac.uk/using/publicsector/placements.asp
This scheme allows researchers and other staff involved in environmental science research to work closely with policy-makers within government and other organisations in the UK. Two types of placement are available: Fellowship placements – from 3 to 24 months, where the researcher works on a specific project agreed by the public-sector partner and NERC; and work shadow placements, where the researcher arranges to shadow a member of staff in a policy-making organisation.

Policy secondments for NERC-funded PhD students, eg NERC/POST fellowships:

www.nerc.ac.uk/using/schemes/internships.asp
These are available for NERC-funded PhD students to spend three months in one of the parliamentary information offices. Students use their scientific and writing skills and gain experience of the science-to-policy environment. Publicity is sent to students in their 2nd and 3rd years; supervisors should encourage those with an interest in policy-making to apply.

'Scientists and policy-makers don't often share a common vocabulary, which can make engaging with politicians a daunting task. The NERC/POST fellowship is a great opportunity to learn how to present complex topics in ways politicians can engage with.'

Gemma Cassells, who took part in a 3-month secondment to POST during her PhD.

Royal Society MP and Civil Servant – Scientist Pairing Scheme:

<http://royalsociety.org/training/pairing-scheme>

Other relevant knowledge exchange funding schemes

NERC's Knowledge Exchange (KE) Call:

www.nerc.ac.uk/using/schemes/kecall.asp
The KE Call allows sharing of knowledge, people, skills and expertise between the UK's research base and the user community (public and private-sector). Grants could cover a secondment or the employment of a facilitator, for example.

Knowledge Transfer Networks (KTNs):

<https://connect.innovateuk/web/grant/home>
The Technology Strategy Board's Knowledge Transfer Networks (KTNs) are designed to help specific communities to develop their ideas and internal interactions, and to communicate with the UK government. NERC jointly supports two KTNs.

CASE studentships:

www.nerc.ac.uk/using/schemes/case.asp
Government departments and other bodies can joint-fund studentships including CASE studentships. University departments receiving funding for four or more NERC students are obliged to find external partners (private or public sector) for at least 30% of them, to provide CASE awards.

Other secondments to government departments or agencies

Opportunities may arise for Research Council staff to be seconded to UK government departments or agencies to work on specific projects or cover for parental leave, for example.

Opportunities may also arise for scientists to spend up to two years as a Seconded National Expert in the European Commission (http://ec.europa.eu/civil_service/job/sne/index_en.htm), although it is unusual for the Commission itself to fund these secondments.



CASE STUDY

Getting to know MPs

Daniela Schmidt, an earth scientist from the University of Bristol, took part in a Royal Society's MP-Scientist Pairing Scheme. This enabled her to work-shadow MP Stephen Williams at Westminster. In return, Stephen spent time with Daniela, getting to grips with a day's work as a scientist.

Daniela said, 'This was a great opportunity for me to understand how politicians work, and the best way to make my science heard. It was such a valuable insight, and very few people's offices were closed to me.'

The timing was brilliant. A lot of Bills that are directly related to my work were being discussed in Parliament. I enjoyed meeting the experts from the Department for Environment, Food and Rural Affairs, the Parliamentary Office of Science and Technology and various Select Committees.

They work so much harder than I thought they did – they have so little time. I was impressed by the range and the amount of information they have to process and translate into comprehensible science and law.

I now know how politicians listen and respond to scientific information. That week, I saw people trying to get information across and failing. Exposure is the important thing – we should be much more visible as scientists.'

Information sources

CASE STUDY

URGENT publication for local authorities

NERC's Urban Regeneration and the Environment (URGENT) programme produced a user-friendly digest of research outcomes, targeted at local authority environmental health, planning and technical/engineering departments. These included:

- Web-based environmental information systems for planners;
- Information on maintaining biodiversity in urban environments;
- A cost-effective method of scanning and mapping sites to aid risk-based management of contaminated land;
- New guidelines to reduce damage to archaeologically sensitive areas during regeneration and redevelopment;
- Information on using trees in urban areas to improve air quality;
- A computer system to predict when and where a road will freeze, saving money on unnecessary salting;
- Information on river contamination and pollution removal.

Some of these outputs have informed local authority policies and practice, and/or led to spin-out companies or further research supported by local authorities themselves.



See Glossary for many useful web-links, and the following:

NERC science-to-policy

Communicating your ideas - guidance notes for staff and fund-holders
www.nerc.ac.uk/publications/guidance/comyourideas.asp

Guidance for applicants: impact plans for responsive mode research
www.nerc.ac.uk/funding/application/impactplans.asp

Knowledge Exchange: Sustainable Solutions from Science
www.nerc.ac.uk/publications/corporate/knowledge.asp

NERC Science Impacts Database: <http://sid.nerc.ac.uk>

Some NERC inputs to major government consultations: www.nerc.ac.uk/using/publicsector/consult/

Common Knowledge, the Rural Economy and Land Use Programme's knowledge exchange brochure
www.relu.ac.uk/news/briefings.htm

Annual call for peer review college (including affiliate membership)
www.nerc.ac.uk/funding/assessment/peerreview/members-call.asp

Other science-to-policy

Government guidelines on the use of scientific advice in policy-making: www.bis.gov.uk/assets/bispartners/goscience/docs/g/10-669-gcsa-guidelines-scientific-engineering-advice-policy-making.pdf

Defra guide to evidence-based policy: <http://archive.defra.gov.uk/corporate/policy/evidence/guidance.htm>

The European Commission's SINAPSE scheme: <http://europa.eu/sinapse/sinapse/index.cfm>.

The EC's Environment Directorate General's News Alert Service *Science for Environment Policy*
http://ec.europa.eu/environment/integration/research/research_alert_en.htm

LWEC report on using research to inform policy: www.lwec.org.uk/publications/using-research-inform-policy-role-interpretation

HM Government Code of Practice on Consultation
www.berr.gov.uk/files/file47158.pdf

Science Media Centre 'How science works' guides on communicating risk and uncertainty
www.sciencemediacentre.org/uploadDir/admincommunicating_risk.pdf
www.sciencemediacentre.org/uploadDir/adminuncertainty_in_a_soundbite.pdf

UK government and parliament websites

Information on the UK Government and links to several national bodies
www.direct.gov.uk/en/index.htm.

The Cabinet Office 'one-stop-shop' on policy development and evaluation
www.nationalschool.gov.uk/policyhub/

The Civil Service: www.civilservice.gov.uk

The official site of the Prime Minister's Office: www.number10.gov.uk

UK Parliament Hansard reports (debates, PQ answers etc)
House of Commons: www.publications.parliament.uk/pa/cm/cmhansrd.htm
House of Lords: www.parliament.the-stationery-office.co.uk/pa/ld/ldhansrd.htm

House of Commons Library Factsheets: www.parliament.uk/about/how/guides/factsheets
Information offices in Westminster (which prepare research papers and briefings for parliamentarians and stock publications and reports): Commons 020 7219 4272; Lords 020 7219 3150

Online resource, supported by the Scottish Government, giving policy information and a schedule of events and activities, designed to increase policy-makers' knowledge and understanding in the food, health, environment and rural sectors: www.knowledgescotland.org

Information on the structure of EU institutions and how the EU makes decisions
http://ec.europa.eu/publications/booklets/eu_glance/68/en.pdf

Information services

Dod's parliamentary and civil service 'companions': www.dodonline.co.uk/engine.asp?showPage=products&type=all
 Some information is free, but much is accessible only if you subscribe online or purchase hard copies of the 'companions', which list members of the various parliaments, assemblies and government departments. Swindon Office holds copies of some.

General political websites:
www.epolitix.com/home/ (free bulletin available) and www.theyworkforyou.com/.

Research policy news: www.researchresearch.com/ (subscription needed - your centre/institution may have one)

Index of case studies

Top 25 challenges to UK biodiversity	5
Saving the wandering albatross	6
The Meeting Place	7
The Countryside Survey	8
Assessing tsunami risk to the UK	10
NERC inputs to parliamentary committee inquiry on 2007 flooding	14
Advising the UN on mercury policy	17
Harmful effects of nanoparticles on wildlife	18
Evidence-based environmental management	20
Rural Economy and Land Use	22
Getting to know MPs	25
URGENT publication for local authorities	26

Glossary

BAS	British Antarctic Survey www.antarctica.ac.uk	LGA	Local Government Association www.lga.gov.uk/
BBSRC	Biotechnology and Biological Sciences Research Council www.bbsrc.ac.uk	LWEC	Living With Environmental Change www.nerc.ac.uk/research/programmes/lwec/
BGS	British Geological Survey www.bgs.ac.uk	MRC	Medical Research Council www.mrc.ac.uk
BIS	Department for Business, Innovation & Skills www.bis.gov.uk	NDPB	Non-Departmental Public Body, eg NERC, government agencies, advisory committees
CEH	Centre for Ecology and Hydrology www.ceh.ac.uk	NOCS	National Oceanography Centre www.noc.ac.uk
CSA	Chief Scientific Advisor	Northern Ireland Assembly	www.niassembly.gov.uk
CST	Council for Science and Technology www.cst.gov.uk	Parliament (United Kingdom)	www.parliament.uk
DCLG	Department for Communities and Local Government www.communities.gov.uk/corporate/	Parliamentary Select Committees	www.parliament.uk/about/how/committees/select
DECC	Department of Energy and Climate Change www.gov.uk/government/organisations/department-of-energy-climate-change	PEER	Partnership for European Environmental Research http://peer-initiative.org/html/
Defra	Department for Environment, Food and Rural Affairs www.defra.gov.uk	PML	Plymouth Marine Laboratory www.pml.ac.uk
DFID	Department for International Development www.dfid.gov.uk	POST	Parliamentary Office of Science and Technology www.parliament.uk/mps-lords-and-offices/offices/bicameral/post
DFT	Department for Transport www.dft.gov.uk	PSC	Parliamentary and Scientific Committee www.scienceinparliament.org.uk
DGSR	Director General, Science and Research	RBFF	Research Base Funders' Forum www.berr.gov.uk/dius/science/science-funding/funders-forum/index.html
EA	Environment Agency www.environment-agency.gov.uk	RCEP	Royal Commission on Environmental Pollution www.rcep.org.uk/
EDM	Early Day Motion http://edmi.parliament.uk	RIA	Regulatory Impact Assessment
EPSRC	Engineering and Physical Sciences Research Council www.epsrc.ac.uk	Royal Society	http://royalsociety.org
ERFF	Environment Research Funders' Forum www.erff.org.uk	SAMS	Scottish Association for Marine Science www.smi.ac.uk
ESRC	Economic and Social Research Council www.esrc.ac.uk	Scottish Government	http://scotland.gov.uk/home
European Commission	http://ec.europa.eu/index_en.htm	Scottish Parliament	www.scottish.parliament.uk
European Parliament	www.europarl.europa.eu/	SEPA	Scottish Environment Protection Agency www.sepa.org.uk
FCO	Foreign and Commonwealth Office www.fco.gov.uk	SET	Science Engineering and Technology
FST	Foundation for Science and Technology www.foundation.org.uk/	SID	NERC's Science Impacts Database http://sid.nerc.ac.uk/
GIFTSS	Government Information From The Space Sector www.bis.gov.uk/ukspaceagency	SINAPSE	Scientific Information for Policy Support in Europe www.eu.int/sinapse
I&DeA	Improvement and Development Agency www.idea.gov.uk/idk/core/page.do?pageld=1	SNH	Scottish Natural Heritage www.snh.org.uk
IPCC	Intergovernmental Panel on Climate Change www.ipcc.ch	SPICe	Scottish Parliament Information Centre www.scottish.parliament.uk/business/research/index.htm
KEN	NERC's Knowledge Exchange Network	STOA	Scientific Technology Options Assessment www.europarl.europa.eu/stoa/default_en.htm
LARCI	Local Authority Research Council Initiative www.rcuk.ac.uk/research/xrcprogrammes/otherprogs/larci/pages/home.aspx	UKCIP	UK Climate Impacts Programme www.ukcip.org.uk
LARIA	Local Authorities Research & Intelligence Association www.laria.gov.uk/	UKRO	United Kingdom Research Office www.ukro.ac.uk
		Welsh Assembly Government	www.wales.gov.uk