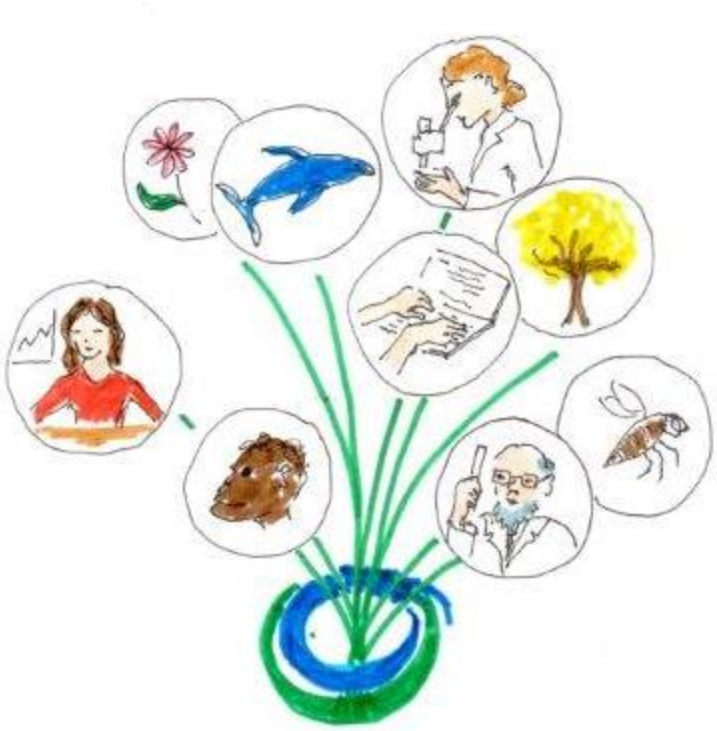
SPIRAL
Science-Policy Interfaces for biodiversity:
Research, Action and Learning

A resource book on science-policy interfaces
The SPIRAL synthesis report

SEVENTH FRAMEWORK PROGRAMME

SPIRAL
Interfacing Biodiversity and Policy



This resource book was developed as part of the SPIRAL project. SPIRAL is an interdisciplinary research project that studies science-policy interfaces between biodiversity research and policy to draw lessons and improve the conservation and sustainable use of biodiversity. SPIRAL was funded under the EU 7th Framework Programme, contract number 244035. For more information on SPIRAL, please visit our website: http://www.spiral-project.eu/ or contact us at info@spiral-project.eu

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About this resource book

This is a resource book on good practices to improve the effectiveness of existing science-policy interfaces or develop new ones. The resource book synthesises information gathered and research done throughout the SPIRAL project ('Science-Policy Interfaces: Research, Action and Learning'). The project carried out research on science-policy interfaces and communication. SPIRAL also supported the design, implementation and improvement of real-life science-policy interfaces, such as the Intergovernmental Science-Policy Platform for Biodiversity and Ecosystem Services (IPBES), AfriBES (a social network of scientific and technical information on biodiversity and ecosystem services for Africa), and the science-policy work of learned societies and research organisations. This resource book complements the range of other SPIRAL outputs, including academic papers, all of which are available on the SPIRAL website at www.spiral-project.eu. Links to all SPIRAL briefs – the most accessible SPIRAL resources – are made throughout this report. For more information specifically on designing and improving SPIs of research projects, please refer to the SPIRAL handbook (http://www.spiral-project.eu/sites/default/files/The-SPIRAL-handbook-website.pdf).

A range of actors are or can be involved in science-policy interfaces including decision-makers (from international to local level), research funders, research institutions and scientists, businesses and business organisations and civil society organisations. A key objective of this manual is to present the information on science-policy interfaces in such a way as to facilitate use by this diverse stakeholder community. To do this we suggest specific briefs that may constitute useful resources to different communities.

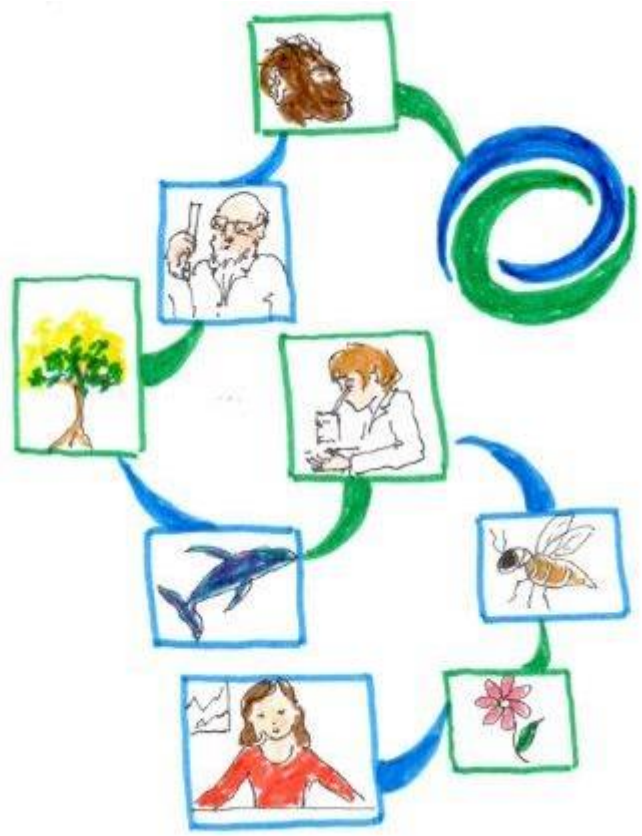
We acknowledge that SPIRAL and its outputs approached SPIs dominantly from the knowledge perspective. Our particular perspective is that of a research project where the scientists involved studied and interacted with SPIs in a range of contexts. The project and its outputs focussed on improved dialogue and interaction in decision-making processes to encourage the inclusion, or at least consideration, of the high quality knowledge(s), including scientific and other knowledges. As such, our aim as a research project was not only to study SPIs but also to acknowledge and encourage the use of knowledge in all its forms in decision-making and taking processes. In addition, although our focus in the SPIRAL project was on biodiversity science-policy interfaces, our findings and recommendations are relevant to other fields.

This resource book can be printed as a pdf document, but can also be used as a web-based tool through which the user is guided towards a collection of targeted briefs addressing various aspects relevant to explore, understand, develop, and assess science-policy interfaces for biodiversity. The tool is hosted on the SPIRAL website at www.spiral-project.eu/content/documents. It is based around a dynamic "SpicyNodes" diagram which can be entered through either the "Who are you?" or the "What do you want to do?" routes (see figure below).


Who are you?
Research policy maker and funder
Understand biodiversity
Focus on impact
A myth-busting guide to science-policy interfaces
Key features of effective SPIs
Integration of research results into policy making: recommendations to policy makers
Integrate credibility, relevance, legitimacy and iterativity
Read these (groups of) briefs
SPI under the spotlight: ways to think about science-policy interfaces
Adding and sustaining the value of research: recommendations for research funding institutions
Learn from existing science-policy interfaces
Read these (groups of) briefs
Policy maker
Research institution, scientist, academic
Read these (groups of) briefs
Business and business organization
Read these (groups of) briefs
A myth-busting guide to science-policy interfaces
Key features of effective SPIs
Understand biodiversity
Recent reflections on science-policy communication in the context of deer management in Scotland
Focus on impact
Afribes: Towards a social network of scientific and technical information for Africa
Reality check for science-policy interfaces
From interfaces to alliances: a shift in how we do science and policy
The Economics of Ecosystems and Biodiversity – TEEB
What do you want to do?
Civil society organization
A myth-busting guide to science-policy interfaces
Key features of effective SPIs
Understand biodiversity
Afribes: Towards a social network of scientific and technical information for Africa
Integrate credibility, relevance, legitimacy and iterativity
The Economics of Ecosystems and Biodiversity – TEEB
From interfaces to alliances: a shift in how we do science and policy
SPI under the spotlight: ways to think about science-policy interfaces
Reality check for science-policy interfaces

A guided tour to SPIRAL resources

Below, the SPIRAL briefs available are organised around a series of key themes. In the second part of this guided tour, the resources are presented according to the categories of actors to whom they may be relevant.



Key themes

Science-Policy Interfaces (SPIs) are the many ways in which scientists, decision makers and others link up to communicate, exchange ideas, and jointly develop knowledge to enrich policy and decision-making processes and/or research. SPIs involve exchange of information and knowledge leading to learning, and ultimately to influencing decisions and changing behaviour – i.e. doing something differently as a result of the learning, see *A Myth-busting guide to SPIs*, and *Useful references on Science-Policy Interfaces (SPIs)*.

An important part of science-policy interfaces is improved **communication**. Communication, especially over problems characterised by complexity and uncertainties, and unlikely to lead to simple solutions, such as issues related to biodiversity and ecosystem services, can be challenging (see *A beginner's guide to understanding challenges of communicating about biodiversity* and *What's so special about biodiversity?*).

Communication is most usefully understood as a network activity, in which there are many stakeholders involved, at different levels. As such, it is important to target communication to **specific audiences** (see *General recommendations for improving science-policy communication*; *Recommendations for improving science-policy communication for individuals*; *Recommendations for*

improving science-policy communication for teams; *Recommendations for improving science-policy communication at the level of organisations*).

Science-Policy Interfaces exist in a wider **context** of policy, media and other factors. The boundaries between a SPI, the context within which it operates, and the possible impacts or effects of the SPI are not fixed, but influence each other and change over time (see *SPIs under the spotlight: ways to think about science-policy interfaces*).

Science-Policy Interfaces can be broken down into **four main dimensions**: structure, goals/objectives, processes and outputs/impacts (see *SPIs under the spotlight: ways to think about science-policy interfaces* and *Key features of effective SPIs*). The **structural features** of SPIs describe how they are set up and the constraints within which the processes are defined (see *Designing for success: SPI structures*). The **goals/objectives** are central to understanding how and why it operates, and why people participate (see *Goals and Roles: objectives and functions*). The **processes** of SPIs define the way in which the key functions are actually carried out (see *Science policy interface processes: fitting activities to evolving contexts*). The **outputs and impacts** of SPIs can be characterised by a set of features describing how and when they are prepared and presented and the ultimate outcomes associated with SPIs and the learning, behavioural and policy changes they foster (see *SPI it out: Making a splash with outputs* and *Focus on Impact*).

The impacts of Science-Policy Interfaces can be to support policy processes more effectively, including designing **funding strategies and research projects** that build on lessons learned in science-policy interactions and foster improved practices in the future (see *Adding and sustaining the value of research: Recommendations for research funding institutions*; *Integration of research results into policy making: recommendations to policy makers* and *Improving the use and impact of your research: recommendations to EU research projects*).

Credibility, relevance and legitimacy (CRELE) are attributes that can explain the influence and impact of Science-Policy Interfaces. Credibility is the perceived quality, validity and scientific adequacy of the people, processes and knowledge exchanged at the interface; Relevance is the perception of the usefulness of the knowledge brokered in the SPI, how closely it relates to the needs of policy and society, and how responsive the SPI processes are to these changing needs; Legitimacy is the perceived fairness and balance of the SPI processes (see *Keep it CRELE: Credibility, Relevance and Legitimacy for SPIs* and *CRELE Choices: trade-offs in SPI design*).

In addition to credibility, relevance and legitimacy, another attribute, **iterativity**, relates to the development and evolution of structure, objectives, processes, knowledge and relationships in continuous and repeated science-policy interactions (see *Iterativity and dynamism in science-policy interfaces*).

Closely linked to iterativity, there is a need to evaluate, learn from and build on the successes of existing science-policy interfaces to counteract the often lacking institutional memory. For examples of **learning from existing SPIs**, see *Reality check for science-policy interfaces*; *Reflections on recent experiences with the UK National Ecosystem Assessment*; *An emerging multi-level and multi-function SPI for the implementation of the Water Framework Directive in Romania*; *Co-constructing INBO's policy relevance; Recent reflections on science-policy communication in the context of deer management in Scotland*; *Reflections on recent experience with the Water Framework Directive*; *Reflections on Science-Policy Interfaces in the development of National Biodiversity Strategies*; *Tools for Science-Policy Interfaces: Recommendations on BISE and Eye on Earth; Towards strengthening environment science-policy interfaces at*

EU-level: the SEPI exploration; *Afribes: Towards a social network of scientific and technical information for Africa; The Economics of Ecosystems and Biodiversity - TEEB*; *Spiraling IPBES*.

Finally, a few key challenges remain evident in current science-policy interfaces. The first is that **individuals** often play a pivotal role in making SPIs work, committing their time and energy but also potentially influencing it. When or if these individuals leave, there is a risk that effort/interest in the SPI may dwindle. The second key remaining challenge is that many actors or institutions in science and policy continue to tend to operate within a **sector-based silo mentality** (see *Reality check for science-policy interfaces*). Both these challenges need to be addressed in order to enhance the connectivity between biodiversity and research and policy-making to improve the conservation and sustainable use of biodiversity and the provision of ecosystem services (see *From interfaces to alliances: a shift in how we do science and policy*).

Key actors

Suggested briefs for policy-makers

Suggested briefs for research policy-makers and funders

Suggested briefs for research institutions, scientists and the academic community

Suggested briefs for businesses and business organisations

Suggested briefs for Civil Society Organisations (CSOs)

Full list of briefs

Understanding science-policy interfaces

Understanding biodiversity

Improving communication

Strengthening science-policy interfaces

Integrating credibility, relevance, legitimacy and iterativity

Learning from existing science-policy interfaces

Moving from interfaces to alliances

Understanding Science-policy Interfaces

SPIRAL Briefs
SCIENCE POLICY INTERFACES: RESEARCH, ACTION & LEARNING

A myth-busting guide to science-policy interfaces (SPIs)

The brief in brief

This is a beginner's guide to what science-policy interfaces (SPIs) are and how they work. It is aimed at people in science and/or policy who are interested in engaging more with the 'other' community and want to prepare for this. It dispels some frequent misunderstandings and looks at how to get more out of SPI work.

What is a science-policy interface (SPI)?

SPIs are the many ways in which scientists, policy makers and others link up to communicate, exchange ideas, and jointly develop knowledge for enriching policy and decision-making processes and/or research. They involve exchange of information and knowledge leading to learning, and ultimately to changed behaviour – doing something differently as a result of the learning – that in turn represents the practical impact of SPIs.

SPIs can be very formal structures, such as the Intergovernmental Panel on Climate Change (IPCC), or the newly created Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES). Many research projects include a component specifically for improving the interactions between the project, policy–makers and other stakeholders and ways in which results are communicated to policy actors – this is also a SPI.

Many SPIs, however, are less formal structures. Discussing a project with funders at the beginning of a piece of work can be a SPI: jointly deciding how to carry out research both to benefit science and to input results into aspects of policy. A workshop with policy-makers and scientists, and maybe other stakeholders, can be a SPI, so can a field trip. Even one-to-one conversations between a decision-maker and a scientist can be a SPI, if knowledge is shared and developed in order to enrich science and/or policy.

SPIs are not limited to direct exchanges between science and policy actors. Other actors such as farmers, fishermen, foresters, land managers and NGOs, can feed in their biodiversity-related knowledge into a process, which in turn helps strengthen scientific knowledge and can increase the quality of decisions being made at various levels. Other actors can also help shape the policy priorities and the sort of science questions that should be addressed. Even lobbying can have many features of SPIs, though usually focused on advocating for particular outcomes.

So SPIs cover a very wide range of communication forums, situations and methods. They can be formal or informal, driven more by policy demand or by supply of science, long-term processes or one-off events. Their common feature is the potential for exchange of information, joint knowledge development and learning.

> There are many [conferences] - particularly with an academic-style focus, which a lot of them are - I wouldn't even think about going because I would probably be asleep after the opening talk!
>
> *Mr N, decision-maker*

However some SPIs are more effective than others. Often, the potential for communication is not realised – for example conference presentations of scientific results that fail to engage policy audiences, or research summaries emailed randomly to government departments. These could result in some learning and impact, but the chances are not good.

Some myths about science and policy

A series of persistent myths underlie conceptions of science and policy in environmental governance. Even where people are aware that these are myths, they often continue to operate as if they were true. The myths affect how people think of, and operate at, the science-policy interface. They can be traced to visions of rationality, science, and controllability inherited from the Enlightenment, and to the difficulty of grasping and dealing with complex socio-ecological systems.

Three myths about science are especially relevant for SPIs:

- *Complex systems can be fully understood and described*;
- *Uncertainty is always reducible or quantifiable*;
- *Simple cause-effect relationships can always be established (deterministic science)*.

Three myths about policy are also common:

- *A socio-ecological system must be fully understood before making decisions that affect it (positively or negatively)*;
- *With enough effort and knowledge, complex systems are fully controllable*;

- *A decision is the end-point of a linear process of reasoning which includes neutral weighting of pros and cons and optimisation.*

The last myth in the list stems from a failure to recognise that 'decision-making' is a continuous process, punctuated by 'choices' or 'decisions', and that the workings of this process depend heavily on institutional and other contexts.

Finally, there are three common myths about SPIs:

- *Science and policy are two independent domains of human activity;*
- *SPIs are all about a one-way flow in which 'truth' (science) speaks to 'power' (policy);*
- *SPIs are simple forums through which reporting of science knowledge results in development of policy grounded in evidence, in clear and controllable ways.*

> They [scientists] go ahead and do their project and then try and pull in policy people, and it's too late by then because…well, it might be useful, but it might not. *Mrs K, policy adviser*

In fact, most of the time, SPIs involve complex interactions and learning processes. Often luck plays a role in why, when and how interactions happen, work, and result in learning. Time, repetition and multiple communication channels and methods can all help – there is no single magic bullet and no one-size-fits-all solution for ideal SPI communication.

What makes SPIs effective?

Some forms of communication are unlikely to result in effective knowledge exchange and learning. One-way communication, for example writing a scientific paper or giving a talk at a conference, is usually not enough on its own – there is nothing wrong with these activities, but they need to be backed up with opportunities for exchange and learning. Similarly, planning research without considering the needs of policy, or setting questions for research without involving scientists in exploring aspects of feasibility, time, and costs, are unlikely to be successful.

> The language of conservation is often talked about: "set aside", "lock up", "preserve"…they have very different meanings and negative meanings to the wider population with whom we really have to engage if we're going to make any difference. *Dr B., Scientist.*

A SPI should instead involve on-going opportunities for exchange and learning, throughout the policy and research processes, in order for both science and policy to get the most out of the process. This can involve spending time on developing common language, building trust, and developing capacities to understand others' positions, views, needs and constraints. Effective SPI communication is best seen as an on-going process: even one-off events or exercises such as a national ecosystem assessment take place within a wider science-policy context, drawing on past experiences and leading forward to new ones. People working in SPIs should remain conscious of these dynamic links and learn from them – for this, formal review and updating procedures may help.

Because SPIs are about fostering learning and influencing behaviour, their effectiveness is highly dependent on the people involved and on the policy processes and contexts within which they operate. Effective learning can benefit from redundancy, in the sense of having several different SPIs operating in the same area, using different approaches, and from repetition of important activities and learning opportunities. These forms of redundancy and repetition should be viewed more as enhancing opportunities for effective communication than as duplication of effort.

Though there can be no 'one-size-fits-all' set of recommendations for the 'ideal' SPI, there are some general features that tend to support success. One popular metaphor considers the (perceived) credibility, relevance and legitimacy ('CRELE') of the SPI processes and the information exchanged. Steps to enhance these features will tend to foster greater learning and behavioural impact, though there can be trade-offs that must be resolved on a case by case basis. These issues are further explored in SPIRAL briefs on CRELE and on trade-offs in SPI design.

SPIRAL has studied a more complete set of SPI features relating to the objectives, structures, processes and outputs of SPIs. These include independence, vision, people, resources, balancing supply and demand, horizon scanning, continuity, conflict management, trust building, capacity building, adaptability, relevant outputs, quality assessment, and translation. Choices about these features will impact on CRELE now and in the future. Again, there are trade-offs and constraints, and people working in SPIs need to be aware of these and make strategic decisions to enhance the effectiveness of communication processes.

What to do next

Most scientists and policy makers, and many in other professions, will at some stage engage with a SPI of some sort. That is not to say that all in science and policy can or should engage in SPIs on a regular basis. It depends on the type of work, organisational roles, colleagues and hierarchies, and personal inclination, motivation and incentives. For those who do want to engage in SPIs, SPIRAL has many resources that can help.

Looking for more information on science-policy interfaces?

For more SPIRAL results, including references related to SPIs, see companion SPIRAL briefs at http://www.spiral-project.eu/content/documents

This brief is a result of research and interactions within and around the SPIRAL project. This brief was written by Sybille van den Hove, Rob Tinch and Estelle Balian (Median), Juliette Young and Allan Watt (Centre for Ecology and Hydrology), and Kerry Waylen (The James Hutton Institute).

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SPIRAL
Interfacing Biodiversity and Policy

Useful references on Science-Policy Interfaces (SPIs)

The brief in brief

In this brief we highlight and describe a few references that are relevant to Science-Policy Interfaces (SPIs) and that we have found useful in the SPIRAL project. The list is of course not exhaustive, and the headers are only indicative: some articles overlap many different headings.

General references on Science-Policy Interfaces (SPIs)

Diaw, C. & Kusumanto, T. 2005. *Scientists in social encounters: the case for an engaged practice of science*. In: Colfer, C.J.P. (ed.). The equitable forest: diversity, community and resource management, pp 72-109. Washington, DC, Resources for the Future and CIFOR.

This chapter questions the link between conventional modes of knowledge extraction and local societies' continuous marginality with regard to global knowledge and power networks. Using case studies from Indonesia and Cameroon, is illustrated how social science methods could go beyond just extracting information from local actors to serve as valid platforms for learning interactively and for negotiating meanings, powers, and representation.

Funtowicz, S. & Ravetz, J. 1993. Science for the Post-Normal Age. *Futures* 25(7): 735-755.

A new type of science, 'post-normal' science, is analysed in contrast to traditional problem-solving strategies, including core science, applied science, and professional consultancy. The two attributes of systems uncertainties and decision stakes are used to distinguish among these.

Gibbons, M., Limoges, C. et al. 1994. *The new production of knowledge - The dynamics of science and research in contemporary societies*. Sage Publications, London.

The authors argue that the ways in which knowledge - scientific, social and cultural - is produced are undergoing fundamental changes. The authors show how reflexivity, transdisciplinarity and heterogeneity - connect with the changing role of knowledge in social relations.

Habermas, J. 1971. *Towards a Rational Society. Student Process, Science and Politics*. Beacon, Boston.

These are selected essays from the Frankfurt School on university functions against a democratic background and on student protests and the faculty's Hobbesian bargain with society. It also reflects how technologically exploitable knowledge can be translated into practical consciousness.

Holmes, J. & Clark, R. 2008. Enhancing the use of science in environmental policy- making and regulation. *Environmental Science & Policy* 11(8): 702-711.

This paper summarises studies undertaken by The Environment Research Funders' Forum (ERFF) of the use of science for environmental policy-making and regulation in the UK to establish what is working, what is not, and why. The aim of the studies has been to inform decisions by ERFF and its members on actions to improve the effectiveness of science in informing environmental policy-making and regulation.

Hoppe, R. (2005). Rethinking the science-policy nexus: from knowledge utilization and science technology studies to types of boundary arrangements, *Poiesis & Praxis: International Journal of Technology Assessment and Ethics of Science*, 3(3), 199-215.

This paper describes how the use of science is often presented as an instrumental problem-solver for policy-makers which does not entirely conform the reality, since knowledge is also used in other complex and interacting ways which include more political or strategic uses.

Hulme, M., Mahony, M., Beck, S., Görg, C., Hansjürgens, B., Hauck, J. Nesshöver, C., Paulsch, A., Vandewalle, M., Wittmer, H., Böschen, S., Bridgewater, P., Diaw, M.C., Fabre, P., Figueroa, A., Heong, K.L., Korn, H., Leemans, R., Lövbrand, E., Hamid, M.N., Monfreda, C., Pielke Jr., R., Settele, J., Winter, M., Vadrot, A.B., van den Hove, S., van der Sluijs, J.P. 2011. Science-policy interface: beyond assessments. *Science* 333(6043):697-8.

This article reflects upon the policy forum "The biodiversity and ecosystem services science-policy interface" by C. Perrings. It states that the framing of the new Intergovernmental Platform on Biodiversity and Ecosystem Services (IPBES) as a body responsible primarily for assessment is too limited an approach and that the goals of IPBES should be expanded.

Jasanoff, S. 1994. *The Fifth Branch. Science Advisers as Policymakers*. Harvard University Press, Cambridge, MA.

In this study Sheila Jasanoff questions the way in which science advisers shape federal policy. This study combines case studies with institutional analysis to consider what counts as "good science", and the role that science knowledge should be expected to play in public sector decision-making.

Jasanoff, S. 2007. Technologies of humility. Nature 450: 33.

This article reflects upon researchers and policy-makers needing ways to accommodate the partiality of scientific knowledge and to act under the inevitable uncertainty it holds.

Lawrence, R. & Després, C. (Eds.) 2004. Futures of Transdisciplinarity. *Futures* 36(4): 397-405.

This paper attempts to clarify the widely used but multiple-interpretable term "transdisciplinary". Why does transdisciplinarity add to interdisciplinarity and multidisciplinarity? Who uses it and why is it valuable in problem solving ? How is transdisciplinarity operationalised in research and professional practice?

Norgaard, R.B. 2004. Learning and knowing collectively. *Ecological Economics* 49: 231-241.

This work reflects on the consequences of scholars from multiple epistemic communities using a variety of models and approaches to understand climate change, biodiversity loss, and other large-scale phenomena stemming from how people interact with the environment. How is this happening, how can it be done better, and what are the implications for ecological economics?

Nowotny, H., Scott, P. and Gibbons, M. 2001. *Re-Thinking Science. Knowledge and the Public in an Age of Uncertainty*. Blackwell, Cambridge, UK.

This work presents an account of the dynamic relationship between society and science. The authors argue that changes in society will enhance a two-way communication, thereby transforming science not only in its research practices and institutions but also in its epistemological core.

Nutley, S. M., I. Walter, and H. T. O. Davies 2007. *Using Evidence: How Research Can Inform Public Services*. Policy Press, Bristol, 363pp.

This key reference synthesises the main theories of research used by policy; summarises empirical evidence of how research is used; and identifies practical issues that must be overcome if research use is to be improved.

Owens, S., 2005. Making a difference? Some perspectives on environmental research and policy. *Transactions of the Institute of British Geographers* 30: 287-292.

In this article the author states that much of the conventional wisdom about policy relevant research is grounded in rational and conventional conceptions on the role of knowledge. Before proclaiming new duties for researchers we should do well to look more closely in to the interplay of rationality and power.

Pielke R.A. Jr. 2007. *The Honest Broker. Making Sense of Science in Policy and Politics*. Cambridge University Press.

This book reflects upon the choice scientists have concerning what role they should play in political debates and policy formation, particularly in terms of how they present their research. What considerations are important when deciding, and what are the consequences for the individual scientist and the broader scientific enterprise. The book aims to identify a range of options for individual scientists to consider making their own judgements on how they would like to position themselves in relation to policy and politics.

Pohl, C. 2008. From science to policy through transdisciplinary research. *Environmental Science & Policy* 11(8): 46-53.

This article questions if transdisciplinary research is a useful means of bridging science and policy; and whether transdisciplinarity goes beyond communicating scientific results to public agencies, the private sector, or civil society.

Ravetz, J. 1971. *Scientific Knowledge and its Social Problems*. Oxford University Press, Oxford.

This book analyses science as the creation and investigation of problems and traces how our understanding of science has evolved over the last two decades. The author demonstrates the role of choice and value judgement, and the inevitability of error in scientific research.

Sarewitz, D. & Pielke R.J. 2007. The Neglected Heart of Science Policy: Reconciling Supply of and Demand for Science. *Environmental Science & Policy* 10: 5-16.

This article reflects upon the effectiveness of science portfolios. It conceptualises science in terms of a supply of knowledge and information, societal outcomes in terms of a demand function and science policy decision-making as a process aimed at reconciling the dynamic relationship between supply and demand.

Spierenburg, M. 2012. Getting the message across. Biodiversity science and policy interfaces: A review. Gaia 21(2): 125-134.

This paper outlines the challenges of effective science-policy communication on biodiversity issues and outlines some key steps needed for scientists to get engaged in political aspects of biodiversity conservation.

Stirling, A. 2006. Analysis, participation and power: justification and closure in participatory multi-criteria analysis. *Land Use Policy* 23: 95–107.

This paper examines the general relationship between participatory deliberation and quantitative analysis in the appraisal of environmental performance. By exploring some detailed implications for participatory multi-criteria assessment, the paper points towards a more balanced emphasis on these two modes of appraisal.

Van den Hove S. 2007. A Rationale for Science-Policy Interfaces. *Futures* 39(7): 807-826.

This paper outlines justifications for science–policy interfaces, the reasons for their growing importance in environmental governance, and the theoretical and epistemological challenges they pose. Van den Hove looks at the intersections between science and policy to highlight that science and policy, far from being mutually exclusive and hermetic categories are intersecting domains of human activity which are in co-evolution.

Watson, R.T. 2005. Turning science into policy: Challenges and experiences from the science-policy interface. *Philosophical Transactions of the Royal Society B.* 360: 471-477.

This paper presents suggestions on how to improve SPIs, based on the experiences of Bob Watson, a key figure in international assessments, to tackle stratosphere ozone depletion, climate change and biodiversity.

References on SPI characteristics

Cash, D.W., Clark, W.C., Alcock, F., Dickson, N.M., Eckley, N., Guston D.H., Jäger, J., Mitchell, R. 2003. Knowledge systems for sustainable development. *PNAS* 100(14): 8086-8091.

The authors outline the challenges of designing and creating initiatives (boundary organisations) to work across scales, sectors and interests, in order to improve science-policy interfaces.

Farrell, A.E. & Jaeger, J. (Eds.) 2006. *Assessments of regional & global environmental risks. Designing Processes for the Effective Use of Science in Decision making*. Resources for the Future. Washington, DC, USA.

The authors present environmental assessments as the bridge between the expert knowledge of scientists and engineers on the one hand and decision-makers on the other. This book is the result of an international, interdisciplinary research project to analyse past environmental assessments and understand how their design influenced their effectiveness in bringing scientific evidence and insight into the decision-making process.

Van den Hove, S. 2006. Between consensus and compromise: acknowledging the negotiation dimension in participatory approaches. Land Use Policy 23(1): 10-17.

In this paper Van den Hove argues that participatory approaches should acknowledge both the irreducible plurality of standpoints and the necessity of common existence in order to be a valuable answer to decision making challenges created by the ecological and societal complexity of environmental issues.

Van der Sluijs, J. 2005. Uncertainty as a monster in the science–policy interface: four coping strategies, *Water Science and Technology* 52 (6): 87–92.

This paper presents a sample of highlights and insights of relevance to the environmental modelling communities, drawn from the international symposium "Uncertainty and Precaution in Environmental Management" (UPEM).

References on learning from existing SPIs

Görg, C., Beck, S., Berghöfer, A., van den Hove, S., Koetz, T., Korn, H., Leiner, S., Neßhöver, C., Rauschmayer, F., Sharman, M., Wittmer, H., Zaunberger, K. 2007. *International Science-Policy Interfaces for Biodiversity Governance - Needs, Challenges, Experiences*. Workshop Report, Helmholtz Centre for Environmental Research, Leipzig: 44pp.

This workshop discussed the needs, gaps and options for an international mechanism on SPIs in biodiversity governance. It was intended to contribute to the IMoSEB consultative process and draws upon the experiences of science-policy interfaces, within and beyond the biodiversity field.

Koetz, T., Bridgewater, P., van den Hove, S., Siebenhüner, B. 2008. The role of the Subsidiary Body on Scientific, Technical and Technological Advice to the Convention on Biological Diversity as science–policy interface. *Environmental Science & Policy* 11(6): 505-516.

This paper provides a critical analysis of the SBSTTA, which has become the centre of heated debates concerning its function as the science–policy interface of the Convention on Biological Diversity. The authors give reasons for SBSTTA's inherently political role in the current governance process of the CBD, and explore ways to enhance SBSTTA's effectiveness as a science–policy interface, going beyond the usual view that it should merely be "more scientific".

Koetz, T., Farrell, K.N., Bridgewater, P. 2011. Building better science-policy interfaces for international environmental governance: assessing potential within the Intergovernmental Platform for Biodiversity and Ecosystem Services. *International Environmental Agreements* 12 (1), 1-21.

This article addresses implementation failure in international environmental governance by considering how different institutional configurations for linking scientific and policy-making processes may help to improve implementation of policies set out in international environmental agreements.

Neßhöver, C., Müssner, R., Henle, K. & Sousa Pinto, I. 2008. Linking biodiversity research and policy in Europe. *Ambio* 37(2):138-141.

A short description of the science-policy interfaces established by national biodiversity platforms (NBPs) and their integration into a European Platform for Biodiversity Research Strategy (EPBRS) and key factors for success and shortcomings based on the experience gained in these platforms.

Loreau, M., Oteng-Yeboah, A., Larigauderie, A., Babin, D. 2006. Improving the interface between biodiversity science and policy: Towards an International Mechanism of Scientific Expertise on Biodiversity (IMoSEB). Earth Science System Partnership: Beijing, November 9-12.

The focus of the Earth System Science Partnership (ESSP) Open Science Conference was on regions around the world facing unprecedented challenges induced by global environmental change. This paper explores the role of an international science-policy mechanism to bridge science and policy to better address the challenges currently facing biodiversity.

Perrings, C., Duraiappah, A., Larigauderie, A., and Mooney, H. 2011. The biodiversity and ecosystem services science–policy interface. *Science* 331:1139–40.

Using the experience of past assessments of global biodiversity and ecosystem services change and the IPCC this article questions what the policy-oriented changes in the Busan outcome imply for the science of the assessment process.

van den Hove S. & Sharman, M. 2006. *Interfaces between Science and Policy for Environmental Governance: Lessons and open questions from the European Platform for Biodiversity Research Strategy*. Part IV (11): 185-209. In: Guimaraes Pereira, A., Guedes Vaz, S., Tognetti, S. (Eds.) Interfaces between Science and Society. Greenleaf, Sheffield.

This chapter aims to clarify, explore and synthesise the conditions, strengths and limitations of real-life interfaces between science and policy-making for environmental governance. The analysis is based on a normative reflection

on the context and scope of such interfaces and on a case study.

Wilson, D.C. 2009. *The Paradoxes of Transparency: Science and the Ecosystem Approach to Fisheries Management in Europe*. Amsterdam University Press, Amsterdam.

This book presents the findings of an extensive sociological survey of the bureaucracy of The International Council for the Exploration of the Sea (ICES)—a network of more than 1,600 scientists from the nations surrounding the North Atlantic and the Baltic Sea— detailing both its failures and the amendments made to Europe's Common Fisheries Policy in attempts to improve and strengthen it.

Wynne, B. 1992. Uncertainty and environmental learning. Re-conceiving science and policy in the preventive paradigm, *Global Environmental Change* 6(1): 111–127.

This paper states that emerging evidence for success on farms of resource-conserving practices must not tempt agricultural professionals into making prescriptions about what constitutes sustainable agriculture. Understanding and solutions can only arise with wide public and scientific participation. New systems of learning are needed, using participatory methods and criteria for trustworthiness which will have profound implications for agricultural professionals.

Looking for more information on science-policy interfaces?

For more SPIRAL results, including references related to SPIs, see companion SPIRAL briefs at http://www.spiral-project.eu/content/documents. This brief is a result of research and interactions within and around the SPIRAL project. This brief was written by Kerry Waylen (The James Hutton Institute), Juliette Young and Allan Watt (Centre for Ecology and Hydrology), Sybille van den Hove, Estelle Balian and Rob Tinch (Median), Annamarie Krieg (NIOZ), and Simo Sarkki (University of Oulu).

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SPIRAL
Interfacing Biodiversity and Policy

Understanding Biodiversity

SPIRAL Briefs
SCIENCE POLICY INTERFACES: RESEARCH, ACTION & LEARNING

A beginner's guide to understanding challenges of communicating about biodiversity

The brief in brief

This brief, as part of an FP7 project called 'SPIRAL', outlines six key challenges in communicating about biodiversity and ecosystem services. This brief is aimed at both holders and users of biodiversity knowledge and seeks to understand the factors currently constraining the communication on the role of biodiversity in ecosystem service provision and human well-being. This brief is complemented by other SPIRAL briefs which focus on different aspects related to biodiversity science-policy interfaces, from understanding science-policy interfaces and biodiversity, to help on developing them, including ways of addressing the communication challenges explored here from institutional levels to individuals.

Uncertainty, complexity, ignorance

Issues related to biodiversity and ecosystem services are often referred to as "wicked" problems, full of uncertainty, highly complex and therefore unlikely to lead to simple solutions. Scientists may feel that a lack of understanding of the uncertainty about and/or complexity of ecosystems can lead to certain ideas or concepts being taken up before sufficient evidence has been accrued. In addition there is often a perception that decision-makers prefer simplistic approaches (e.g. simple climatic envelope models to predict the impact of climate change on biodiversity, or cost-benefit analysis to compare costs and benefits of actions), despite reservations from the scientific community.

> The policy maker would also want to say can you not just tell us what you've found and why it's important? I've heard scientists say…"it's not my job to actually be even suggesting what we should be doing. That's…that's not for me, I'm a scientist!"
> *Dr M, scientist*

There is a big challenge therefore in balancing the communication of complexity and uncertainties, but also of ignorance, to decision-makers whilst remaining pertinent and useful.

Lack of links, or differences, between disciplines and sectors

Although interdisciplinarity has long been advocated in research relating to biodiversity and ecosystem services, implementing this approach remains a challenge. Many of the challenges associated with communication between science and policy are, in fact, similar to those associated with interdisciplinarity. A key task associated with communicating research to policy is initial integration of different natural and social sciences that jointly better inform on biodiversity and ecosystem services.

Lack of links, or differences, between research and policy

There are important institutional barriers between science and policy, which affect communication and more broadly interaction. In the policy community there is often a high turn-over of people, which means that knowing who to contact can be difficult and keeping contacts within policy circles even more so. The latter is an important consideration as many science-policy interfaces are one-to-one interactions which relate to personalities of the individuals involved. As with the challenge of interdisciplinarity, there is certain amount of jargon associated with the science and policy communities – understanding each others' language can pose problems. There may also be a mismatch between the needs and constraints of policy and science.

> The policy people don't understand what science can deliver. They don't understand how long it takes and they don't understand the limitations because they're not trained in that area. Equally the scientists don't understand that policy people need to be able to communicate, need certainty and so they're always saying "oh well it might be but it might not be"
> *Dr G, policy adviser*

Norms and values

Fundamental differences in norms and values can prevent effective communication between science and policy. For example, conservationists may worry about allocating a

monetary value to ecosystem services feeling that biodiversity may be devalued and at more risk. In addition, some scientists may not always understand other, non-economic, influences on decision-making, which reflect other societal values. There can also be a perception that certain groups whose norms and values match better with those held within policy may have a greater influence on policy, resulting in potential lack of scientific rigour. The same holds for more powerful groups. Lack of acknowledgement and understanding of different norm and value systems can lead to frustration and disappointment, thereby impacting on the willingness to communicate and on effective interactions between science and policy.

Appropriateness of communication procedures

Aspects that are particularly challenging in terms of procedure relate to timing and format issues, and getting it right in terms of sources of information. Scientists often get frustrated with their research not being taken up. This can be due to a mismatch between provision of research and the policy cycle. Timing also dictates standards of science. Whilst there may be a case for rushing results to meet policy demands, there is a risk this may impact on the quality of the science produced, and, in turn, its credibility. These trade-offs need to be carefully considered.

> Scientists tend to be very matter of fact. It's all facts so they present it as facts and then it's…just not accessible. And they think "well why is it not accessible?" Because they've kind of presented information that is fact as fact and that's not how people really communicate
> *Dr K, policy-maker*

Another issue relates to sources of information. It is not always clear how policy gains its evidence - there are rarely "audit" trails to follow information pathways. This has led to the perception that policy-makers are not using published results, but rely on expert panels or workshops – that can be perceived to have less legitimacy. This may be because from a policy perspective it may be easier to gain distilled information from an expert panel than trawling through scientific publications. Indeed, policy-makers often feel that there is no lack of information, but a lack of "relevant" and synthesised information.

Influence of media and other sectors

Scientists often have the perception that sectors other than science, particularly the media, can and do have an important influence on the communication of scientific information to policy. Scientists are often wary of the media distorting or misrepresenting their research. This can, in the long-term lead to scientists not engaging in communication outside of the scientific community, and the potential loss of that research to policy. The perceived influence of lobbies can also lead to disillusionment over the quality and usefulness of research.

> Politicians I'm afraid probably only listen to the last person that they spoke to.
> *Mr G, local decision-maker*

Looking for more information on science-policy interfaces?

For more SPIRAL results, including separate briefs focussing on practical steps or recommendations to address some of the above challenges, see companion SPIRAL briefs at http://www.spiral-project.eu/content/documents

This brief is a result of research and interactions within and around the SPIRAL project. It was written by Juliette Young (Centre for Ecology and Hydrology) and Kerry Waylen (The James Hutton Institute).

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SPIRAL
Interfacing Biodiversity and Policy

SPIRAL Briefs
SCIENCE POLICY INTERFACES: RESEARCH, ACTION & LEARNING

What's so special about biodiversity?

The brief in brief

This brief, as part of the SPIRAL project, outlines the main characteristics of biodiversity, namely complexity, unknowns and uncertainties, temporal and spatial scales, irreversibility and human dependence on biodiversity. This synthetic information is aimed at both holders and users of biodiversity knowledge and decision-makers who wish to understand what makes biodiversity so different. More information can be found in other SPIRAL briefs which focus on different aspects related to biodiversity science-policy interfaces, from understanding science-policy interfaces, to help on developing and assessing them.

What do we mean by "biodiversity"?

One of the first issues we need to address in the context of science-policy interfaces for biodiversity is what we mean by "biodiversity". The definition of biological diversity provided by the Convention on Biological Diversity is *"the variability among living organisms from all sources including, inter alia, terrestrial, marine and other aquatic ecosystems and the ecological complexes of which they are part; this includes diversity within species, between species and of ecosystems"*[1]. No consensual definition exists, yet this one has the merit of making explicit the different levels (genes, species and ecosystems) and the different biomes. There are great differences in how biodiversity is framed by different publics (scientists, decision-makers, general public etc). These different interpretations can impact on perceptions of biodiversity and its management. For example, while individuals may be unaware of the 'scientific' definition of biodiversity, they can still express attitudes towards biodiversity management measures that are well grounded in complex mental concepts and corresponding normative evaluations[2] but also in very practical experience. We must not assume that because different publics may not know the term, or may share a different understanding of 'biodiversity' they do not care or have strong feelings and views about it and the management of our relationships to biodiversity.

Complexity

The majority of issues relating to biodiversity are incredibly complex not only in themselves, due to the relationships between components of these systems, but also due to the multitude of inter-linkages among environmental phenomena. The complexity of studying biodiversity, and the factors that may influence it, can in some cases, as with climate change, lead to disagreement amongst scientists. This is not necessarily a problem, as it can cause healthy discussions that progress the study of biodiversity, but complexity should be acknowledged as an inherent characteristic of biodiversity.

Unknowns and uncertainties

There are many unknowns when it comes to biodiversity. Only a fraction of biodiversity is known in any detail and therefore attempting to determine the effects of human activities on known and, more importantly, unknown biodiversity is extremely difficult. A potential risk is that certain groups of organisms may receive less attention than others, particularly uncharismatic and little-known species such as soil invertebrates and microbes.

In addition to unknowns, a certain amount of uncertainty exists in all scientific research including extrinsic uncertainties (i.e. insufficient scientific knowledge) and intrinsic uncertainties inherent to the complexity and indeterminacy of socio-ecological systems and environmental issues. While scientists may in some cases be able to give a measure of uncertainty, they will never be able to remove uncertainty from the study of biodiversity or of any complex socio-ecological system for that matter.

[1] http://www.cbd.int/convention/articles/?a=cbd-02

[2] Fischer, A. & Young, J. (2007). Understanding mental constructs of biodiversity: implications for biodiversity management and conservation. Biological Conservation 136: 271-282.

Temporal and spatial scales
The evolution of, and impacts on, biodiversity extend over large temporal and spatial scales. For example, pollution from industrial emissions can be carried hundreds or even thousands of kilometres in the atmosphere before being deposited elsewhere, potentially affecting the biodiversity in those areas. Often the effects of impacts will take decades to be felt, far longer sometimes than human lifetimes[3].

Irreversibility
Another characteristic of biodiversity is that once damage is done, it may be irreversible. Extinctions are the most common manifestation of irreversibility. Famous cases of extinctions include the dodo *Raphus cucullatus*, hunted to extinction in the 17th century, and the more recent demise of the Baiji, or river dolphin *Lipotes vexillifer* from the Yantze river. It is highly likely that elements of biodiversity are being lost without our knowledge.

Dependence on biodiversity
Perhaps the most important characteristic of biodiversity from an anthropocentric point of view is that humans are wholly dependent on biodiversity for survival and well-being. Biodiversity is an essential provider of ecosystem goods such as food, raw materials, medicines, fuel, fibre and shelter. In addition, biodiversity provides us with irreplaceable ecosystem services such as water purification, nutrient cycling and pollination. Biodiversity also contributes directly to national economies and provides employment through agriculture, forestry, fishing and hunting. There are also important intrinsic values attributed to biodiversity, which can never be fully comprehended.

Where does this leave us?

The above characteristics of biodiversity show that we are dealing with a highly complex and dynamic system that we still know very little about, which is capable of providing us with a wealth of goods and services, but which is being threatened[4]. Below we highlight some preliminary suggestions[5] on ways forward in terms of science-policy interfaces for biodiversity:

- Joined-up policy, recognising that several different policy sectors 'deal with' biodiversity, and that any development is likely to impact on some aspect of biodiversity. Integration of biodiversity concerns across policy sectors is a priority. Priority sectors that need to consider biodiversity include fisheries, agriculture, transport, energy, development, etc.

- Science, just as policy, has a tendency to operate in silos. A shift is needed to look at biodiversity in a more interdisciplinary way to address the complex social and ecological issue of biodiversity change.
- Building strong indirect science-policy links is also essential. This will require considering research more holistically, looking at what stakeholders want in terms of biodiversity policy, what the impacts of environmental policy on stakeholders' activities are, and what societal changes are impacting on policy. Better understanding of the dynamics of the socio-ecological system will enable better framing of the crucial science-policy questions we need to address and answer, and will lead to science that people and biodiversity need.

Looking for more information on science-policy interfaces?
For more SPIRAL results, including separate briefs focussing on practical steps or recommendations to address some of the above challenges, see companion SPIRAL briefs at http://www.spiral-project.eu/content/documents This brief is a result of research and interactions within and around the SPIRAL project. It was written by Juliette Young (Centre for Ecology and Hydrology) and Kerry Waylen (The James Hutton Institute).

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[3] van den Hove (2000). Participatory approaches to environmental decision-making: the European Commission Climate Policy Process as a case study. Ecological Economics 33: 457-472.
[4] E.g. Millennium Ecosystem Assessment and National Ecosystem Assessment
[5] These recommendations are based on interviews carried out with science and policy actors in three case studies: the UK NEA, the implementation of the WFD, and deer management in Scotland. This information was complemented by discussions in a workshop held in June 2012. For more information on each of these case studies, please see other SPIRAL briefs.

Improving Communication

Recommendations for improving science-policy communication

The brief in brief

The purpose of this SPIRAL brief is to highlight that opportunities and responsibilities for improving communication are relevant to both policy and science and across scales (from individuals to organisations)[1]. It provides an overview of activities and approaches which can help to improve communication of both scientific and policy knowledge relating to ecosystem services and biodiversity.

Looking across the table

In many situations it can feel as if the onus for improving communication falls to individuals. It is certainly true that communication depends on interest and commitment from individuals in both policy and science arenas, and it is perhaps easy to picture how a researcher could go about 'packaging' findings from a paper or research project in order to inform policy colleagues. However, recommendations are also relevant at higher scales. For example, the options available to individuals are constrained and dependent on their work teams, parent organisations and funding opportunities, and in turn these relate to sectorial expectations and career structures. Improving communication will depend on both individual and institutional commitment and prioritisation. In the table on the next page we have therefore listed recommendations at three scales: i) individuals, ii) teams and iii) organisations.

Looking down the table

The reality of science-policy communication often resembles a messy network and in real life, there exist no separate easily identifiable 'camps' of scientists and policy-makers. For example, where do those working in statutory environmental agencies fit in? However, scientific research and policy-making do have distinct differences in purpose and ethos, and the onus for improving communication falls on both.

Theorteical and academic background

Consideration of policy and science processes and the understanding of SPIs as processes of coproduction of knowledge and of interactive two-way communication are contained in separate SPIRAL briefs, at http://www.spiral-project.eu/content/documents. The view of science-policy interfaces which underlies our project is described in van den Hove, S. (2007) *A rationale for science-policy interfaces*, Futures, 39(7), 807-826, and an accessible review and comparison of science and policy links across Europe is provided by Nutley, S., Morton, S., Jung, T. and Boaz, A. (2010) *Evidence and policy in six European countries: diverse approaches and common challenges*, Evidence & Policy: A Journal of Research, Debate and Practice, 6(2), 131-144.

Looking for more information on science-policy interfaces?

For more SPIRAL results, see companion SPIRAL briefs at http://www.spiral-project.eu/content/documents

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SPIRAL
Interfacing Biodiversity and Policy

[1]The information in the brief is based on interviews carried out with science and policy actors in three case studies: the UK NEA, the implementation of the WFD, and deer management in Scotland. This information was complemented by discussions in a workshop held in June 2012. For more information on each of these case studies, please see other SPIRAL briefs.

	Individual	Teams	Organisation
Science	• Look for training courses and other opportunities to learn about policy processes. • Recognise that 'policymakers' are diverse and have diverse views. Some have science backgrounds. • Use visual materials. • Use different communication tools, e.g. scenarios, user guides, videos or online best practice guides, maps, social media. • Be prepared to adapt approaches according to your audience. • Plan to publish reviews. These are helpful to non-researchers, and can fit with academic motivations. • Contextualise the presentation of research or specific findings.	• Discuss plans and outputs throughout projects, and from the design stage, not just at the end. • Policy briefs can be useful but must be disseminated and linked to other communication outputs. • Organise field trips and practical demonstrations. • Allow communication strategies to evolve and be flexible. • Learn from experience in interdisciplinary research. • Proactively seek out ways to present research and its implications to different audiences. • Preface all reports with accessibly-written executive summaries.	• Research and fund training for communication skills and understanding of policy processes for scientists. • Explore potential for broader assessment of impact), and create and publish in high journals aimed at policy. • Encourage scientists to get acquainted with policy processes and support those who wish to operate at the science-policy interface.
Both science and policy	• Seek out events where other disciplines and sectors will attend. • Explore job-shadowing, i.e. scientists and policy-makers observing the day-to-day job of the other. • Cultivate personal contacts though recognise that everyone is under time pressures. • Look for training courses and opportunities to improve communication and networking skills.	• Plan projects and budgets to spend time and resources on science-policy interfaces and communication. • Explore the use of scenario-building and other tools as a process for building shared understanding. • Provide directories of experts /subject-specific contacts. • Consider the merits of cross-reviewing: for example in addition to academics reviewing academic papers (peer-review) and policy-makers reviewing policies, explore the merits of academics reviewing policy, or policy-makers reviewing academic outputs • Plan topic-focused events that allow mingling from those with different backgrounds. • Organise field trips to bring together researchers and stakeholders across levels (e.g. from policy to land-manager).	• Promote general understanding about science and its role in society. • Provide incentives (monetary and career) for interaction between science and policy. • Promote discussions about career structures and motivations. • Fund and support interdisciplinary research. • Fund training or resourcing for "linker/broker/facilitator" individuals and "linker" events to build science-policy relationships (do not just focus on tangible "Knowledge Exchange outputs"). • Develop a communication strategy to help identify and prioritise audiences and partners. • Provide funding for networking events.
Policy	• Recognise that many researchers are personally motivated to see their research used and valued. • Recognise that 'scientists' are diverse and do not have knowledge of all issues relating to biodiversity and ecosystem services. • Subscribe to feeds about relevant news and policy brief sites. • Seek out opportunities to learn how science works in general, as well as to learn about specific job-related topics.	• Be transparent about questions, and expected needs for current and/or future knowledge. Putting this into a briefing note for researchers can be a helpful starting point for discussion. • Welcome conversations about defining questions or problems. • Consider developing a list or network of scientific experts and researchers to help you. • Provide space and resources to allow teams and individuals to learn and to build contacts beyond the policy sphere.	• Promote transparency and wider understanding (e.g. through training course) of policy and decision-making and implementation processes. • Explore if and why science is valued compared to other forms of evidence. • Liaise with funders to ensure funded projects (i) are clearly aware of policy priorities, and (ii) encourage communication e.g. enforce clearly written summaries from tender stage. • Liaise with funders to develop projects that allow flexibility for interaction between science and policy.

SPIRAL Briefs
SCIENCE POLICY INTERFACES: RESEARCH, ACTION & LEARNING

Recommendations for improving science-policy communication for individuals

The brief in brief

In this brief we suggest recommendations[1] for how to improve science-policy communication for individuals interested in or connected with science-policy interfaces (both in research and policy departments and agencies).

Why look at the individual-level?

The actions and commitments of individuals across the science and policy sectors are undeniably essential for improving science-policy communication. It is true that any individual's ideas, actions and opportunities are shaped and constrained by factors beyond his or her control, such as their employers' priorities and career structures. However, no communication can occur without the interest and input of individuals across various organisations and sectors that contribute to research, policy design and implementation.

Overview of recommendations for individuals

Recommendations for researchers

Learning the basic principles of good communication is a good start for any individual wishing to improve their ability to communicate with policy-makers (and, of course, this should also aid communication with other audiences). Therefore, it is useful for early-career researchers (PhDs and postdocs) to proactively seek out learning opportunities (training courses and feedback). Thinking about science-policy interaction issues should begin early in careers, but should not later be forgotten: training should be continued throughout careers, especially because senior scientists may find new opportunities to communicate that were hitherto unavailable to them. The other area which scientists need to learn about is policy processes relevant to their topic area. There is rarely any such thing as a single 'decision-maker'. Instead, policies are crafted in incremental processes involving teams of individuals and interests. For scientists who wish to proactively communicate knowledge, simply recognising the complexity and process nature of "policy-making" and "policy implementation" can be an important first step to making policy appear more approachable. Understanding the different stages in the policy cycle and the individuals' role involved, can help to understand policy-makers' requests and pinpoint likely interests in knowledge. Furthermore, getting to know policy departments and processes hopefully leads to a natural understanding that individuals working in policy have different roles and views. It may also be helpful to differentiate between policy-making and policy-implementation. Within the environmental sector it can often be the case that the policymaker has a personal interest or qualification(s) in environmental issues. This helps to emphasise that communication must, where be possible, be tailored and contextualised to different individuals and interests. Because policy makers are a diverse bunch, and often working under tight time constraints, using a variety of different communication tools can help to promote and reinforce a message. For example, these can include: policy briefs; press-releases; printed user guides; DVD or online best practice guides; attending relevant meetings; maps; social media. However, whoever the audience and whatever the message, there are some basic principles, such as introducing topics with simple points and using visual materials, which can help make messages salient.

[1] The information in the brief is based on interviews carried out with science and policy actors in three case studies: the UK NEA, the implementation of the WFD, and deer management in Scotland. This information was complemented by discussions in a workshop held in June 2012. For more information on each of these case studies, please see other SPIRAL briefs.

Science research	○ Look for training courses or opportunities to learn about policy processes. ○ Recognise that 'policymakers' are diverse and have diverse views. Some have science backgrounds. ○ Use visual materials. ○ Use different communication tools, e.g. scenarios, user guides, DVD or online best practice guides, maps, social media (e.g. twitter, blogs). ○ Be prepared to adapt approaches according to your audience. ○ Plan to publish reviews. These are helpful to non-researchers, and can fit with academic motivations. ○ Contextualise the presentation of research or specific findings.
Both science	○ Seek out events where other disciplines and sectors will attend. ○ Explore job-shadowing, i.e. scientists and policy-makers observing the day-to-day job of the other. ○ Cultivate personal contacts but recognise that everyone is under time pressures. ○ Look for training courses and opportunities to improve communication and networking skills.
Policy &	○ Subscribe to news feeds about relevant news and policy brief sites. ○ Recognise that many researchers are personally motivated to see their research used and valued. ○ Recognise that 'scientists' are diverse and do not have knowledge of all issues relating to biodiversity and ecosystem services. ○ Seek out opportunities to learn how science works in general, as well as to learn about specific job-related topics.

Recommendations for those working in policy and public agencies

Communication is a two-way process. No matter what techniques researchers use to package information and communicate knowledge, commitment to communication is also required from those in policy-making and implementation roles. This, of course, requires time. There are some tools available that can help to manage information and highlight relevant bodies of knowledge: subscribing to news feeds can help spot new articles and updates on policy-brief sites. However, it is also helpful to build and value relationships with individual researchers, many of whom are personally motivated to see their research understood and used. Building relationships is mutually beneficial, allowing each 'side' to better understand and trust the other, and encouraging more meaningful conversations, and more successful communication of knowledge. However, it is important to recognise that just as policy roles vary, so are scientists diverse in their interests and expertise. An individual cannot know a great deal about every particular topic (there are a vast number of disciplines and specialist topics within the general field of ecosystem services and biodiversity), although they may be able to suggest better colleagues to speak to. A better general understanding of the process of science can help policy-makers to identify what kinds of knowledge might be available from science.

Recommendations applying across science and policy

Individuals in science and policy should make time to seek opportunities to build personal relationships and identify communication opportunities. Therefore, attending events involving both scientists and policy makers, and seeking opportunities for job-shadowing can be particularly useful, although training courses can also help to improve specific communication and networking skills.

Looking for more information on science-policy interfaces?

For more SPIRAL results, see companion SPIRAL briefs at http://www.spiral-project.eu/content/documents

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SPIRAL
Interfacing Biodiversity and Policy

Recommendations for improving science-policy communication for teams

The brief in brief

In this brief we suggest recommendations for how to improve science-policy communication in teams interested in or connected with science-policy interfaces (both in research and policy departments and agencies) [1].

Why look at the team-level?

It is obvious that the actions and commitments of individuals across science and policy are essential for improving science-policy communication, whilst organisational factors can shape their opportunities to get involved in communication. However, on a day-to-day basis, whether in policy or science, much of the work is carried out in teams of individuals working on specific projects. Planning communication strategies in teams can help to ensure that a mixture of approaches are integrated, and play to the respective strengths of individuals.

Recommendations for teams in science

Teams are well placed to use multiple methods to encourage communication linked to certain projects or topics. Every method has pros and cons. For example, press releases may translate into news that reach a wide general audience but are untargeted. By contrast, policy briefs can be very useful for reaching more specific audiences. However for briefs to actually be read, they need to be effectively disseminated and shared, by linking to sources of information and news feeds that relevant policy sectors read, emailing briefs to personal contacts in policy sectors, and taking hard copies to relevant meetings. Ideally, different communication strategies are linked: so for example, a twitter feed can link to a policy brief, which links to a clearly written website which displays more detailed sources of information and summaries, as well as links to related topics and individual academics. Although there is often a reliance on textual outputs, using personal contacts and practical experiences can be a very good way to encourage engagement. If possible and relevant, teams may consider organising a field trip or practical demonstration. As well as engaging with a variety of learning styles, these events can also allow building of personal contacts and trust, which aid communication. To encourage policy understanding and engagement, this should start early in projects (even before a project begins), and continue throughout, evolving where appropriate. If the team members are experienced in interdisciplinary work, insights from these experiences may help with science-policy communication. Enquiring proactively with policy about desired communication strategies may help to refine communication strategies, so although communication should be carefully considered before a project starts, flexibility must be fostered to allow plans to adapt.

Recommendations for teams in policy

Project teams in policy and public agencies can help scientists plan and identify communication opportunities, by clearly and proactively flagging the topics and plans they are working on. Just as researchers are encouraged to clearly capture their knowledge and ideas, it can be helpful for policy teams to do the same. Being transparent about questions, and expected needs for current and/or future knowledge, and explicitly writing this into a briefing note for researchers can be a helpful starting point for discussion. At the same time, and linked to this, compiling a list of relevant science teams and academics can be a useful resource. Of course, doing this requires time for at least some members of the team, but investing time in identifying and making links with relevant scientists can be invaluable for supporting later communication and ensuring institutional memory when team members move on. When policy teams wish to pose specific questions to scientists, it is helpful to be as transparent as possible about the rationale behind the question and the use to which answers will be put: for example, this will allow scientists to identify knowledge areas which the policy-makers may not have considered, and 'acceptable' levels of uncertainty. Teams should also expect and welcome questions and conversations about these questions and problems: academics are trained to be critical and may have whole areas of knowledge or awareness of new emerging issues that are relevant to shaping existing and new policy areas.

[1] The information in this brief is based on interviews carried out with science and policy actors in three case studies: the UK NEA, the implementation of the WFD, and deer management in Scotland. This information was complemented by discussions in a workshop held in June 2012. For more information on each of these case studies, please see other SPIRAL briefs.

Overview of recommendations for teams

Science	• Discuss plans and outputs throughout projects, and from the design stage, not just at the end. • Allow communication strategies to evolve and be flexible. • Learn from experience in interdisciplinary research. • Proactively seek out ways to present research and its implications to different audiences. • Preface all reports with accessibly-written executive summaries. • Write policy briefs but also disseminate and link to other communication outputs.
Both science and policy	• Plan projects and budgets to spend time and resources on science-policy interfaces and communication. • Explore the use of scenario-building and other tools as a process for building shared understanding. • Provide directories of experts /subject-specific contacts. • Consider the merits of cross-reviewing: for example in addition to academics reviewing academic papers (peer-review) and policy-makers reviewing policies, explore the merits of academics reviewing policy, or policy-makers reviewing academic outputs. • Plan topic-focused events that allow mingling with those with different backgrounds. • Organise field trips to bring together researchers and stakeholders across levels (e.g. from policy to land-manager).
Policy	• Be transparent about questions, and expected needs for current and/or future knowledge. Putting this into a briefing note for researchers can be a helpful starting point for discussion. • Welcome conversations about defining questions or problems. • Consider developing a list or network of scientific experts and researchers to help you. • Provide space and resources to allow teams and individuals to learn and to build contacts beyond the policy sphere.

Recommendations applying across science and policy

The most important point is that all teams should plan projects and budgets that allow time and resources for building science-policy interfaces and communication. However, it is also useful to consider specific initiatives that allow science and policy teams working on linked topics to communicate and learn about each others' views and knowledge. These may include the use of scenario-building, or seminar events and field trips focused on certain topics, or cross peer-review that involves academics reviewing policy documents and policy-makers reviewing academic outputs.

Looking for more information on science-policy interfaces?

For more SPIRAL results, see companion SPIRAL briefs at http://www.spiral-project.eu/content/documents

This brief is a result of research and interactions within and around the SPIRAL project. This brief was written by Kerry Waylen (JHI) and Juliette Young (CEH).

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SPIRAL
Interfacing Biodiversity and Policy

Recommendations for improving science-policy communication at the level of organisations

The brief in brief

The actions and commitments of individuals across the science and policy sectors are undeniably essential for improving science-policy communication. However, any individuals' ideas, actions and opportunities are shaped and constrained by factors beyond his or her control. Therefore, to produce widespread and lasting improvements in science-policy communication, major shifts are required at a higher level. Organisations ranging from universities and research institutes through to policy departments may consider implementing the following recommendations to improve the effectiveness of science-policy communication. It is important to note that these recommendations are also relevant to funders of scientific research, who hold key power in shaping research activities.

Recommendations for research organisations

Some scientists have an aptitude and appreciation of the need to communicate beyond their peers, but in general science-policy communication cannot be assumed to automatically occur. However, through training, organisations can encourage their employees to firstly understand the need for communication, and secondly equip them to contribute confidently to communication. These same skills are often thought relevant to supporting interdisciplinary research (which in itself is thought important for addressing topics of societal relevance) so encouraging interdisciplinarity may also be indirectly supportive. Training should happen throughout scientists' careers: although there is a growing emphasis on training early career researchers, established scientists are just as likely to need training or advice to improve their skills for working at the science-policy interface. In addition, learning about relevant policy processes may help better engagement with policy. In general, organisations should support staff who wish to learn about policy processes and those who wish to focus on interfacing with policy. Unfortunately, communication and interaction with policy and society are often seen as 'bonus' activities or not carried out by 'proper' scientists. Addressing this may entail officially recognising the value of science-policy communication through alternative career structures and providing more incentives to take part in the science-policy interface. For example, performance rewards and promotion could be linked to evidence of policy engagement, rather than just academic paper outputs, teaching, or income generation. In order to align an emphasis on communication with existing career priorities, publications could be assessed for evidence of wider engagement and scientists could be encouraged to publish in or establish journals aimed at policy.

Overview of recommendations at high level

Science	○ Research and fund training for communication skills and understanding of policy processes for scientists. ○ Explore potential for broader assessment of impact, and create and publish in journals aimed at policy. ○ Encourage scientists to get acquainted with policy processes and support those who wish to operate at the science-policy interface.
Both science and policy	○ Promote general understanding about science and its role in society. ○ Provide incentives (monetary and career) for interaction between science and policy. ○ Promote discussions about career structures and motivations. ○ Fund and support interdisciplinary research. ○ Fund training or resourcing for "linker/broker/facilitator" individuals and "linker" events to build science-policy relationships (do not just focus on tangible "Knowledge Exchange outputs"). ○ Develop, and regularly revisit, a communication strategy to help identify and prioritise audiences and partners. ○ Provide funding for networking events.
Policy	○ Promote transparency and wider understanding (e.g. through training course) of policy and decision-making and implementation processes. ○ Explore if and why science is valued compared to other forms of evidence. ○ Liaise with funders to ensure funded projects (i) are clearly aware of policy priorities, and (ii) encourage communication e.g. enforce clearly written summaries from tender stage. ○ Liaise with funders to develop projects that allow flexibility for interaction between science and policy.

Recommendations for policy departments

Just as science organisations must find ways to encourage staff to engage in communication, so policy departments must encourage their staff and processes to support engagement with the scientific community. In particular, as well as making time for specific learning, a wider policy awareness of the nature of science and the scientific process could help to underpin science-policy communication. Promoting this awareness could be achieved through training courses, specific group events, job-shadowing or work placements. Subsequently, this learning should be used to prompt reflection and communication on whether and how science is valued and used versus other forms of evidence and influences on policy-making processes. Communicating about these policy processes is particularly important since there is often little accessible available information about the realities of policy-making processes. However, if scientists better understand policy decision-making and implementation processes, this could help them to identify where and how their knowledge can appropriately feed in. Liaising with science funders can promote this indirectly, by encouraging research topics that clearly take policy priorities into consideration and research processes that allow flexibility for interaction between science and policy.

Recommendations applying across science and policy

Communication will only improve if encouraged by career structures and organisational recognition of its importance. Not every scientist and policy maker should entirely or even partly devote themselves to communication. However, organisations should consider a greater diversity of career structures to appropriately value communication (e.g. explicitly designate "broker" or "facilitator" career paths). Communication and networking efforts do not always deliver immediate or tangible benefits, but this does not mean that it is inefficient or wasteful to commit individual careers or organisational activities to communication.

Looking for more information on science-policy interfaces?

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SPIRAL
Interfacing Biodiversity and Policy

Strengthening science-policy interfaces

SPIRAL Briefs
SCIENCE POLICY INTERFACES: RESEARCH, ACTION & LEARNING

SPIs under the Spotlight:
Ways to think about science-policy interfaces

The Brief in brief

This brief summarises the different dimensions and attributes of sciences-policy interfaces (SPIs) which have been used in the SPIRAL project to help understand and analyse SPIs.

SPIs and their contexts

Any science-policy interface, with a particular set of institutional arrangements and participants, exists in a wider environment of policy, media and other factors (Figure 1). The boundary between an SPI and its context is not fixed, and an SPI and its environment both influence each other and change over time.

Dimensions of an SPI

SPIRAL uses a series of dimensions to understand SPIs (see Figure 1). Four dimensions relate to the SPI itself: 'structures', 'objectives/functions', 'processes', and 'outputs'; and two dimensions relate to the wider societal arena in which the SPI is embedded: 'context' and 'impacts' (or 'effects').

SPIRAL also explores three cross-cutting attributes: credibility, relevance and legitimacy (CRELE). These are described in more detail in the SPIRAL companion briefs *'Keep it CRELE'* and *'CRELE Choices: trade-offs in SPI design'*. To capture the dynamic features of SPIs, we complemented CRELE with a fourth attribute, 'iterativity', which relates to the development and evolution of structures, objectives, processes, knowledge and relationships in continuous and repeating science-policy interactions. A companion SPIRAL brief on iterativity is under preparation.

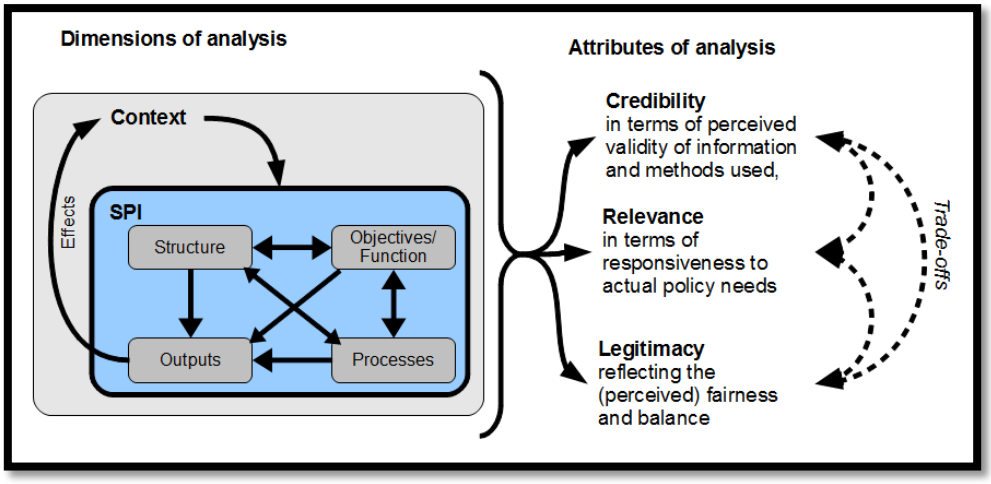

Figure 1: Illustration of dimensions and attributes of analysis

Structure of SPIs

By structure, we mean the institutional arrangements that have been set up and developed to achieve the objectives/functions of the SPI. A wide range of 'typical' SPI structures can be identified, ranging from very formal and institutionalised to informal and more flexible. They can operate at different political levels, and at different stages of the policy process (early warning, issue identification, policy design, implementation, assessment, review) and they can be closer to policy or to scientific processes.

For more information on structures, see companion SPIRAL brief 'Designing for success: SPI structures'.

Functions of SPIs

The objectives/function of an SPI are in part its stated aims, but can also include 'realised' functions that depart from the stated objectives. Less formal SPIs may not have any stated objective, but nonetheless fulfil important functions. Individual participants in a SPI may have expectations and goals for the SPI that differ from or even conflict with its stated function.

For more information on functions, see companion SPIRAL brief *'Goals and Roles: SPI objectives and functions'*.

Processes

An SPI will operate through a series of processes, within the framework of its function and structure. These will be more or less formally defined in procedural rules and guidelines for their work. Actual processes will rarely be fully codified, and may also deviate from the 'official' codified procedures. A companion SPIRAL brief on processes is under preparation.

Outputs

Outputs are the specific products that an SPI develops through its processes, in fulfilling its functions. These outputs can include various forms of reports and publications, organising or participating in assessments, meeting and various events, development of models, scenarios, indicators and other tools for use in biodiversity management and decision making, responses to requests for information, and so on.

Impacts / Effects

An SPI's processes and outputs lead to effects on the world outside – the 'context' (see below). The effects can be positive or negative, intended or unintended, direct or indirect, short term 'outcomes' and/or long-term 'impacts'.

The effects of an SPI are often difficult to measure or even to identify: usually they cannot be traced back to the work of an SPI only, but to a combination of the SPI and other activities and developments in the SPI's context. These may be complementary, aiding success, or may hinder or block SPI aspirations.

Analysing SPI effects is therefore difficult, but attention should be given to the coherence of outputs with the objectives of the SPI, how they are communicated to and taken up by policy makers and other actors, and how the outputs relate to other processes and actors, including those of other SPIs. Even where direct effects over a policy process of interest appear to be limited, there may be longer-term and/or indirect effects through changes in the understanding, outlook and behaviour of individuals and organisations influenced by an SPI. Iteration of processes and information can play an important role here: gradual accumulation of concordant information and messages can eventually lead to gradual or sudden change in behaviour. The processes at work are complex and the impacts may be unintended and unexpected.

Concrete effects will often be hard to measure, but even anecdotal information in this respect can be important in identifying reasons for success or failure, and in planning future actions.

For more information on effects, and how to plan for them, see the companion SPIRAL brief '*Focus on Impacts*'.

Context

The broader context or environment in which any science-policy interface operates includes, but is not limited to, the demand or supply drivers that led to its establishment. The context may have a strong influence on the function, structure and processes of the SPI, and is crucial in determining its impacts. Human and organisational values are an important part of context and will be quite different for different stakeholders and in different times and cultures. In European countries, the cultural context and understanding of science has increasingly come to involve strong expectations that publicly funded research should contribute as a public good to societal discussions, making establishment of and participation in SPIs quite "standard".

Other important features of an SPI's context include its accountability to the policy and science institutions in which it is embedded, the activities and disposition of other SPIs and key players in policy processes, the roles played by NGOs and other stakeholders, and so on. It is also important to remember that context and effectiveness are not static, but rather historical, depending on past science and policy processes, and influencing future opportunities. These different perceptions and features of an SPI's context will (or should) explicitly influence the design of structure, function, processes and outputs of the SPI, in order to fit the SPI to its context and enhance its prospects for achieving desirable effects

Looking for more information on science-policy interfaces?

For more SPIRAL results see companion SPIRAL briefs at http://www.spiral-project.eu/content/documents.

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SPIRAL
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SPIRAL Briefs

SCIENCE POLICY INTERFACES: RESEARCH, ACTION & LEARNING

Key features of effective SPIs

The Brief in brief

Science-policy interfaces (SPIs) take a wide range of forms and operate in complex political, legal and cultural environments. Understanding how to improve their performance requires thinking about general features of SPIs and how these relate to the effectiveness with which they achieve their goals in different contexts. This brief is aimed at those developing SPIs, as well actors assessing or funding SPIs.

Features of SPIs

'Science-policy interfaces' refers to a very diverse set of formal and informal institutions and processes through which scientists and other actors in the policy process work together to enrich decision making and/or research. Each individual SPI is a special case, but to think about SPIs generally we need simplifying frameworks that highlight factors important for all SPIs. Three such frameworks have proven useful in the SPIRAL project:

- Breaking SPIs down into key design and operational steps: the SPI goals, functions, structures, processes, outputs, and outcomes (see companion SPIRAL briefs "Designing for success: SPI structures"; "Goals and roles: SPI objectives and functions"; "Focus on Impact").
- Considering the Credibility, Relevance and Legitimacy (CRELE) of SPIs and their outputs (see companion SPIRAL brief on unpacking CRELE).
- Analysing the key features that can be used to describe and categorise SPIs.

This brief focuses on the third of these points. Considering key features, and relating them to SPI design and operational decisions, can help to explain how aspects of CRELE are determined and guide choices and trade-offs with the aim of improving the effectiveness of SPIs.

Improving the effectiveness of SPIs

Work in SPIRAL initially led to the identification of a large number of SPI features, which has subsequently been refined into a shorter list of the most important aspects. These are presented in the tables below, with some suggestions on how to assess them.

The **goals** of the SPI are central to understanding how and why it operates, why people participate, and play a strong role in setting the foundations of credibility, relevance and legitimacy. As in other categories, these features involve trade-offs, and different solutions are possible; but lack of clarity or agreement about goals and roles can be a source of serious problems for SPIs.

Goal Features	What to assess
Vision	Clarity, scope and transparency of the vision and objectives of SPI.
Drivers	Demand-pull from policy, mandates, supply-driven promotion of research, emerging issues.

The **structural features** of SPIs describe how they are set up and the constraints within which the processes are defined. Identifying structural strengths and weaknesses can be an important step in improving CRELE and SPI performance.

Structural Features	What to assess
Independence	Freedom from external control, neutrality or bias in position, range of membership.
Participation	Range of relevant expertise and interests included; competence of participants; openness to new participants.
Resources	Financial resources, human resources (e.g. leadership, champions, ambassadors, translators), networks, time.

The **processes** of SPIs define the way in which the key functions are actually carried out. This is the largest group of features describing several aspects of activities that SPIs typically need to undertake. Again, there are important trade-offs and SPIs need to decide how to allocate scarce resources across different activities.

Process Features	What to assess
Horizon scanning	Procedures to anticipate science, technology, policy and societal

	developments.
Continuity	Continuity of SPI work on the same issues; continuity of personnel; iterative processes.
Conflict management	Strategies such as third party facilitation; allowing sufficient time for compromise.
Trust building	Possibilities to participate in discussions, clear procedures, opportunities for informal discussions; transparency about processes and products.
Capacity building	Helping policy makers to understand science and scientists to understand policy makers; building capacities for further SPI work.
Adaptability	Responsiveness to changing contexts; flexibility to change.

The **outputs** of SPIs can be characterised by a set of features describing how they are prepared and presented.

Output Features	**What to assess**
Relevant outputs	Timely in respect to policy needs, accessible, comprehensive; efficient dissemination.
Quality assessment	Processes to ensure quality, comprehensiveness, transparency, robustness, and management of uncertainty.
Translation	Efforts to convey messages across different domains and individuals, and making the message relevant for various audiences.

Finally, we can also consider the ultimate **outcomes** associated with SPIs and the learning, behavioural and policy changes they foster. These are not fully within the control of the SPI and do not reflect direct design or operation choices in the way that the other features do. Nevertheless, it is useful to assess these outcomes and to bear in mind that they represent the 'bottom line' of SPI performance: balancing features and developing CRELE are just means to achieving the end of effective impacts on biodiversity and associated behaviours and policy.

Outcome Features	**What to assess**
Social learning	Do SPI participants, audiences, wider public learn and change their thinking about biodiversity?
Behavioural impact	Do SPI participants, audiences, wider public change behaviour as a result of learning?
Policy impact	Do SPI information, learning, and associated changes in policy-maker behaviour lead to changes in policy?
Biodiversity impact	Do the above changes lead to changes in drivers and pressures threatening biodiversity, societal responses and the state of biodiversity?

Trade-offs in features

SPIs have a crucial role to play in contributing to bringing about the necessary changes in awareness and behaviour if we are to face up to the pressing problems associated with biodiversity loss. SPIs must be fit for purpose, and able to reach their target audiences in timely and effective ways to maximise influence. This requires joint consideration of audiences, policy contexts, SPI features, and goal-oriented strategies that prioritise the impacts of SPIs.

However there is no 'one size fits all' solution: rather the full suite of features needs to be taken into account in a context-dependent way. Some features that help with some objectives and/or audiences may hinder others. Though it may seem natural to consider one option as generally superior to others, often the better choice is context specific, and the appropriate balance can vary over time.

Looking for more information on science-policy interfaces?

For more SPIRAL results, including separate briefs focussing on unpacking Credibility, Relevance and Legitimacy in SPIs, and managing trade-offs between SPI features, see companion SPIRAL briefs at http://www.spiral-project.eu/content/documents.

This brief is a result of research and interactions within and around the SPIRAL project. This brief was written by Rob Tinch (Median), Simo Sarkki (University of Oulu), Jari Niemelä (University of Helsinki), Sybille van den Hove (Median), Juliette Young and Allan Watt (CEH).

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SPIRAL
Interfacing Biodiversity and Policy

Designing for success: SPI structures

The Brief in brief

This brief looks at how the structures of Science-Policy Interfaces (SPIs) impact on the credibility, relevance and legitimacy of the SPI and draws lessons for SPI design choices. This brief is aimed at those developing SPIs, as well actors evaluating or funding SPIs.

What are SPI structures?

A distinction can be made between structures, objectives & functions, processes, outputs, and outcomes of SPIs.

SPI structures are institutional arrangements set up to achieve the objectives of the SPI. SPI structures vary, ranging from:

- very formal, institutionalised bodies (e.g. Subsidiary Body on Scientific, Technical and Technological Advice of the Convention on Biological Diversity, Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services) to informal and flexible relationships (e.g. ad hoc advisory boards, seminar series)
- one-off or time-bound exercises (e.g. Millennium Ecosystem Assessment, national ecosystem assessments, interfaces for specific research projects) to periodic assessments (e.g. Global Biodiversity Outlook) or semi-permanent institutions (e.g. national biodiversity platforms).
- large international bodies to small groups and even individual relationships

Structure and function of SPIs are closely linked. SPIs can fill a wide range of objectives and functions, and this will partly determine appropriate structures. Important aspects include:

- the geographical and temporal scales of the SPI;
- the political level(s) at which it operates;
- whether it is closer to policy or to scientific processes;
- whether it focuses on a relatively narrow issue or has a broad remit;
- whether it focuses on a particular policy, or particular stages of the policy cycle (early warning, issue identification, policy design, implementation, assessment, review);
- whether it has a formal mandate and fixed rules, or is more informal and flexible.

Structures and CRELE

Three important attributes may help to explain SPIs' influence, outcomes and impacts: the perceived credibility, relevance and legitimacy (CRELE) of the knowledge and processes involved (for more information, see the "Keeping it CRELE" SPIRAL Brief). Different structures have different implications for CRELE. The relationships, and appropriate design decisions, will depend on the goals and functions of the SPI as well as on other contextual features.

Criteria for SPI structures

Although SPI structures vary hugely, all SPIs can be considered in terms of three crucial structural features (see table below). These features are often strongly connected to credibility, relevance and legitimacy.

Structural Features	Components
Independence	Freedom from external control, transparency, objectivity, balanced membership
People	All relevant expertise and interests included; competent participants; open to new participants
Resources	Financial resources, human resources (e.g. leadership, champions, ambassadors, translators), networks, time

Independence

Independence of SPI from external control and vested interests increases credibility. For some SPIs, full independence is impossible: they exist to report to a specific organisation. Others can be formally independent, but may have links with one or more organisations.

Credibility and legitimacy can be maintained by use of 'Chinese Walls' and codified independence from interference in due process. Ensure transparent documentation for all dependencies such as funding links and power structures.

Seeking an objective, transparent and rigorous stance can be important for credibility and ultimately relevance. Becoming tied to a particular perspective or partisan policy agenda can damage the perception of credibility and even lead to exclusion from some forums.

Ensure a balanced membership to enhance legitimacy as well as credibility. This may be in terms of geographical representation, interest groups, scientific perspectives… The details will vary according to the context. Be aware of a need to update membership with evolving contexts.

People

An SPI is only as good as the participants. Get good people involved, then keep them. A wide coverage of expertise increases the knowledge base, legitimacy and credibility of the SPI. A range of theoretical and applied experience, coverage of different views/paradigms, types of knowledge, and interdisciplinary skills may be relevant. Ensure opportunities for participation are genuine – involving token members with no real say may damage perceived legitimacy. Prioritise recruitment and maintenance of highly competent participants with sufficient expertise, peer-group respect, and ability to represent their constituencies. This is key to credibility and also legitimacy. But remain open to new participants to increase legitimacy and create commitment from the next generation of experts. Ensure that participants are motivated and committed: incentives, clear policy demand, or simply feeling valued and useful can attract participation and action by relevant scientists, policy makers, and other stakeholders.

> They are not putting anything out before showing it to you, they are not mistreating you, not giving anything to the media which you did not say. So you do not feel misused: you are respected. Dr H, scientist.

Resources

SPIs depend on human and financial resources to achieve their objectives. Shape the workplan to respect short-term resource constraints, and seek out resources for long-term ambitions. Adequate and sustained financing enables the SPI to achieve objectives; inadequate funding endangers continuity and motivation. Trying to achieve short-term targets with inadequate resources is a temporary option that may cause long-term damage.

Key human resources can play critical roles. 'Champions' in strategic organisations and charismatic 'ambassadors' to strategically important events can create audiences and secure support. Well-respected and visible participants enhance credibility and legitimacy. 'Translators' can facilitate knowledge exchange between science, policy and stakeholders.

> *…by the end of 13 months people had put so much into it, and they could not keep up the volunteer work they had invested in it, they just dissolved. It was like survival of the fittest at the end…* Dr H, scientist.

To conclude, SPI structures vary greatly. The most appropriate features to prioritise vary according the SPI goals and features of the policy, governance and scientific contexts. So it is neither possible nor desirable to derive 'one size fits all' solutions for SPI structure. Consideration of the impacts on CRELE features may help design an appropriate structure.

Looking for more information on science-policy interfaces?

For more SPIRAL results, including separate briefs focussing on lessons learned from other SPI processes, see companion SPIRAL briefs at http://www.spiral-project.eu/content/documents

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SPIRAL
Interfacing Biodiversity and Policy

Goals and Roles: SPI objectives and functions

The Brief in brief

This brief examines the objectives and functions science-policy interface (SPI), and identifies some lessons learnt. This brief is aimed at those developing SPIs, as well those assessing or funding SPIs.

What are SPI objectives and functions?

A distinction can be made between structures, objectives, functions, processes, outputs, and outcomes of SPIs. An SPI objective refers to the stated (or sometimes implicit) aims of the SPI. Objectives address one or more policy or societal needs by fulfilling a role in the interaction between science and policy. In practice, SPI objectives may be flexible, and in some cases participants may not agree on details, or may have conflicting goals or hidden agendas. SPI functions, or the roles that an SPI *actually* fulfils, may differ from its objectives. Possible SPI objectives and/or functions include, for example:

- knowledge creation and synthesis
- watching and early warning
- communication and translation between science and policy
- awareness raising
- direct policy support
- shaping research agendas
- mediation between different actors and perspectives
- capacity building

These generic goals and functions of SPIs can apply at different scales, and to different policy processes or science areas. They will partly determine appropriate structures and processes for an SPI. Important aspects include:

- the geographical, administrative and temporal scales of the SPI;
- the political level(s) at which it operates;
- whether it is closer to policy or to scientific processes;
- whether it focuses on a relatively narrow issue or takes a broad remit;
- whether it focuses on a particular policy, or particular stages of the policy cycle (early warning, issue identification, policy design, implementation, assessment, review);
- whether it has a formal mandate and fixed rules, or is more informal and flexible.

Objectives and CRELE

Three important attributes may help to explain SPIs' influence, outcomes and impacts: the perceived credibility, relevance and legitimacy (CRELE) of the knowledge and processes involved (for more information, see the "Keeping it CRELE" SPIRAL Brief). Different objectives have different requirements for CRELE, depending on various contextual features. For example, credibility may be strongly emphasised for knowledge creation and synthesis, direct policy support calls foremost for relevance, while a mediation role makes legitimacy a priority. Thinking about the impacts on CRELE, both immediately and in the long term, can help in making decisions about SPI objectives and functions.

Criteria for SPI objectives and functions

SPI goals vary hugely, but all SPIs can be evaluated in terms of two crucial features of their objectives (see table below). These features are often strongly connected to credibility, relevance and legitimacy.

Functional Features	Components
Vision	Clarity, scope and transparency of the objectives of SPI
Balancing supply and demand	The balance struck between meeting immediate policy needs and focus on broader, long-term or emerging issues

Vision

Having a clear and transparent strategic vision helps to achieve agreement on the scales, sectors and actors that a SPI targets, clearly locating an SPI in the wider science-policy landscape. A well-defined vision enhances relevance by making it clear who target audiences are and who are possible collaborators. Transparency about funding links, objectives, and working processes and rules enhances credibility and legitimacy.

Within the vision, the choice of strategy between pushing a particular perspective, approach or issue versus a more objective or neutral stance regarding a range of possible scientific paradigms or policy options can be important. Lobbying may be effective in some instances, and may enhance relevance. Wider approaches and opening up policy options can increase legitimacy and credibility. Either strategy may be appropriate, depending on the context, but it is probably better to pick one and stick with it – applying different strategies at different times, places or issues is likely to confuse participants and audiences and damage CRELE.

'If policy is asking for something that isn't actually possible, the only thing you can do is to try and get the people who are asking for it to understand that it isn't possible' *Dr. S, Scientist*

Having ambitious goals, for example aiming to address big issues, make strong contributions to policy processes, or play a major role in shaping research agendas, can motivate participants, and helps to emphasise the relevance of the SPI in broader contexts. But ambitions need to match resources, at least in the long-run, and trying to achieve too much with too little is likely to backfire.

Dynamic aspects of the vision can also be important. Some SPIs are specifically set up, or decide, to serve a short-term or one-off purpose: for example, production of a national ecosystem assessment. Such SPIs may give substantial thought to their legacy – the long-term impacts of their output – but need not otherwise be concerned with long-term, dynamic features at the level of the SPI.

Other SPIs that have non-prescribed lifespans and longer term goals will need to consider long term aspects of their vision, and the consequences of current decisions on their ability to achieve long-term goals. Features of continuity, iteration, adaptability and long-term resourcing become important, as does the need to maintain CRELE over the long haul.

Balancing supply and demand

A science- or supply-driven vision can aim to create policy demand by addressing important societal problems, topical concepts, and gaps in knowledge and policies, through a variety of awareness raising and demonstration methods. But there can be danger that science-driven SPIs lack policy relevance, and therefore practical impact, if the issues addressed by SPI do not match with policy needs.

A policy- or demand-led vision is an alternative strategy. Some SPIs are set up with a specific policy mandate, and fall automatically into this camp. Other SPIs may decide to seek an explicit mandate. Such mandate means the SPI cannot be easily ignored by policy makers, but this can come at the cost of limiting the field or scope of action, the processes and rules, and the forms of communication and reporting. Relevance is usually enhanced, but perceived legitimacy and/or credibility could suffer. The SPI can become tied to a particular political process, with the risk that if that process ends, the SPI fails.

'By the end of 13 months people had put so much into it, and they could not keep up the volunteer work they had invested in it, they just dissolved. It was like survival of the fittest at the end'. *Dr H., Scientist*

Intermediate visions are also possible, in which SPIs seek to satisfy policy demand, while also leaving sufficient resources to work on emerging issues and maintain adaptability, credibility and long-term policy relevance.

Final thoughts

SPIs can fulfil a wide range of functions and goals, and the most appropriate and relevant features to prioritise vary according to a number of dimensions of the policy problem, governance context, scientific evidence, and people involved. So it is neither possible nor desirable to derive 'one size fits all' solutions to the problems of designing and improving SPIs for influencing behaviour. There are many possible 'visions' for an SPI, and many possible positions regarding the balance of supply and demand in shaping an SPI's work. Clarity about these features is always desirable, and will help ensure that SPIs are fit for purpose and meet the expectations of participants. Consideration of the short- and long-term vision, alongside awareness of CRELE and the associated requirements for the SPI, will help in guiding design and operational choices.

Looking for more information on science-policy interfaces?

For more SPIRAL results, including separate briefs focussing on characteristics of SPIs or lessons learned from SPI processes, see companion SPIRAL briefs at http://www.spiral-project.eu/content/documents

This brief is a result of research and interactions within and around the SPIRAL project. This brief was written by Simo Sarkki (University of Oulu), Jari Niemelä (University of Helsinki), and Rob Tinch (Median).

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Science-policy interfaces processes: fitting activities to evolving contexts

The Brief in brief

This brief examines the processes used by science-policy interfaces (SPIs) in their design and operation. It considers the aims and attributes of key processes, and their impact on the credibility, relevance and legitimacy of the SPs. This brief is aimed at those developing SPIs, as well as actors evaluating or funding SPIs.

What are SPI processes?

A distinction can be made between structures, objectives & functions, processes, outputs, and outcomes of SPIs (see companion SPIRAL briefs[1]).

SPI processes refer to the ways in which the SPI uses its structures to achieve its objectives and functions, via production of outputs.

Just as there are many 'types' of SPI, there are a great many kinds of process. Processes will often be defined by procedural rules and guidelines, but there may be additions to, or variations from, 'official' codified procedures, and in some cases most interaction may be *ad hoc*. In this brief we first consider what processes try to achieve, and then outline some aspects of key processes that need to be considered.

Aims of SPI processes

Processes are in place to ensure, in particular:

- wide and fair participation;
- transparency;
- effective communication among participants;
- provision of resources and inputs;
- co-production of knowledge;
- timely and effective communication with target audiences;
- capacities inside and outside the SPI;
- evaluation of the SPI.

Aspects of SPI processes

The processes of an SPI define the ways in which its key functions are actually carried out. The following table describes the major aspects of the key processes that SPIs typically need to undertake. There are important trade-offs between these processes and SPIs need to decide how to allocate scarce resources across different ones.

Key Processes	Components
Horizon scanning	Procedures to anticipate science and policy developments.
Continuity	Continuity of SPI work on the same issues; continuity of personnel; iterative processes.
Adaptability	Responsiveness to changing contexts; flexibility to change.
Conflict management	Strategies such as third party facilitation; allowing sufficient time for compromise.
Trust building	Possibilities to participate in discussions, clear procedures, opportunities for informal discussions; transparency about processes and products.
Capacity building	Helping policy makers to understand science and scientists to understand policy makers; building capacities for further SPI work.

These processes are discussed in some more detail after the next section on credibility, relevance and legitimacy.

Processes and CRELE

Three important attributes may help to explain SPIs' influence, outcomes and impacts: the perceived credibility, relevance and legitimacy (CRELE) of the knowledge and

[1] www.spiral-project.eu/sites/default/files/04_Building%20for%20success.pdf
www.spiral-project.eu/sites/default/files/22_SPI-outputs.pdf
www.spiral-project.eu/sites/default/files/06_%20GoalsandRoles.pdf
www.spiral-project.eu/sites/default/files/21_Focus-on-Impact.pdf

processes involved (for more information, see the "Keeping it CRELE" SPIRAL Brief[2]).

Different processes have different implications for CRELE, depending on various contextual features, and there can be trade-offs to consider in deciding which aspects to emphasise[3].

For example, legitimacy may be enhanced by various processes for ensuring wide participation, trust-building and conflict management; but these processes take time and can limit the scope for rapid action and therefore relevance.

This can be partly countered by horizon scanning, enhancing continuity and adaptability. In fact, many processes have strongly dynamic features: these are the on-going ways in which SPIs use structures to achieve functions, so they are inherently iterative. Participation in them can lead to learning and improvement, especially if evaluation and change are made part of the processes.

You know, you are trying to establish dialogue in a very short period of time. You do not even have a common concept, it makes the dialogue really complicated. … I guess you can say that's something we learned during the process, we got better.

Dr L., scientist

Horizon scanning

To stay relevant, and also credible, SPIs need to implement processes to scout out the future policy and decision contexts, and science needs and trends. Horizon scanning includes various planning, scoping and knowledge-filtering activities.

Continuity

Continuity of policy support, communication, network building and maintenance, as well as a certain amount of continuity in membership and participation, are necessary to ensure smooth running of the SPI and to avoid erosion of CRELE.

Adaptability

On-going assessment and evaluation must be combined with agreed processes to revisit and modify structures and procedures, respond to changing contexts, meet new challenges and take advantage of new opportunities.

Conflict management

Clearly stated and agreed methods for managing disagreements, including, for example, specific stages for recourse to internal and independent external conciliation, will help to avoid the potentially corrosive effects of conflict.

Trust building

Effective communication is grounded in trust, with both rational and emotional aspects being important. Regular opportunities for open communication, transparency and sensitivity to diverse cultures and values will help. Following agreed procedures for internal and external communication will help ensure participants do not feel things are happening "behind their backs".

Capacity building

The effectiveness of the SPI, and of the messages it seeks to transmit, will often be enhanced by on-going processes to building capacity inside and outside the SPI, thereby ensuring that scientists, policy makers and others have the knowledge and tools to understand each others' positions and constraints, as well as the technical details of policy contexts and science.

Final thoughts

The most appropriate and relevant processes needed in SPIs vary according to a number of dimensions of the policy problem, governance context, and scientific evidence. So it is neither possible nor desirable to derive 'one size fits all' solutions to the problems of designing, evaluating and improving SPIs for influencing behaviour. However, the processes identified here can help those working with SPIs to improve them. Processes, often the most dynamic and flexible components of SPIs, deserve particular attention in fitting SPI activities to evolving contexts.

Looking for more information on science-policy interfaces?

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[2] http://www.spiral-project.eu/sites/default/files/07_Keep-it-CRELE.pdf
[3] http://www.spiral-project.eu/sites/default/files/13_Brief_CRELE-choices.pdf

SPI it out: Making a splash with outputs

The Brief in brief

Science-policy interfaces (SPIs) produce various outputs and outcomes that influence behaviour in science, policy and society. This brief examines SPI outputs, and identifies ways of enhancing their effectiveness. This brief is aimed at those developing SPIs, as well actors assessing or funding SPIs.

A diversity of outputs

SPI outputs refer to the tangible products emerging from science-policy interface processes. These include the obvious categories of reports, assessments and policy briefs, but also websites, press releases, declarations, indicators, workshops, conferences and so on.

Outputs are the result of SPI processes, carried out to achieve SPI goals and functions. There is some overlap with processes, which can involve for example series of workshops and meetings along with review and analysis work, and we might view a particular meeting as both a part of a process and an output in its own right.

Outputs are also related to, yet distinct from, outcomes, which are the final impacts that SPIs have on policy development, human behaviour, and ultimately biodiversity and ecosystem services. These arise through the interaction of the SPI outputs with their target audiences and the relevant policy, legal and social contexts. Outcomes can also arise directly from processes, without being mediated by an output. In this brief we focus on improving outputs: the brief "Focus on Impact" considers outcomes in more detail.

From outputs to impact

There are many important aspects of SPIs and contextual factors that influence the ways in which outputs create impact. One useful model focuses attention on three features of SPIs and their outputs: *credibility*, *relevance* and *legitimacy* (CRELE). This is discussed in more detail in the SPIRAL briefs "Keep it CRELE" and "CRELE Choices".[1]

Thinking about CRELE and analysing SPIRAL's empirical evidence led us to identify three important features of outputs that enhance CRELE and can help to maximise the impacts arising through SPI outputs:

- Ensuring outputs are relevant
- Quality assessment of outputs
- Translation for target audiences

> It was pressure to come up very quickly with some results. And also to meet expectations of policy makers, they expected numbers and figures, … sometimes we could not find evidence for these claims, so it was hard to really get science behind what policy makers expected us to deliver. On the other hand, this kind of interaction gave us opportunity to really give relevant input for policy makers *Dr S, scientist.*

Relevant outputs

Outputs will have more chance of making an impact if they are timely with respect to policy needs, comprehensive, understandable and effectively disseminated. Possible measures include:

- Strategic promotion to increase visibility by launching outputs in key relevant events, selecting the right presenters and formats for the audience.
- Use of brief summaries to enhance accessibility and expand audience.
- Tailor outputs to the needs of target audiences and policy contexts.
- Timetable for outputs meshed with needs of the policy cycle, with mechanisms for rapid response where needed, and planning in advance for anticipated needs.

[1] Available at http://www.spiral-project.eu/content/documents

In some circumstances, too much focus on relevance can be damaging. Publishing premature results can decrease trust and lead to unnecessary conflict, and longer term goals may require attention to emerging issues and problems that are not high on the immediate policy agenda.

Quality assessment of outputs

The credibility of outputs is greatly enhanced by quality assessment measures in the development and publication of outputs, making it important to implement a system for continuous or periodic quality review of research and knowledge used in the SPI. Key elements of that system include data collection, extended peer review and treatment of uncertainty, in particular:

- Covering the full range of existing and reliable data sources to widen the knowledge base and ensure quality of knowledge.
- Checking completeness of knowledge coverage as it may help to identify knowledge gaps and further needs.
- Ensuring transparency and traceability about the origins of each piece of knowledge, to increase credibility and legitimacy.
- Adequate attention to accounting for and communicating uncertainties, divergent views and knowledge gaps. Formal procedures for scientific peer review.
- Extended/stakeholder review by policy makers and other stakeholders to increase CRELE.

Translation for target audiences

Efforts to convey information clearly to actors in diverse audiences and domains can help to ensure that messages are understood and seen to be useful. Good practice may include:

- Adapting language used to the audiences: avoiding jargon, explaining background assumptions, clearly explaining complex relationships and uncertainties while avoiding unimportant details and diversions.
- Using skilled 'translators' to help convey messages between scientists, policy makers and other stakeholders and ensure that mutual understanding is achieved.
- Using appropriate communication tools (figures, maps, pictures…) to capture the core of complex issues.
- Matching science and policy contexts to ensure that scales and variables of interests are aligned.
- Developing a clear communication and outreach strategy including effective media relations.

The way forward

The most appropriate and relevant features of SPIs to prioritise vary according to specific aspects of the policy problem, governance context, and scientific evidence. These and other factors will all combine in determining the most appropriate outputs for SPI work. So, it is neither possible nor desirable to derive 'one size fits all' solutions to the problems of designing, evaluating and improving SPIs for influencing behaviour. However, the identified features and related lessons learned can help those working with SPIs to find solutions for design problems. The three features outlined here aim ultimately to foster better connections between science and policy, as part of the adaptive governance process for biodiversity and ecosystem services.

Looking for more information on science-policy interfaces?

For more SPIRAL results, including separate briefs focussing on other features of SPIS, and lessons learned from other SPI processes, see companion SPIRAL briefs at http://www.spiral-project.eu/content/documents.

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SPIRAL
Interfacing Biodiversity and Policy

Focus on Impact

The Brief in brief

Science-policy interfaces (SPIs) have a crucial role to play in bringing about necessary changes in awareness and behaviour relating to biodiversity. This brief explores how to ensure that SPIs are fit for purpose, focused on reaching their target audiences in timely and effective ways. This brief is aimed at those developing SPIs, as well actors assessing or funding SPIs.

SPIs make a difference

Human behaviour is putting great pressure on biodiversity and ecosystem services. Science helps to protect biodiversity and sustainably use ecosystems by providing key evidence to policy-makers and others, in particular regarding:

- The causes of biodiversity loss;
- The ecological, human and economic consequences of biodiversity loss;
- Policy options for protection and sustainable uses of biodiversity and ecosystems, and their pros and cons.

SPIs are ways to manage the interactions between scientists and policy-makers (see Figure 1). Information exchange and dialogue may result in learning and changes in the behaviour or decisions of participants. This in turn may lead to the development and implementation of policy instruments (such as indicators, targets, scenarios, regulations, quotas, charges) that modify people's and organisations' behaviour relating to biodiversity.

Thus, one practical set of outcomes of SPIs is how they change behaviour:

- Directly, through raising awareness of problems and solutions and triggering action;
- Indirectly, via policy decisions taken by policy makers informed through the SPI;
- Indirectly, via the long-term consequences of research decisions influenced by the SPI (for example, encouraging scientists to address policy-relevant topics).

Focusing on the impact of SPIs means working out how to boost the positive behavioural changes the SPI contributes to: this is what really matters for biodiversity. Achieving this requires consideration of SPI features, target audiences, and policy contexts. These must be reflected in the overarching goals and strategy of the SPI.

Impacts depend on SPI features

SPI impacts can be enhanced by certain features of the SPI structure, processes and outputs.

There is not a single recipe for success, but rather a suite of features that need to be taken into account in a context-dependent way.

Important features may include:

- Capacity building, at all levels;
- Understanding, trust-building and inclusiveness;
- Iterative and joint processes and learning, with science and policy communities mutually enriched by their participation in SPIs;
- Tailoring of information and outputs to the intended audiences, and ensuring communication uses appropriate language for the intended audiences;
- Quality control and balancing the needs of scientific credibility and caution with the time constraints of the policy process.

Impacts depend on audiences

Depending on the target audiences of an SPI, the kind of information needed and the SPI features that can enhance the impact on behaviour will vary.

For local stakeholders, for instance, emphasis is often needed on capacity building, trust building, feedback mechanisms, and accessible outputs. For policy makers, independence, strong quality control, robustness and clarity of messages may be particularly important. While for experts, technical details, establishing scientific credentials, and demonstrating wide knowledge are often crucial.

But these are not hard rules: audiences vary, and understanding their needs is key. Often there is more than one target group, so it is important to tailor the processes and outputs accordingly, and to make sure that various needs are met.

Impacts depend on contexts

The specific contexts and goals of the SPI will influence the kind of tools that can be used, the kind of outputs produced, and what aspects of the SPI to prioritise.

If the goal of an SPI is awareness-raising within various target audiences, it is essential to tailor outputs according to target groups' needs. Using various media and methods can give wide visibility. Using scenarios to highlight choices can make messages 'real' and stimulate debate. Including procedures for feedback and dialogue can enhance legitimacy and encourage learning on all sides. A policy mandate, or strong leadership from policy actors, may be counterproductive and may limit ability to explore and raise awareness of emerging issues.

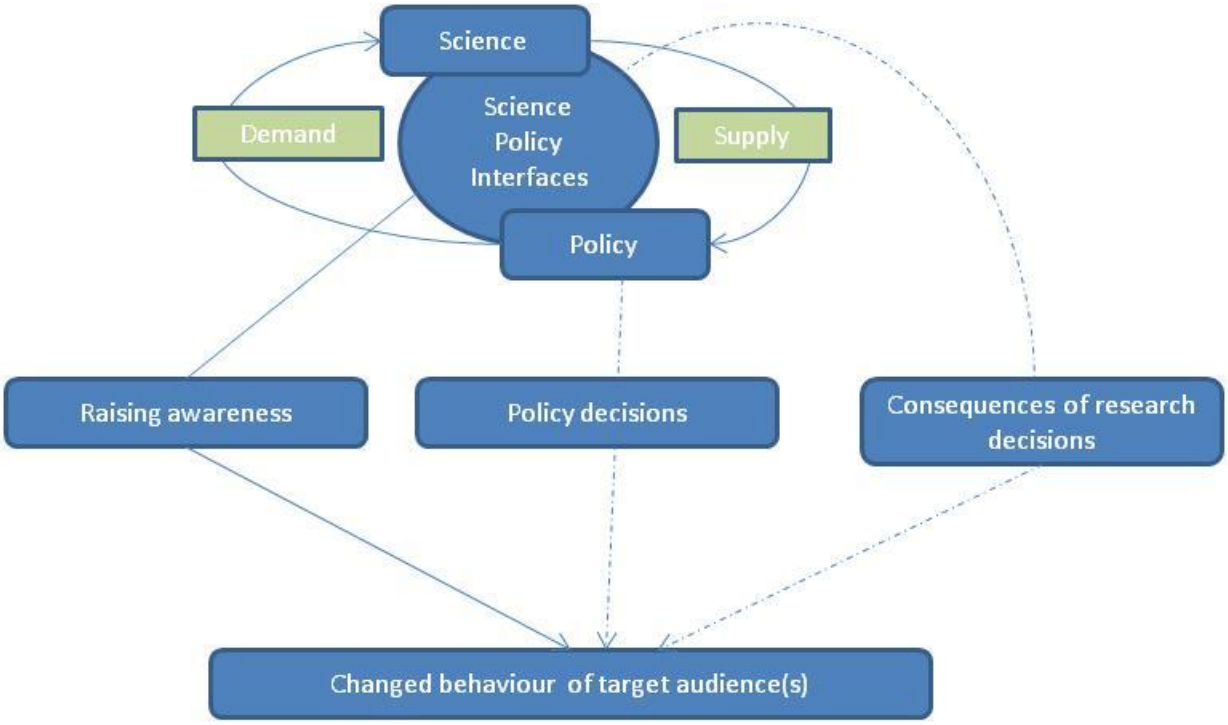

Figure 1. The figure shows the ways in which science, policy and SPIs interact and influence biodiversity-related behaviour both direct (shown as solid lines) and indirectly (shown as dashed lines).

If the goal is to contribute to consensus building (or reaching compromise) on particular issues or in specific areas, conflict management tools are needed and trust building must be emphasized. Independence is important to create a credible position for the SPI in conflict mediation. Particular attention is needed to agree the procedures and methods for reaching consensus or compromise – bringing people together and establishing an agreed process may be the main impact.

If the goal of a SPI is to directly support policy processes, clear understanding of the policy cycle is essential. Outputs and interventions must be timely, targeted, strategic and appropriate. Seeking a clear policy mandate can be important. At early stages in policy development, opening up uncertainties may be useful, and focus can include exploring issues from a variety of perspectives. At later stages, when there is urgent need to support decision-making, clarity of advice and filling specific gaps in knowledge become most relevant.

'Mainstreaming' biodiversity into policy

'Mainstreaming' biodiversity considerations into all policy sectors is essential to stopping biodiversity loss, and to avoiding the dire consequences of continued erosion of our natural capital. Holistic approaches to biodiversity and the causes and consequences of its loss are a vital step. Innovative policy solutions are urgently needed. These changes will only occur if there is a generalised change in the understanding and awareness among policy makers, in businesses and the general public. SPIs have a crucial role to play in contributing to bringing about these necessary changes in awareness and behaviour.

SPIs must be fit for purpose, and focused on reaching their target audiences in timely and effective ways to maximise influence.

This requires joint consideration of audiences, policy contexts, SPI features, and goal-oriented strategies that prioritise the impacts of SPIs. There is no 'one size fits all' solution, and indeed the arguments outlined above demonstrate that some features that help with some objectives and/or audiences may hinder with others. These ideas are developed further in SPIRAL briefs on Credibility, Relevance and Legitimacy in SPIs, and managing trade-offs between SPI features.

Looking for more information on science-policy interfaces?

For more SPIRAL results, including separate briefs focussing on lessons learned from other SPI processes, see companion SPIRAL briefs at http://www.spiral-project.eu/content/documents. This brief is a result of research and interactions within and around the SPIRAL project. This brief was written by Simo Sarkki (University of Oulu), Jari Niemelä (University of Helsinki), Rob Tinch and Sybille van den Hove (Median), Juliette Young and Allan Watt (CEH).

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SPIRAL
Interfacing Biodiversity and Policy

SPIRAL Briefs
SCIENCE POLICY INTERFACES: RESEARCH, ACTION & LEARNING

Adding and sustaining the value of research: Recommendations for research funding institutions

The Brief in brief

For research to support more effectively policy processes, research funders can play an important role. This brief outlines some challenges that research funding institutions currently face, and some recommendations to address these challenges.

Challenges faced by research funding institutions

Research funders face a series of challenges, including:

- Designing funding strategies that incorporate policy-relevant topics in a timely manner, anticipate policy needs and help to raise awareness of the need for policy activities;
- Encouraging and supporting projects in their efforts to interface with policy;
- Ensuring that the knowledge gained in past projects is maintained and openly available for on-going and future projects, but also for policy processes, end-users and the wider society;
- Taking stock of lessons learnt on science-policy interactions and fostering improved practises in new projects.

Recommendations for research funding institutions

The following recommendations[1] may contribute to address these challenges:

- ***Support the early and continuing policy connection of projects***. Projects may need explicit help to make early policy connections and identify relevant beneficiaries of their work. This may also help avoid policy makers being bombarded by untimely and/or untargeted information. Possible measures include improving the:
  - Memory of science-policy interactions. The EC Directorate-General for Research and Innovation and other funding agencies could implement a process to develop a "memory of science-policy interactions", where new projects can gather knowledge on how to plan and conduct such interactions and avoid repeating mistakes from other projects.
  - Memory of policy landscape mapping. A dynamic "map of the policy landscape" could be established to facilitate access to relevant policy information, building on policy landscape analyses made in previous projects, to serve as a resource for, and be dynamically updated by, new projects.
  - Partnering of parallel projects. Bringing together thematically-related research projects in regular meetings and other forms of interaction to exchange information and best practice about communication needs, formats, options, and to support the implementation of joint SPI activities.

- ***Fund specific brokerage and dissemination projects***. For some policy areas, one can establish support projects that promote wide dissemination of research results and science-policy interactions by pro-actively acting as knowledge brokers for other projects. Existing examples include RESPONDER and other knowledge brokerage projects[2], the KNEU support action[3] and the MarineTT support action[4]. This may be particularly useful when policy processes require the collection and synthesis of information from different projects.

- ***Ensure availability of ad hoc flexible funding for SPIs***. Flexible and rapid funding mechanisms should be available in Horizon 2020 to allow for rapid response to specific science-policy interface activities as policy priorities evolve. This could include funding for science-policy workshops and synthesis processes.

[1] The following recommendations were developed at a workshop on "Better interfacing EU research projects and EU policy-making", organised by SPIRAL jointly with the European Commission Directorate General for Research and Innovation (DG RTD), with the participation of the European Environment Agency (EEA).

[2] RESPONDER aims to promote sustainable consumption by exploring novel ways of knowledge brokerage: www.scp-responder.eu; WATERDISS 2.0: www.waterdiss.eu; PSI-CONNECT: www.psiconnect.eu

[3] www.biodiversityknowledge.eu

[4] www.marinett.eu

- ***Combine research and implementation***. In some cases, combining research and implementation projects can significantly improve science-policy interactions. The project formats of COST actions[5] could be a starting point. LIFE[6] or INTERREG[7] projects could also be potential partners for research projects.

- ***Ensure long-term availability of information and data***. Maintaining long-term information and data should be considered a project goal in its own right, alongside specific "new questions" in each funding period. This could be strengthened through contractual obligations, greater awareness of policies on access to environmental data (particularly INSPIRE[8]) and in-project evaluations and reviews.

- ***Develop and use existing information systems*** such as the Biodiversity Information System for Europe (BISE) as knowledge hubs. The role of BISE as a major hub and entry point to biodiversity and ecosystems research results should be strengthened (see companion SPIRAL brief for recommendations on BISE). Projects could consider making data and research results available in BISE, or similar relevant systems in other areas.

- ***Require minimum mandatory policy-relevant information from projects***. In order to support the information hub function of platforms such as BISE, all research projects in Horizon2020 should provide basic information on their science-policy related work, including (a) a policy-focused project description including yearly updates on relevant activities, and the right key words, and (b) specific reporting products for policy-relevant results. Such elements could become part of the evaluation processes of on-going projects.

- ***Develop a SPI 'survival kit' for projects***. The EC Directorate-General for Research and Innovation could develop and make a series of tools and resources available to projects to help them develop and implement their SPIs. This could include guidelines on how to prepare a policy brief, the forthcoming SPIRAL handbook on SPIs, a list of potential policy contacts and relevant EU institutions.

- ***Systematically inform projects about key science-policy events***. Projects should be made better aware of key event such as Green Week, Bridging the Gap, side events at UN Conferences of the Parties of Environmental Treaties, and how they can get engaged. This could be done via a regular information mailing to coordinators, and through direct contact on a case by case basis.

- ***Strengthen use of EU research information media***. The European Commission should promote its own popular science journals and policy services (RTD Info, Research EU, Science for Environment Policy) and websites, and strongly encourage all projects to publish policy-relevant activities and results there. These media could include articles on successful interfacing from both a science and a policy perspective. This would also address the problem of the plethora of unconvincing business-driven research dissemination magazines approaching projects, sometimes claiming that they are mandated by the European Commission.

- ***Brief evaluators and reviewers***. Evaluators of proposals and project reviewers, as well as EC Directorate-General Research and Innovation scientific officers moderating evaluation panels, should receive more guidance on how to assess the science-policy interface and dissemination activities in projects.

Looking for more information on science-policy interfaces?

For more SPIRAL results, including separate briefs focussing on recommendations to policy-makers and research projects, see companion SPIRAL briefs at http://www.spiral-project.eu/content/documents

This brief is a result of research and interactions within and around the SPIRAL project. This brief was written by Johannes Timaeus, Carsten Neßhöver & Heidi Wittmer (UFZ); Juliette Young & Allan Watt (Centre for Ecology and Hydrology); and Sybille van den Hove (Median).

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[5] COST (European Cooperation in Science and Technology) is one of the longest-running European frameworks supporting cooperation among scientists and researchers across Europe http://www.cost.eu/

[6] LIFE is the EU's financial instrument supporting environmental and nature conservation projects throughout the EU, as well as in some candidate, acceding and neighbouring countries: http://ec.europa.eu/environment/life/index.htm

[7] INTERREG provides funding for interregional cooperation across Europe: http://www.interreg4c.net/

[8] The INSPIRE Directive establishes an infrastructure for spatial information in Europe to support Community environmental policies, and policies or activities which may have an impact on the environment: http://inspire.jrc.ec.europa.eu/

SPIRAL Briefs

SCIENCE POLICY INTERFACES: RESEARCH, ACTION & LEARNING

Integration of research results into policy making: Recommendations to policy-makers

The Brief in brief

EU-funded research projects are increasingly asked to include policy and societal dimensions into their work plans and strengthen their dissemination and science-policy interface (SPI) activities. A key challenge on the policy side is to stimulate the development of science-policy interaction processes and institutions that respond to policy needs in an effective manner. This brief outlines some recommendations to address this challenge.

Recommendations to policy-makers[1]

- ***Reinforce the strategic dialogue***. A long term consultative strategic dialogue between science and policy can contribute to ensuring that policy has access to, and uses, best available knowledge. It can also bring about a better focus of research questions to meet policy needs. This entails reinforcing the capacity to formulate policy needs and questions as well as forward looking approaches and horizon scanning as part of the process.

- ***Recognise that good interfaces are resource intensive***. Too often the research contribution to policy initiatives (e.g. involvement in assessments, participation in advisory committees and expert groups, drafting of policy briefs, information papers to support international negotiations) is under-resourced. These activities are time consuming and need to be appropriately funded, both by research funders and by policy institutions.

- ***Increase SPI skills***. Find creative ways to improve the skills of staff in policy and research communities operating at the science-policy interface. This could include specific training, dedicated summer schools open to both scientists and policy-makers, and secondments of policy-makers and scientists.

- ***Strengthen the role and effectiveness of chief scientists and their units***. By working more closely together and in collaboration with scientific networks, chief scientist units in different Directorates-General (DGs) of the European Commission could strongly support the integration of knowledge across DGs, hence also supporting environmental integration and policy coherence.

- ***Consider establishing science-policy platforms or fora***. Collecting information needs from policy, facilitating the strategic dialogue, and synthesizing research via science-policy platforms could be an effective and efficient way to fill some of the key gaps at the science-policy interfaces.

- ***Remember that there is no one-size-fits-all science-policy interface***. A combination of processes will be needed, spanning policy levels, policy areas and governance systems. Be creative, learn by doing, and leave space for evolution and adaptation of processes.

- ***Identify areas of research needing long-term support***. As part of the strategic dialogue, policy-makers, the scientific community and civil society should jointly identify research areas and types of research, which need to be maintained in a long-term perspective. This should be implemented in particular in successive calls of Horizon 2020 in order to maintain the research flow, the long-term datasets needed for environmental research, the policy links and the development of the European Research Area.

Looking for more information on science-policy interfaces?

For more SPIRAL results, including separate briefs focussing on recommendations to funders and research projects, see companion SPIRAL briefs at http://www.spiral-project.eu/content/documents

[1] The following recommendations were developed at a workshop on "Better interfacing EU research projects and EU policy-making", organised by SPIRAL jointly with the European Commission Directorate General for Research and Innovation (DG RTD), with the participation of the European Environment Agency (EEA).

This brief is a result of research and interactions within and around the SPIRAL project. This brief was written by Johannes Timaeus, Carsten Neßhöver & Heidi Wittmer (UFZ); Juliette Young & Allan Watt (Centre for Ecology and Hydrology); and Sybille van den Hove (Median).

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SPIRAL
Interfacing Biodiversity and Policy

Improving the use and impact of your research: Recommendations to EU research projects

The Brief in brief

EU-funded research projects are increasingly asked to include policy and societal dimensions into their work plans and strengthen their dissemination and science-policy interface (SPI) activities. This brief outlines some challenges that research projects currently face, and some recommendations to address these challenges.

Challenges faced by research projects

Most environmental research projects recognise their responsibility to contribute to addressing societal problems and the importance of developing strong science-policy interfaces. Yet projects are still facing basic challenges in planning and implementing their interface work, including:

- Framing the project in the broader policy and societal context;
- Engaging with policy and other actors throughout the lifetime of the project;
- Interacting better and more broadly;
- Working with other projects and learning from their experiences.

Recommendations for research projects[1]

The following recommendations could help to overcome the above challenges, particularly if complemented by funders' supporting actions (see companion SPIRAL brief).

- ***Establish a dialogue over the lifetime of the project***. Remember that effective SPIs and communication should not be end-of-pipe. In many cases, establishing a dialogue with policy makers and other stakeholders from the onset, and keeping them involved in the formulation or refinement of research questions, can significantly contribute to effective science-policy interactions. Steps to support this include the need to:

  - Ensure early links with relevant actors at the EU level. Projects should ask the project officer at the European Commission to support an early meeting with appropriate policy officers from relevant policy Directorate-Generals at the start of the project, preferably before the kick-off meeting of the project to allow work package leaders responsible for communication and the project coordinator to meet key individuals face-to-face and understand their knowledge requirements.
  - Develop a strong strategy for science-policy interfaces and dissemination. Such a strategy should be implemented and revised as appropriate, and include, in particular, timed and targeted actions for different audiences, but also for different types of knowledge (some knowledge may not be directly policy-relevant yet still worth communicating to policy-makers as background information). Maintain a database of key contacts and build the 'brand' of your project. Include an internal evaluation process in the strategy. Allocate enough resources to the implementation of the strategy.
  - Make scientists aware of how policy works. Inform scientists in your project about policy processes, policy cycles, the societal context and what types of results are useful for policy.
  - Ensure you have knowledge brokers on board. Make use of people or teams in the consortium who are good knowledge brokers. Both young and more senior scientists may be interested in contributing to science-policy or science-society interfaces. Consider bringing in partners with specific knowledge brokering skills, and/or providing a PhD position in the project to focus on science-policy interface aspects in the project.
  - Improve involvement of policy-makers at relevant levels. Interact with policy-makers from sub-national to international level as appropriate. Be sure to also include some policy implementing partners such as local administrations or NGOs in the project.
  - Use advisory boards and stakeholder groups. These can include carefully selected policy makers and other key stakeholders. If well run, with the right people involved, they are extremely useful to identify key research avenues of value to policy, identify policy-relevant results, provide input to the implementation plan, alert researchers to priority issues on the policy agenda, help bring

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research progress rapidly to the attention of policy-makers and other potential users, and help develop targeted policy relevant outputs from the projects.

- Use existing science-policy institutions. Institutions such as the European Environment Agency, national environment agencies and national biodiversity platforms can be very useful to learn more about policy needs and to disseminate results.
- Develop a policy section on websites. A dedicated section on the project website could make policy-relevant information easily accessible and act as a forum where policy makers can ask questions that could be answered by the project.
- Ensure interaction events at the end of the project, and beyond. Projects must ensure there is sufficient time and resources set aside for interaction via personal meetings and larger events with policy makers when the final results have been produced. In order to foster the uptake of project results in policy, it might be relevant to maintain a dialogue beyond the project's duration.
- Involve policy-makers and other stakeholders in the development of scenarios, storylines, models, policy options and decision-support tools to ensure that they are adapted to user needs.

- ***Connect with past and present projects working on related topics***. It may be helpful and efficient to cluster projects for science-policy interactions and broader dissemination. Such SPI alliances of projects can enhance joint learning, make it easier for policy makers to engage (fewer meetings) as well as provide a broader picture and a more refined input to policy. This can be top-down driven if supported by funding agencies (see our companion SPIRAL brief on recommendations to funders) or more informal and bottom-up when initiated by projects.

- ***Produce targeted and attractive briefs***. Such briefs are a major policy-relevant product and should be made widely and systematically available, e.g. via information systems such as the Biodiversity Information System for Europe (BISE). Briefs need to be targeted and readable, they should link the issues to relevant policies or at least provide a "policy hook", an explanation as to why this matters, and when appropriate what policy-makers could do about it. Briefs should include a short summary, suggest further reading, and provide a point of contact. Explore innovative ways of producing and updating briefs, e.g. "wiki-briefs".

- ***Make use of existing science-policy dissemination channels***. Projects should more systematically provide articles to Science for Environment Policy, the news and information service set up by the EC Directorate General for Environment and to similar SPI channels. There are more and more peer-reviewed environmental science journals accepting commentaries or papers with an explicit science-policy focus, in which projects could aim to publish.

- ***Use open policy meetings for dissemination***. A number of broader open policy meetings exist (e.g., high level conferences, Bridging the Gap series, Green Week), where projects can improve their impact and recognition. Also joint presentations of related research results from several projects showcasing on-going research can be a good way to reach policy makers.

- ***Disseminate more broadly***. Better dissemination to the wider public is key. Possible actions include: striving for more dissemination through the media, including European ones (e.g. Euronews); production of popular or children's books; using new media such as video via Youtube and social media (e.g. Twitter); using tools such as Eye on Earth. Projects should explore opportunities to use specific partners for dissemination, including NGOs, professional communicators, Science Museums, Aquaria, Planetaria.

- ***Provide training in science-policy activities***. Educating and training researchers in communicating beyond the scientific community is still a major task. This should play a broader role in university education, but could also be part of larger projects or clusters, e.g. via summer schools that address policy, SPI and communication issues.

- ***Make your data available to other researchers, policy makers, and the public***. Options to do this include BISE or Eye on Earth (see companion SPIRAL briefs). Projects should ensure they set aside enough resources to prepare and upload data to repositories in a format that is appropriate for future uses.

Looking for more information on science-policy interfaces?

For more SPIRAL results, including separate briefs focussing on recommendations to funders, policy-makers, BISE and Eye on Earth, see companion SPIRAL briefs at http://www.spiral-project.eu/content/documents

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SPIRAL
Interfacing Biodiversity and Policy

Integrating credibility, relevance, legitimacy and iterativity

SPIRAL Briefs
SCIENCE POLICY INTERFACES: RESEARCH, ACTION & LEARNING

Keep it CRELE: Credibility, Relevance and Legitimacy for SPIs

The Brief in brief

This brief examines Credibility, Relevance and Legitimacy - attributes that have been used to explain the success and/or failure of science-policy interfaces (SPIs) to impact on policy and behaviour. Through workshops and interviews, SPIRAL has uncovered a need to explain what CRELE attributes mean in practice, to explore how CRELE attributes can be enhanced by SPI design, and explain how to build CRELE in to SPI structures. These issues are explored in turn in this brief, which is aimed at those developing and designing SPIs, and those evaluating or funding SPIs.

Credibility, relevance and legitimacy

Credibility, relevance and legitimacy (CRELE) are attributes which can explain the influence and impact of SPIs.

- Credibility is the perceived quality, validity and scientific adequacy of the people, processes and knowledge exchanged at the interface;
- Relevance is the salience and responsiveness of the SPI to policy and societal needs;
- Legitimacy is the perceived fairness and balance of the SPI processes.

These CRELE attributes are widely accepted and used, and can explain an SPI's influence. The emerging Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES, http://www.ipbes.net/) considers the CRELE attributes as important. The Intergovernmental Panel on Climate Change (IPCC) uses CRELE to evaluate scenarios, draw lessons from past experiences and explain assessments' influence. .

Lessons learned on CRELE

SPIRAL has produced a set of lessons learned on how to build credibility, relevance and legitimacy into SPIs and on what design features enhance these attributes.

SPIRAL work also uncovered the importance of considering trade-offs across the CRELE attributes: sometimes it is not possible to achieve all three attributes, so it is necessary to prioritise.

Achieving Credibility

To be credible, SPIs must have access to excellent people, skills, and the latest knowledge. But that alone is not enough: the way the SPI is seen by others is vital.

Senior and respected participants enhance the credibility of the SPI. Key human resources, including 'champions' in strategic organisations, leaders, science translators, and charismatic 'ambassadors' can improve visibility and credibility.

Some continuity in membership of SPIs is useful to ensure that knowledge and skills about running the SPI are built upon and not lost, to maintain relationships, and to build trust.

Independence from external control and from vested interests enhances credibility. SPIs should be both cautious and transparent regarding links to other organisations and interests, in particular where significant funding is involved.

Formal and publicised procedures for peer review and quality control increase credibility, and reduce the risks of costly mistakes. Similarly, attention to accounting for and communicating uncertainty increases credibility.

Transparency and traceability regarding the origins of knowledge and outputs, with a full and open audit trail, enhance credibility and may save the SPI's reputation (and that of its participants) if things go wrong and scapegoats are sought.

Enhancing Relevance

Relevance is crucial for having a real impact. It is also key to motivating participation, not just on the policy side but also among scientists. Nobody wants to waste time.

Continuous and iterative policy support builds trust with policy makers and enhances capacities for communication on all sides. Seeking a policy mandate can further enhance relevance. It buys a direct line to policy but, on the other hand, it may also limit flexibility to explore wider issues and can diminish independence and legitimacy. Similarly, lobbying may increase relevance, but risks harming credibility.

Using understandable language adapted to the specific audiences is crucial to relevance. Avoiding jargon, explaining concepts, and establishing common assumptions all help to build understanding and maximise the chance of outputs reaching and influencing the intended audiences. Skilled "translators" can help to improve knowledge exchange. High-impact communication, for example using pictures, figures, or strong messages such as tipping points or irreversibility, can help get complex points across. On

the other hand, if uncertainties are glossed over this may threaten credibility in the long term. Presenting outputs at relevant events, by appropriate presenters for the audience, and at the right time in terms of policy cycle, in accessible format increases relevance.

> "…but then the minister opened a conference with our simple diagram – called it the "ecological Dow Jones index of the North Sea" – presented it as simple, clear, and insisted that it must be in the third water management plan!" ***Dr B, government scientist.***

Adaptability to changing circumstances is key to relevance. This requires on-going reviews of SPI activities and impacts, and horizon scanning for new knowledge, problems and opportunities. SPIs can even seek to be "gate keepers" for new knowledge, helping policy makers to distinguish between "crackpot ideas" and "strokes of genius", and ensuring early involvement in new developments. Flexibility is needed in order to modify previous agreements, correct weaknesses, understand changing science and policy contexts, and respond accordingly. Seeking out new members and skills may be necessary. Iterative and parallel processes of capacity building and SPI development increase relevance and effectiveness of the SPI, and create a sense of continuity and commitment.

Building Legitimacy

Legitimacy is especially important when knowledge is contested, when policy decisions involve winners and losers, and in all other situations where conflict may arise.

Wide coverage of expertise and perspectives not only increases the knowledge base and credibility of the SPI, it also helps legitimacy, provided time is taken to explore issues from a variety of perspectives. It may be necessary to have balanced membership for example through 'seats' or votes for relevant interests, sectors, or geographical areas.

Successful conflict management can enhance legitimacy. Clearly stated, appropriate and agreed methods are needed to manage conflict and dissent. Recourse to an external or neutral ombudsman may be necessary. Yet it is important to recognise that consensus should not always be the target. Usually, reaching compromise is a more realistic and even fairer objective.

Multi-stakeholder dialogue is often needed for building relationships, trust, and legitimacy. Formal consultation processes may be required, but it is also often helpful to encourage informal dialogue as people may be more comfortable with this.

Incorporating extended peer review, including scientists from a broad range of disciplines and also other stakeholders in quality control procedures, can build trust and enhance both legitimacy and relevance.

Final thoughts

Building credibility, relevance and legitimacy into SPI design is key to ensuring impact. But SPIs have to work with numerous constraints (resources, time, policy cycle and so on), and it is not always possible to enhance all aspects of CRELE.

Though it may be tempting to focus on the immediate policy challenges, it is important to consider not just short-term improvements in CRELE, but also the long-term prognosis. CRELE takes time to build, but can be lost very quickly.

SPIs need to make strategic choices regarding what dimension of CRELE to emphasize and what specific features to prioritise to ensure high impact over the long term. There is no 'one size fits all' recipe: the right balance of features will vary according to the context. The SPIRAL brief on Trade-offs discusses this issue in more detail.

Looking for more information on science-policy interfaces?

For more SPIRAL results, including separate briefs focussing on characteristics of SPIs or lessons learned from SPI processes, see companion SPIRAL briefs at http://www.spiral-project.eu/content/documents

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SPIRAL Briefs

SCIENCE POLICY INTERFACES: RESEARCH, ACTION & LEARNING

CRELE Choices: trade-offs in SPI design

The Brief in brief

This brief examines trade-offs among science-policy interface (SPI) design features. It describes difficult choices in terms of their impacts on credibility, relevance and legitimacy, and explains how trade-offs can be managed in different contexts. The brief is aimed at those developing and designing SPIs, as well actors evaluating or funding SPIs.

CRELE in SPIs

The idea of simple linear knowledge transfer from science to policy – 'truth' speaking to 'power' – is not adequate to explain the complex interactions in real SPIs. The effectiveness and impact of SPIs depends on the perceived credibility, relevance and legitimacy (CRELE) of knowledge and processes (these ideas are explored in the SPIRAL Brief on CRELE). Potential trade-offs between these attributes, and ways to manage them, examined below.

Four trade-offs summarised

Evidence from workshops and interviews revealed a number of trade-offs met in real biodiversity SPIs. Four of the most important are discussed below.

Personal Time trade-off

> In the old days it *[science-policy work]* was a negative, because it took time away from your work that you do here, but now it is actually an honour to be selected by an international community to do this. And that has been a big change. *Dr M., scientist*

Time spent on SPI work can enhance any dimension of CRELE, but taking time away from other roles may have immediate consequences. Longer term, impact on individual work could be positive or negative.

Clarity-Complexity trade-off

Strong and clear messages increase relevance but thorough communication of uncertainties and multiple perspectives increases credibility and legitimacy.

Speed-Quality trade-off

> We cannot wait for three years that you come up with your mid-term research study and peer reviewed papers - *Mrs P, policy maker*

Timely and rapid responses to policy needs enhance relevance, but time-consuming quality assessment and consensus building enhance credibility and legitimacy.

Push-Pull trade-off

Following policy demands strongly enhances short-term relevance while more supply-oriented research strategies enable identification of emerging issues and development of innovative solutions, maintaining CRELE in the long-term.

Managing trade-offs

The extent to which the trade-offs arise depends on the details of each case. It is important to understand what can be controlled or influenced in an SPI to mitigate trade-offs and maintain appropriate levels of CRELE.

Managing the Personal Time trade-off

There can be a lack of motivation for scientists and policy makers to take part in SPI work, if it is not recognised as important by hierarchies and does not help career development. Motivations for scientists and policy can be enhanced in various ways.

Find financial support for participation. This can remove important barriers including lack of budgets for travel and the need to fund working hours.

Match the spatial, temporal and administrative scales addressed by scientists to those considered important by policy makers. This helps ensure that knowledge is relevant, enhancing SPI impact and encouraging participation on all sides. For example there is policy demand for knowledge at watershed scales because of the Water Framework Directive: SPIs need to ensure that science meets this need.

Meet individual needs of participants. Scientists can be motivated by policy demand: interest from high-level decision makers, and having a practical impact on policy, can be highly satisfying. Policy makers can be motivated by learning opportunities and feeling close to the cutting edge of research in their policy areas.

Career recognition can overcome the trade-off. Promote and fund structures that recognise SPI work encourage participation and create a virtuous circle with peer-respect for strong SPI work. Scientists are increasingly stressing SPI work in their curriculum vitae. Policy leaders need to recognise that staff time in SPIs will pay long-term

dividends, e.g. SPIs can provide a warning mechanism for policy makers to understand emerging and important issues.

Managing the Clarity-Complexity trade-off

Where the clarity-complexity trade-off really exists, a difficult balance must be struck between short-term policy relevance and long-term credibility and legitimacy. But the trade-off can be less extreme than it is sometimes presented.

> The naïve view that policy makers can't deal with ambiguity, can't deal with fuzzy things is completely wrong! *Dr S – policy adviser*

The trade-off between simplification and communication of uncertainties is acute only where policy makers really do demand simplified messages. This is not always the case. Be aware that preferences can vary with the stage of policy cycle: at early stages, opening up uncertainties can be useful for all; towards the end of policy cycle, the need for definitive and simple advice increases.
Address milder forms of the trade-off through style and form of information. For example, giving numbers with confidence intervals may be appropriate for scientific publications but in policy work it can look cluttered and confusing and encourage focus on the central estimate. A graphical representation of the distribution of outputs may be more effective for communicating and may help ensure that the range of outcomes. Be innovative and explore ways of communicating that preserve information about uncertainties.

Managing the Speed-Quality trade-off

The main secret to easing the trade-off between timely advice and rigorous and time consuming quality assurance is forward planning.
Timely submissions of scientific advice can be assured by acknowledging the timetable of policy actions and planning accordingly. It is crucial to be aware of policy cycles of relevant policy actors: involve them in the work of the SPI.
Communicating policy deadlines to scientists and reviewers is important; it may also be necessary for someone to be responsible for chasing up between SPI meetings to ensure deadlines are met. Make sure all involved understand the consequences of delay.
Encourage informal interactions: policy makers need to know 'who to call' to get the latest advice, but ensure this advice comes with appropriate caveats. Feed these interactions in to the work and quality assessment programmes to keep future advice both relevant and credible.
Scan horizons, plan for flexibility, play a role in shaping the next generation of political questions. Put the SPI in the best position to provide timely and credible advice.

Managing the Push-Pull trade-off

At present, demand-led science is often seen as more important than curiosity-driven research. But policy demand and policy relevance are distinct issues.

A focus only on immediate policy demand neglects the role of SPIs as knowledge brokers for relevant emerging issues. Supply-led research may support a broad range of long-term relevance, including a chance of very high impact for some emerging issues. But demand-led research is important for short-term impact and keeping an SPI in the policy loop.

So the trade-off between supply and demand oriented science is a matter of balance. Specific conditions may alter the appropriate strategy in the short term, but a SPI seeking to maintain CRELE over the long haul needs a strategy that involves both forms of research.

To conclude, there is often a tendency to consider one option superior to others. But in fact the better option is usually context specific, and the appropriate balance can vary over time. Trade-offs are not static, but very dynamic in several ways. Some trade-offs may be fundamental (not resolvable in any circumstance), others are can be solved with additional resources, pose a problem only in some contexts, or evolve with changing contexts

Looking for more information on science-policy interfaces?

For more SPIRAL results, including separate briefs focussing on SPI attributes, or lessons learned from SPI processes, see companion SPIRAL briefs at http://www.spiral-project.eu/content/documents

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SCIENCE POLICY INTERFACES: RESEARCH, ACTION & LEARNING

Iterativity and dynamism in science-policy interfaces

The Brief in brief

This brief examines the role of iterative and dynamic processes in science-policy interfaces (SPI). This brief is aimed at those developing SPIs, as well those evaluating or funding SPIs.

Understanding SPI impacts

Science-policy interaction mechanisms based on linear knowledge transfer - "knowledge speaking truth to power" - often fail to influence policy makers' and public behaviour. Especially in cases of high uncertainty and contested values – quite common in issues related to biodiversity loss and conservation – SPIs' influences on target audiences stem from complex two-way interactions, learning and trust-building processes (see SPIRAL briefs "A myth-busting guide to science-policy interfaces" and "Focus on impacts"[1]).

The credibility, relevance and legitimacy (CRELE) of knowledge, and the processes through which it is brokered, provide a partial explanation of the effectiveness and impact of SPIs, alongside numerous contextual factors. Considering CRELE, how to increase it, and how to deal with the inevitable trade-offs among its components, are powerful approaches towards improving interactions at the science-policy intersection (see SPIRAL briefs "Keep it CRELE: credibility, relevance and legitimacy for SPIs" and "CRELE Choices: trade-offs in SPI Design"[2]).

Yet the CRELE model is rather static and does not fully capture the vital dynamic and iterative aspects of science-policy interfaces. Trade-offs are often over time rather than immediate (a boost to relevance today at the expense of credibility tomorrow, for example). Repetition can substantially increase the power of a message. The CRELE model alone does not sufficiently capture the way in which processes of iteration and repetition can be central in explaining SPIs' influence.

[1] http://www.spiral-project.eu/sites/default/files/Myth-busting.pdf
http://www.spiral-project.eu/sites/default/files/21_Focus-on-Impact.pdf

[2] http://www.spiral-project.eu/sites/default/files/07_Keep-it-CRELE.pdf
http://www.spiral-project.eu/sites/default/files/13_Brief_CRELE-choices.pdf

Dynamic features in SPIs

SPIRAL research identified specific features of the goals, structures, processes and outputs of SPIs that can explain CRELE and the effectiveness of SPIs. Many of these features have strong dynamic and iterative elements.

SPI aspects	Dynamic features
Goals	Vision – understanding of stakes, forward looking, adaptation to context. Drivers – demand and supply both dynamic and dependent on potentially changing context.
Structures	Financial and human resources –balance of continuity and renewal, individual learning and development.
Processes	Continuity – dynamic maintenance of people, structures and roles. Trust building – iterative procedure of constructing trust relationships. Capacity building – iterative procedure of identifying and addressing internal and audience capacity needs. Horizon scanning – iterative procedure for matching activities to emerging policy needs and science developments. Adaptability – responsiveness to changing contexts, flexibility to change
Outputs	Appropriate outputs – iterative identification of needs, timely delivery, performance review Quality assessment – dynamic processes to ensure quality, apply best knowledge, keep up with state of the art, revision of outputs Translation – iterative processes of matching messages to audience interests and abilities, repeated presentation, variation of formats

Iterativity and the dynamic interaction between science and policy

The CRELE model needs to be extended to take full account of dynamic features. SPIRAL has suggested the attribute of "iterativity" to do this. Iterativity puts emphasis on the added value of dynamic and repetitive features of SPI structures, objectives, processes and outputs.

This draws attention to SPIs' potential to influence policy and behaviour more effectively through dynamic interaction between science and policy, and recognises that CRELE alone cannot explain influence. Iterativity is not a simple dynamic dimension of CRELE, but emerges as a separate attribute: iterativity can influence CRELE, but also has strong direct influences on SPI contexts and participants, and can enhance learning and impact even where CRELE attributes remain unchanged.

For example, regular and repeated interactions are needed to create commitment, mutual trust and understanding of diverse positions and reasoning. Learning takes time, and people may need to hear a message several times, and in different ways, before it sinks in and even more before it changes behaviour. Iterativity for SPIs therefore encompasses the evolution of structures, objectives, processes, knowledge, outputs and relationships in continuous and repeating science-policy interactions.

Iterative and dynamic interaction strategies

Repetition and iteration can be particularly important where information runs counter to audiences' preconceived ideas, and especially if it runs against decisions that have already been taken. People have a tendency to accept confirmatory information uncritically, but to counter-argue or resist contradictory information. They may even selectively seek exposure to confirmatory sources, and resist exposure to conflicting sources.

Dynamic aspects of interaction are important to overcoming these tendencies, and successful strategies include:

- presenting evidence early, sequentially, and iteratively;
- trust-building and developing non-threatening communication contexts;
- building capacities and joint creation of areas of agreed background, knowledge and principles from which to build.

More generally, regular iterative best-practices include quality control procedures, internal and external performance review, horizon scanning and updating of SPI structures and processes.

Even more fundamentally, people involved in SPIs should recognise that, while context and CRELE are central to determining the impact of SPIs, these factors change over time, at least in part due to SPI activities. Seeing interaction as an iterative process of co-evolution, exerting influence on all participants, emphasises both the ability of SPIs partly to shape the future contexts within which they act, and the need for flexibility to change internal structures, processes and even goals in response to learning and development through the communication process.

Final thoughts

The long-term sustainability and success of thriving science-policy processes must be built on credibility, relevance and legitimacy not only today but also tomorrow. As a corollary, an understanding of the influence of SPIs today requires consideration of their history of iterative communication and co-evolution with their contexts. In a complex environment and with complex issues, science-policy interactions can rarely be understood as linear processes or one-shot occurrences. Both the effective organization of an SPI with its objectives, structures and processes, and its participation in knowledge production, synthesis, exchange and use, are dynamic process in which repetition, feedback, learning and adaptation play central roles in unavoidably evolving context. Thinking about these dynamic aspects of credibility, relevance, legitimacy and iterativity help us understand both when and why SPIs have influence, and how science-policy processes can be developed to promote more influential SPIs able to contribute to the pressing social and ecological need to halt biodiversity loss and the further deterioration of ecosystem services and to develop strategies for sustainability.

Looking for more information on science-policy interfaces?

For more SPIRAL results, including separate briefs focussing on lessons learned from other SPI processes, see companion SPIRAL briefs at http://www.spiral-project.eu/content/documents

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Learning from existing science-policy interfaces

SPIRAL Briefs

SCIENCE POLICY INTERFACES: RESEARCH, ACTION & LEARNING

Reality check for science-policy interfaces

The Brief in brief

SPIRAL used real life science-policy interface (SPI) 'test cases' to confront practice with theory and identify examples of effective practices, as well as facilitating and hindering factors for SPIs. SPIRAL both studied-- and fed-back its expertise and findings into-- the planning, design, implementation and assessment of those test cases. This brief presents some lessons learnt and three cross-cutting issues: the crucial role of individuals in making an SPI work, the still dominating sector-based silo mentality and the importance of engagement with stakeholders.

Introduction and Rationale

Science-policy interfaces are the many ways in which scientists, policy makers and other stakeholders link up to communicate, exchange ideas, and jointly develop knowledge for enriching policy and decision-making processes and/or research.

SPIRAL used 'test cases' to study and test specific, real-life science-policy interfaces at various levels: national, European and international. The specific objectives of this work were to: learn from the processes of planning, designing, implementing and assessing SPIs; contribute to those processes; and extract lessons and examples of best practices incorporating other aspects of SPIRAL's work.

These objectives were achieved by interacting directly in SPI test cases design, operation and assessment, and being engaged in hands-on testing, reality-checking and feeding-back its findings from other elements of SPIRAL's work. As such, it was an opportunity to confront theory and real life practice, to evaluate the relevance and applicability of SPIRAL's results and to further develop recommendations.

The nine SPIRAL test cases:
The Intergovernmental platform for Biodiversity and Ecosystem Services (IPBES); the AfriBES Network; A Biodiversity Science-Policy Interface Mechanism for Europe; Towards strengthening environmental science-policy interfaces at EU level: the SEPI exploration; The Economics of Ecosystem and Biodiversity – TEEB; The Society for Conservation Biology (SCB) – European Chapter; The implementation of the Water Framework Directive in Romania; Het Instituut voor Natuur en Bosonderzoek (INBO); and The Royal Netherlands Institute of Sea Research (NIOZ).

Helpful lessons

A non-exhaustive set of lessons were distilled from SPIRAL's exploration. They are organised here in relation to SPIRAL's 4-part conceptual framework for SPI analysis.

(a) Structure

The challenge of a multi-level structure: SPIs intending to play a role at various levels may end up facing difficulties to maintain coherence and common goals with their wide range of local, national, regional activities or nodes, each with various priorities and unevenly distributed resources.

The role of individuals: an SPI can be strongly dependent on the involvement of individuals committing their time and energy but also potentially influencing it with their own perceptions and priorities, which may not necessarily be in tune with the objectives of the SPI.

Champions: the use of 'champions' or charismatic 'ambassadors' who are well-respected and highly-placed can contribute to improving visibility and credibility of an SPI, especially very formal and high level ones, and facilitate access to other resources.

Leadership and coordination: a charismatic leadership is a key component but should be complemented by efficient coordination and a reliable knowledge basis (ensured through e.g. appropriate quality assessment processes).

The trade-off between formal and informal approaches: there is a trade-off between top-down formally organized and managed SPIs on the one hand, and the need for adaptability and to allow for informal science-policy relations that may function without such top-down orchestration, and even may be hampered by it on the other hand.

Membership and coordination: bottom-up approaches require an initial pool of motivated and active members, and efficient coordination.

Governance, adaptability and legitimacy: light governance of a SPI contributes to its adaptability but might hinder legitimacy, especially in cultural contexts where formal arrangements are seen as more legitimate, reliable or sustainable.

Political mandates: a clear political mandate may generate the dynamics needed in both the policy and scientific communities as it may provide a sense of mission for the various actors operating in the SPI.

Representation and diversity: a good and relatively balanced diversity of relevant participants is necessary to avoid an SPI being seen as a private club or becoming dominated by specific disciplines.

Transparency and inclusiveness: an open architecture format where anyone could contribute evidence (e.g. via calls for evidence) can support transparency but needs to be complemented by an active recruitment of contributors and careful review processes to ensure credibility.

(b) Functions/Objectives

Walking the fine line between advocacy and "neutrality": a difficult choice for an SPI is to engage more in an advocacy role for conservation (or other environmental issues) or to remain in a more informative "honest brokering" role, thus reducing the risk that scientific credibility be compromised. Scientific credibility is not only linked to scientific quality, but also of transparency.

Trade-offs between credibility and legitimacy: there is a trade-off between independence/credibility and the legitimacy (political mandate, intergovernmental process) of SPIs.

Levels: there is a need for integration across levels from local to member state to EU level;

The linear model: the persistent dominance of the linear model (one-way transfer of knowledge from science to policy) hinders the development of more dynamic SPIs; SPI activities are often restricted to a one-way communication putting emphasis on involving scientists with great communication skills or translating the scientific knowledge into more digested messages for policy makers: a useful yet insufficient approach.

Transparency of objectives and motivations: clarity on objectives and internal common understanding of the participant's motivations to join the SPI contribute to the success of SPIs.

Connections and gaps between interfaces: environmental policies build on an evolving mosaic of interfaces, which need to be connected in a flexible manner with the active consent of those involved.

(c) Processes

Incentives, ownership and engagement: bottom-up SPIs are challenging as potential actors need incentives to engage time and effort; it is then important to foster their ownership of the process and ensure continued engagement and real added-value for them.

Conflict management: building capacity of all actors is a major condition for effective conflict management. As relevant actors engaged in the SPI work might have conflicting needs and demands, mediation tools to build trust and better understanding of each other from the start of the SPI are important.

Interdisciplinarity and transdisciplinarity: Complex environmental issues require interdisciplinary SPIs whereby a broad diversity of relevant experts are engaged, and transdisciplinary approaches to integrate various scientific disciplines and other types of knowledge, and build common understanding and trust.

Transparency of processes is a major criteria for effective SPIs and entails clarification of who is involved, when and how, who funds, who influences etc.

Responding to changing policy drivers: flexibility and adaptive management are needed as user needs and concerns change and evolve according to the changing policy landscapes and priorities, the demands on an SPI become more challenging and face increasing trade-offs between credibility, relevance and legitimacy.

The issue of scaling and context dependency: biodiversity issues are usually quite context-dependent both in terms of knowledge availability (including different type of knowledge) and in terms of policy development and implementation. As a consequence, EU and international SPIs (e.g. IPBES) face a challenge of scaling up and down for both integration and applicability of the knowledge they will review and analyse.

Learning Institutions: SPIs addressing complex interrelated biophysical, socioeconomic and institutional issues should be established as learning institutions to deal with complexity – which implies uncertainty, ambiguity, indeterminacy, non-linearity, and ignorance.

Cross-cutting issues

Three inter-related, over-arching themes emerged as cutting across most test cases: (i) ***the role that individuals play in making SPIs work***, (ii) the recognition that many actors or institutions still tend to operate within ***a sector-based silo mentality*** and (iii) widespread concerns about ***how best to engage*** stakeholders and other actors.

The development of effective SPIs requires effort, time and resources for the development of interpersonal relationships to enhance communication and, thus, successful collaboration between scientists and policy-makers. These interpersonal relationships can focus on such things as how actors understand themselves and one another, how they communicate, collaborate, and work together through finding common ground.

Many test cases were hindered by a 'silo mentality' both in the science and in the policy realm:- an attitude found in some organisations that occurs when several departments or groups do not want (or are unable) to share information or knowledge with others, resulting in missing key information, feedbacks and/or connections. If individuals or sectors had clearer understandings of, and communications/interactions with, other relevant individuals or sectors, then considerable benefits might accrue.

Finally there were consistent concerns that many important stakeholders were not effectively engaged or were totally ignored, and that there was often a tension between actors that required participative engagement and conflict management being part of the SPI from the start.

Looking for more information on science-policy interfaces?

For more SPIRAL results, including separate briefs each test case, see companion SPIRAL briefs at http://www.spiral-project.eu/content/documents

This brief is a result of research and interactions within and around the SPIRAL project. This brief was written by Estelle Balian (Median), David Carss, Juliette Young, & Allan Watt (Centre for Ecology and Hydrology)

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SPIRAL Briefs
SCIENCE POLICY INTERFACES: RESEARCH, ACTION & LEARNING

Reflections on recent experiences with the UK National Ecosystem Assessment

The brief in brief

It is often argued that there is a need to improve communication between science and policy on ecosystem services and biodiversity topics. However, why communication problems exist and exactly *how* to improve science-policy communication is not always clear. In the SPIRAL project, we explored factors constraining or facilitating communication in three case studies. Here we focus on communication in the development of the UK National Ecosystem Assessment (UK NEA). We reflect on some of the experiences and views of individuals connected with developing the first phase of the UK NEA. We also discuss implications of our research for informing future work on the NEA and related topics.

What we did

We conducted twenty-five semi-structured interviews[1], in the second half of 2011, with a range of individuals connected with the production of the 2011 UK NEA report: from the client group, co-chairs, the user group, chapter author groups, and the secretariat, plus a handful of individuals who were not directly connected with the UK NEA[2], but may well be expected to read or use it. In these interviews we explored understandings and experiences relating to the NEA, as well as discussing broader views and recommendations about science-policy interfaces. We used NVivo software to aid an inductive analysis of transcripts of these interviews.

> We had some contact with the authors….particularly on the response options and scenario chapters
> [Was the process useful in making connections between…people?]
> Not hugely! No. No.
> *Mr P, Client Group*

Factors constraining communication in the UK NEA process

Across all interviewee groups there was some dissatisfaction with opportunities to communicate during the assessment process. In particular, there was dissatisfaction with the communication about the process across groups, and a desire for more connections (e.g. between the client group and chapter author groups). Authors even felt disconnected from those working on other chapters, although they often valued the chance to discuss issues within chapter teams.

In particular, some authors worried that the full range of social science views may not have been sufficiently integrated. It was felt that this could have affected the report, in particular the extent to which new ideas were advanced, and the structure of the chapters. It also meant there were lost networking opportunities, which are often useful for advancing thinking as well as building understanding across different groups.

Many of the above comments are linked to the fact that the whole UK NEA process took only 2 years. Limited resources in terms of time and money may also have limited opportunities for communication between and within groups.

Interviewees had different views on the 2011 UK NEA report as a communication tool. There was confusion over its basic purpose. Opinions included advancing thinking and scientific ideas, operationalizing ecosystem services concepts into policy, communicating new ideas from science to policy, and providing specific facts to help decision-making for particular problems. Some interviewees admitted to simply being confused! This affected how interviewees viewed the report. It is also is a strong indication of imperfect communication processes during the assessment. Some argued that the NEA had created a compelling and easily understandable explanation of the state and value of the UK's natural environment and ecosystem services. However, many thought the size and dense content of the main report is quite daunting. Its

[1] In qualitative research such as this the aim is not to use a representative sample, rather to capture the full range of views and experiences, so that the range of views, and experiences and patterns can be exhaustively explored and explained.
[2] The site http://uknea.unep-wcmc.org/About/WhosInvolved/tabid/63/Default.aspx explains the role of these different groups.

inaccessibility was not aided by it being launched whilst several chapters appeared to still be in a draft format.

Factors facilitating communication in the NEA process

Where opportunities to discuss issues and topics did occur, they were highly welcomed by interviewees. One interviewee valued highly the intense discussions within his chapter group. The UK NEA also benefitted from a process in which the chapters were reviewed by non-academics. This cross-sector review process was deemed a particularly useful process for helping communication across different potential user groups. Although dealing with hundreds of responses could be a large burden of work for authors, it raised the UK NEA's profile with a wide range of potential users (e.g. interest groups), as well as allowing the groups within the NEA to better understand the scope of and evolving thinking in other chapters.

The way in which uncertainty was handled in the final report was mostly well supported by interviewees and seen to aid communication. Each chapter starts with a set of key findings and include an indication of the level of scientific certainty, and where possible a likelihood scale. This consistent labelling was highlighted by interviewees as being very useful, and indeed needed in such a complex and uncertain field.

Furthermore, the quantity of evidence compiled in the final report was considered to maximise potential practical uses for answering specific questions or purposes.

How communication may affect uses of the UK NEA

While it is too early to know if the UK NEA may be useful as a 'problem-solving tool', studying the process of developing the NEA can shed some light on other potential uses and outcomes. For example, there is evidence that conceptual learning occurred not only between producers and users (particularly through the review process) but also within author groups, who said they had enjoyed working in new groupings for "intense" thinking and analysis about new topics often beyond many authors' 'comfort zone'. Some interviewees suggested the UK NEA could also be of relevance to changing mindsets and introducing concepts to audiences who might traditionally not consider or strongly value environmental issues, such as non-environmental policy makers.

A White Paper was published by DEFRA just one week after the UK NEA report was launched. White Papers are documents produced by the UK Government setting out details of future policy. They allow the Government to receive feedback before it formally presents the policies as Bills. A member of the client group was personally aware of the NEA's content and conclusions well before its official publication, and so his department could ensure this was picked up and referred to in the White Paper. This suggests that the NEA may also have strategic uses, and supports the value of communication throughout the whole process for encouraging policy uses.

Reflections on the future

The production of the 2011 UK NEA report was an ambitious task that involved many different groups: managing such a process will always be challenging. However, there are perhaps lessons to be learned for future work for NEAs in the UK and in other countries or regions, and related topics. Interviewees' experiences suggest that improving communication between various disciplinary and sectoral groups is a key challenge, but worth the effort. Assessments such as the UK NEA should therefore not only focus on tangible outcomes and reports (with attention on tailoring them for defined audiences) but also support *processes* (devoting resources to bring together different groups and allowing space for views to evolve). In the case of the UK NEA, the ongoing work in its second phase includes communicating existing messages from the 2011 report in formats targeted to particular audiences. Results from this work suggest that future activities should not focus only on tangible products but also on events that promote ongoing dialogue and learning.

> The NEA2 should be an exercise of going through that pile [of chapters] and actually looking for consistencies, and linkages across the way.
>
> *Dr T, lead chapter author*

Looking for more information on science-policy interfaces?

For more SPIRAL results, including recommendation on communication building on this and other case studies, see companion SPIRAL briefs at http://www.spiral-project.eu/content/documents

This brief is a result of research and interactions within and around the SPIRAL project. This brief was written by Kerry Waylen (JHI) and Juliette Young (CEH).

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Interfacing Biodiversity and Policy

SPIRAL Briefs
SCIENCE POLICY INTERFACES: RESEARCH, ACTION & LEARNING

An emerging Multi-level and Multi-function SPI for the implementation of the Water Framework Directive in Romania

The Brief in brief

This SPIRAL brief highlights the rationale and process of restructuring and developing the institutional arrangements for policy support in the field of water protection and management, into a multilevel and multifunction SPI supporting the implementation of the WFD at large river catchments across Romania (WFD-SPI/Ro).

Setting the scene

The water Framework Directive (WFD)

The quality of surface and ground waters and the health of inland and coastal water ecosystems are the results of long term integration of the cumulated stress of both human and natural pressures, acting in or across watersheds. Based on such scientific interpretation of the complex relationships across space and time, among human and natural systems, the adaptive and integrated water resources management at watershed scale or sustainable watershed management has been chosen as major strategic target for the Water Framework Directive (WFD)[1].

WFD in Romania

During the preparatory phase for EU accession (2000/2006), the Romanian authorities transposed the WFD and other related directives into national legislation[2]. Thus by early2007, the domestic legal framework required the implementation of basic WFD's standards and targets in the integrated water policies and management plans established for large watersheds. In the first phase the mandate to implement WFD measures has been allocated to former Water department / Ministry of Environment, Water and Forests and National Water Authority (NWA) in charge of water policy implementation on one hand, and two research institutes: the National Institute of Hydrology (NIH) and the National Institute for Environment (NIE), in charge of scientific and technical support and acting as policy driven SPI like components, on the other hand.

In order to cope with so diverse and urgent tasks, new water – SPI components have been formally established (e.g. scientific and technical advisory council (STAC), River Basin Committees (RBC)s, Inter-ministerial Water Committee (IWC)) and specific collaborative works were launched among former WFD:SPI and other research organisations. In this context the research team in systems ecology and sustainability of the University of Bucharest (UB) worked closely with NWA and NIE, and had a strong representation in STAC.

However the former and emerging institutional arrangements showed some limitations related to:

i) understanding and implementing innovative concepts, approaches and tools such as biodiversity, ecosystem services, Good Ecological Status (GES) and Potential (GEP), ecological indicators, integrated or holistic approach, extended economic valuation by including critical ecosystem services; ii) the capacity to deliver reliable and relevant inter and transdisciplinary knowledge; iii) the capacity to involve a wide range of stakeholders, both from science and non-science sectors; iv) **weak connectivity and coordination among former and newly established SPI components**; v) the absence of well defined and effective processes to bridge between science and people on one hand, and between science and key policy bodies on the other hand.

By the end of 2009, the need for institutional consolidation and integration and for operational improvement of the existing SPI components has been perceived, by most of those involved in WFD implementation, as a major priority. The selection of "WFD implementation/Romania" as a test case in the SPIRAL project created an opportunity, for the UB team, to trigger collaborative work on: i) development of a comprehensive vision on the structure and functions of WFD–SPI/Ro; ii) building an integrated and dynamic WFD-SPI and iii) testing and improving the operational capacity.

The proposed WFD-SPI/Ro consists in two complementary sets of organisations: i) on the policy side: all relevant agencies / organisations in charge for integrated water, water-related and biodiversity policies development, coordination and implementation, and, ii) on the science side: a range of interconnected supply- and demand-driven or mixed organisations, networks and platforms.

The WFD-SPI/Ro has several major functions: i) multi and transdisciplinary knowledge generation and delivery to all levels of policy cycle; ii) developing and promoting the holistic vision and operational tools for integrated water policies and adaptive management in and across watersheds; iii) identification and use of the reliable and relevant data sets for assessing the environmental flows and ecological status of the inland and coastal water ecosystems and; iv) capacity building and fostering broad participation of the science and non-science actors in the policy development and decision making.

Approach taken in SPIRAL to study the test case

The UB team involved in the SPIRAL project has initiated and guided the collaborative work carried out during the Test Case analysis with representatives of policy making organisations from central (6), regional (8) and local level (15); scientists from universities, research institutes and natural museums (>20), and other stakeholder groups (>20), in particular fishermen, farmers, householders, NGOs, conservationists or those from

[1] WFD60/2000/EC: http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2000:327:0001:0072:EN:PDF

[2] Law nº 310/2004 and Law nº 112/2006

inland water navigation and hydropower generation sectors. The consolidated SPI conceptual framework[3], and the set of criteria for SPI analysis[4] as well as set of recommendations concerning communication[5] have been or will be extensively used.

Key lessons learned from the Test Case

The test case analysis revealed several significant achievements and needs for more improvement. A series of aspects concerning the WFD-SPI/RO conceptual framework (vision), structure and functions are particularly striking.

- The first aspect highlights the **improved vision which framed the structural and functional integration and consolidation of the water and biodiversity SPI components**. In that regard a couple of critical elements received special consideration: i) the appropriate space and time dimensions for identification and understanding the complex and dynamic interactions within and between social and natural systems; ii) stakeholders mapping and their involvement in transdisciplinary integration of scientific and traditional knowledge, and in policy and decision making; iii) co-existence of dynamic and competing water, biodiversity and water related policy objectives inside and across watersheds; iv) multi-level organisation of the policy cycle and the importance of a consistent hierarchy of decisions; v) multi-level, spatial distributed and dynamic institutional arrangements and; vi) dependence of successful operation on a combination of diverse tools - indicators, methods, models and scenarios – for GES/GEP assessment, systems modelling and multi-criteria analysis.
- The second striking aspect of the current WFD-SPI/Ro is the **multi-level architecture and involvement of various scientific disciplines as well as non scientific expertise, with major policy levels and nodes of decision cycle**. Such architecture proved to better facilitate: balancing membership and power relations; multi-disciplinary and transdisciplinary integration of relevant scientific and traditional knowledge and expertise; and flexible combinations among science and policy driven functions.

The WFD-SPI/Ro showed also, a significant potential to interact with the emerging SPIs focused on biodiversity conservation and sustainable development.

- The third striking aspect concerns which and to what extend some of the key features of effective SPIs as identified by SPIRAL[6] were present in the "Test case". *Horizon scanning*: some bad experience gained during first phase of WFD implementation revealed the need for long term planning of both integrated water policies and retrospective and prospective inter and transdisciplinary research.

Continuity and adaptability: composition and multi-level structure of the WFD-SPI/Ro enables continuous and iterative policy support, maintenance of high networking potential and dynamic membership which assure adaptation to the changing policy and economic context.

Conflict management: Open scientific and policy debates among: science experts of the STAC; policy experts of the IWC; and diverse stakeholders (RBC) are the main mechanism used to manage cross sectoral conflicts or to buffer power relations

Capacity building: By 2007 most of the policy makers and scientists who were involved in WFD implementation shared sectoral and short term vision, reductionist approach and conventional tools. Main reasons for that situation reside in the low potential or motivation of most academic organisations to adapt their interdisciplinary curricula in accordance with the WFD needs; preservation of discipline based experts of former organisations in charge of water management and; emigration of most skilled experts. It has been noticed also that many sources of required data and information were owned by a large variety of experts and research organisations, and usually in different formats and difficult to access. **Thus building and improving specific capacity for WFD implementation at and across watersheds, has been viewed as a long term objective**. In that regard, two initiatives were launched: i) designing and development of a cyber-infrastructure and information system which is aimed for integration and flow of the reliable data and knowledge in the policy cycle, and; ii) development and implementation of transdisciplinary curricula (in particular master and PhD) and short training courses aiming at education and training a new generation of policy and decision makers, and scientists better skilled to understand complexity and to address water and related policies issues at large space and time scales.

A recent one-day workshop was organised in Romania to present, discuss and validate the test case results. Twenty key representatives from the policy and science components of the WFD-SPI/Ro attended the workshop and endorsed the striking aspects mentioned above. Although participants recognised that the test case created opportunities for improving the SPI components and helped to clarify concepts and build the operational framework, they acknowledged that much is still to be done to strengthen connectivity among SPI components and increase of its functioning capacity and efficiency. In that regard it has been proposed that in the next couple of months similar workshops will be organized at the watershed level.

Looking for more information on science-policy interfaces?

For more SPIRAL results, including separate briefs focussing on results from other test cases, see companion SPIRAL briefs at http://www.spiral-project.eu/content/documents

This brief is a result of research and interactions within and around the SPIRAL project. This brief was written by: Angheluta Vadineanu, Magdalena Bucur and Nicoleta Geamana / University of Bucharest.

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[3] http://www.spiral-project.eu/sites/default/files/SPIRAL_1-1_all.pdf

[4] See companion SPIRAL brief "SPI under the spotlight"

[5] See companion SPIRAL brief "*Recommendations for improving science-policy communication*".

[6] See companion SPIRAL brief "*Key features of effective SPIs*"

SPIRAL Briefs
SCIENCE POLICY INTERFACES: RESEARCH, ACTION & LEARNING

Co-constructing INBO's policy relevance

The Brief in brief

We introduce how INBO is 'on the move' by changing its science-policy interface culture. Based on the results of an assessment by a management school, INBO's management has initiated several actions leading up to a cultural change oriented towards increased policy relevance. INBO personnel are being extensively consulted during this process. Moreover, the preferences from stakeholder organizations have been given a more structural place in INBO's research. This brief presents this co-construction of INBO's policy relevance, two examples of science-policy interface practice and some key lessons.

Setting the scene

INBO is the Flemish research and knowledge centre for nature and its sustainable management and use. INBO carries out research and supplies knowledge to all those who prepare or make policies or are interested in them. As a leading scientific institute, INBO works primarily for the Flemish government, but also supplies information for international reporting and deals with questions from local authorities. In addition, INBO supports organisations for nature management, forestry, agriculture, hunting and fisheries. Originally, some 30 years ago, INBO was set up as a kind of science-policy interface (SPI). According to the current management board, over the years the SPI-performance became increasingly hampered by the ambition to have policy impact (advocating for nature conservation), rather than playing the role of an "honest broker" by providing objective scientific knowledge for policy, on the basis of which a number of policy relevant scenarios are constructed, so that policy makers can make a well informed choice. At the same time the record of INBO researchers' scientific peer-reviewed publications could be improved as a credible objective scientific basis. In order to improve INBO's SPI (knowledge brokering) performance, a management school was asked for an assessment. According to the current director of INBO there were two main reasons to choose a management school for this task: 1) To be a frontrunner in Flanders as the first Governmental Agency doing such an assessment. 2) In order to legitimize INBO within a policy landscape that is dominated by a business culture. In 2011 the Vlerick Management School assessed INBO's performance in order to detect INBO's 'unique value proposition': *"A particular bundle of benefits offered by the company, and being sought and bought by the customer. The value proposition communicates why customers should buy a company's products and/or services over that of the competitors. The value proposition is different than the products and services offered by the company in that it considers the user's total consumption system."* Based on a stakeholder analysis (potential clients and competitors) and focus group discussions with those stakeholders, INBO's unique value proposition was constructed: *"INBO carries out scientific, policy relevant nature research in Flanders. It is committed to short and long-term research. The short-term research aims at developing a broad knowledge base and is carried out on demand of policymakers. The long-term research aims at knowledge generation for future support of policy makers. Long-term research is defined as research for which you have to collect data over a period of several years. A separate part (called the Own Capital) of INBO is committed to medium range nature research in partnerships with other research organisations in Flanders and Europe (universities, research organisations, consultancy bureaus)".* The assessment provided the following recommendations:

- Move away from the perception of being: subjective, not neutral, not flexible enough, not transparent enough, doing science for science only.
- Main targets: objectivity (reference to literature, data availability), neutrality (decision support e.g. with display of possible scenarios), flexibility (demand driven), transparency (disclosure of all material);
- More economic and sociological research.

Two examples illustrate how INBO is trying to implement policy relevance in line with the above mentioned recommendations in practice: the so-called "*envelope financing mechanism*" and participatory research exemplified by a project on *wild boar management.*

1. Envelope financing mechanism.

This mechanism was instigated in 2012 to specifically enhance the policy relevance of short term INBO-research. Stakeholders get a yearly budget which they can use to ask for specific short-term INBO research. Financial resources are covered by structural funding of INBO and by human resources (scientific personnel). This mechanism is being implemented both with the historically most important clients, such as the Agency for Nature and Forest (ANB) as well as with new clients including from less nature-conservation-oriented policy domains such as agriculture. Broadening the client base is an important element in assuring a more balanced analysis and perception of INBO's research. Currently INBO is in the process of developing a simple and flexible procedure for implementing the

mechanism. As this mechanism is rather new, it is too early to judge its functioning.

2. Participatory research: Wild boar management project.

This project aims at organising collaborative impact management of wild boar, the population of which is growing substantially, both in numbers and in geographic spread, causing problems which might develop in an even more problematic situation in case of inaction. The project instigates close collaboration with a diversity of local stakeholders, such as farmers, hunters, nature organizations, communities, etc. The initiative of this experimental project was taken by ANB of the Province of Limburg together with ANB at the Flemish level. INBO assists ANB with scientific input both on the ecological and technical aspects of wild boar management and on the more social aspects of this management. INBO organised several workshops with the different stakeholders and ANB to determine the different aspects of the desired future conditions that could be the fundamental objectives of wild boar management in Limburg. The output of these workshops serves as a further input for the decision-making process by ANB.

Approach taken in SPIRAL to study the test case

We studied the general re-orientation of INBO based on several documents including confidential overviews of anonymous reflections from INBO personnel. We discussed this in an interview with two senior INBO management representatives. We also looked into the two examples above to have a clearer view on practical aspects of the re-orientation. We built upon the SPIRAL overviews of key SPI-aspects.

Key lessons learned from the Test Case

Being a better science-policy interface, understood here as increasing policy relevance, is one of the main strategic aims of INBO. This is underlined by the outcomes of the external assessment and was formalized by implementing a new strategy addressing the main challenges identified in the assessment. INBO faced the double challenge of improving policy relevance and its reputation for scientifically sound research. It addressed these by implementing mechanisms to involve the clients from the outset in the process of defining the research question, as well as significantly increasing its scientific publication record, which has contributed to its research being recognised as objective and based on state of the art science. One of the new strategic actions aiming for policy relevance is external (client) control: demand-driven research. The issue of neutrality is, however, important for INBO, not only at management level but also (listening to discussions in the INBO-corridors and on the INBO-Yammer) this topic leads to intense discussion among the scientists. Recently INBO management picked up the need for a more structured discussion about what neutrality means and how it should be operationalized. At the end of 2012 the issue was brought to the attention of INBO personnel via the research group leaders to be discussed at research group level. Currently results of these discussions are being processed and will result in what management considers as a co-constructed and broadly supported text on INBO's neutrality.

The key lesson from this case is a series of remaining questions which may be relevant to the development of other SPIs: (i) Will an essentially top-down approach, formally organising and managing policy relevance be successful? (ii)To what extent is the complexity related to science-policy relations manageable? (iii) Will the approach be flexible and adaptive enough? (iv) Will it be effective for all relevant activities of INBO? (v) How and to what extent will there still be room for informal science-policy relations that may function without such top-down orchestration, and may even be hampered by it? For INBO it is too early to judge.

Looking for more information on science-policy interfaces?

For more SPIRAL results, including separate briefs focussing on results from other test cases, see companion SPIRAL briefs at http://www.spiral-project.eu/content/documents

This brief is a result of research and interactions within and around the SPIRAL project. This brief was written by Hans Keune (INBO) with contributions from Janine van Vessem (INBO), Jim Casear (INBO), Heidi Wittmer (UFZ), Annamarie Krieg (NIOZ), Carlo Heip (NIOZ), Koen Van Muylem (INBO), Maurice Hoffman (INBO), Jurgen Tack (INBO).

The **SPIRAL** project studies Science-Policy Interfaces between biodiversity research and policy to improve the conservation and sustainable use of biodiversity. SPIRAL is an interdisciplinary research project funded under the European Community's Seventh Framework Programme (FP7/2007-2013), contract number: 244035.

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SPIRAL Briefs
SCIENCE POLICY INTERFACES: RESEARCH, ACTION & LEARNING

Recent reflections on science-policy communication in the context of deer management in Scotland

The brief in brief

This brief, as part of the SPIRAL project, identifies issues and insights for improving communication between science and policy in local-scale decision making. Reconciling public and private objectives for environmental, social and economic sustainability is complex, and requires information to be shared across different groups. This makes it crucial that communication between policy, science and practice is more effective. Here we discuss these links and ideas for encouraging them, in order to support wild deer management in Scotland, and for local-scale management of wildlife resources in general. These findings are based on interviews carried out as part of the "Collaborative Frameworks in Land Management: A Case Study on Integrated Deer Management" project[1], together with additional interviews carried out as part of SPIRAL.

Deer management in Scotland

Scottish deer management is an excellent example of an issue where management of certain species interacts with and affects the status of other natural resources, with implications for livelihoods. Deer species found in Scotland include Roe Deer (*Capreolus capreolus*) and Red Deer (*Cervus elaphus*) and both have expanded their range and population in recent decades, as sheep farming has become less profitable and deer no longer had any natural predators. Deer in Scotland are 'owned' by no one and the right to hunt them lies with the owner of the land they inhabit. Landowners take responsibility for the welfare of deer and their habitat: this is usually achieved by managing deer numbers by regular culling.

Currently, deer are hunted across most of the Scottish uplands and are both culturally important and financially valuable. However, high deer numbers can result in damage to woodlands, heath and blanket bog, crop damage, and road traffic accidents. Balancing the range of actors and aims in the context of deer management means there is an increasing need to make communication between policy, science and practice more effective to help practitioners and policy reach their objectives.

Over 70 Deer Management Groups (DMGs) are found across Scotland. These groups take a broadly collaborative approach to managing deer: they are voluntary and run by representatives of the neighbouring landholdings in the DMG area. DMGs were originally a mechanism to agree on stag shooting numbers and prevent one estate taking too many in relation to their landholding size and the ranging behaviour of the stags. DMGs also attempt to ensure that hinds are culled while ensuring enough fertile hinds remain to produce stags. They may also adjust culls if there is strong evidence that the habitat is deteriorating. Some DMGs have developed Deer Management Plans that attempt to address the complexities of integrating deer management with other land use (including conservation) objectives.

Science-policy communication for deer management

There are already a number of links and tools valued for aiding communication and decision-making about deer management. Key insights from interviewees on practical strategies for improving communication included:

• The use of **digital tools** was considered useful by gamekeepers (especially the young), particularly in terms of developing "*mapping software* [in] *which you can have layers*". This was seen as a practical way of integrating local knowledge with scientific knowledge and methodologies to produce a useful decision-making tool. However, constraints include the labour-intensive nature of developing, and updating, such tools, the expense and wide availability of good quality mapping software, and potential

[1] The research was conducted as part of the Research Councils' Rural Economy and Land Use (RELU) Programme (Projects: RES 227-025-0014 and RES-811-25-0002).

lack of buy-in by older keepers. There were also concerns over the accuracy of such tools (particularly at the finer scale). These combined concerns led one interviewee to suggest that these tools could be considered in some cases to be more useful to national, rather than local-level, decision-makers.

• Building the capacity of deer/land-managers to utilise **monitoring methodologies**. Guidance on how to carry out deer counts and/or habitat assessments would improve ownership and value of such methods to practitioners and promote understanding and acceptance of the resulting data. For example, the organisation of training days on monitoring habitat change or best practice demonstration events (or DVDs) were considered useful in promoting knowledge exchange between local decision-makers.

• The DMG process has the potential to promote **open discussions between deer and/or land managers and scientists**.

> *"the whole Deer Management Group process has been really positive […] it's got people round the table talking, it's got people having to appreciate other people's view on landscape and natural resources, and if there are those differences of management well at least let's be open about them and talk about them and agree to differ or agree to compromise and to come to a common view"* – ***Dr V, scientist***

The use of mapping software could help in promoting discussions in DMGs on deer management at the landscape scale.

There are also social science insights on deliberation, handling different values and decision-making. Interactions with researchers and DMG members can also be a useful adaptive process to determine what data or evidence is required to support decision making in relation to deer and other land-use objectives.

• DMGs have the potential to **widen membership** to allow for a broader range of views, beyond deer management related issues, to be represented.

• The perceived gap between local and national-level decision-making needs to be bridged by promoting **opportunities for local practitioners to inform** national policy-makers about the local level barriers and constraints in achieving wider public benefits. To address public misunderstanding or concerns over land management, it can be helpful to communicate to the public about the need for active land management, the responsibilities of land managers, the rationales for managing land in different ways, and the public benefits land management can provide.

• Better knowledge exchange is essential to promote the **uptake of scientific results and methodologies**. These need not only relate specifically to deer ecology. For example, some research may not focus on deer, but the results could be used in decisions relating to the management of deer. This could be achieved easily by scientists explaining how such outputs are produced, or how tools could be useful to land/deer managers.

> *"We as gamekeepers and stalkers think that we are such true professionals in what we're doing and that we need to be involved […] we're trying to educate MPs, we invite MPs out on the hill to see […] actually how it happens, or why it happens"* - ***Mr M, land manager***

Broader implications

The above suggestions imply that it is not sufficient just to make available relevant data and tools, to aid decision-making over deer management and local-scale management of wildlife resources. Instead, for all groups to understand the key issues, it is necessary to engage with the existing thinking (or 'mindsets') of land managers, policy makers, researchers and the public. Scientists can better explain and adapt outputs in formats accessible to local decision-makers, explore how to integrate local knowledge in their scientific research, and learn to present the relevance of their research in terms of local management practices. Meanwhile, deer/land-managers can engage more with current methodologies for gathering data and communicate their roles and outlook to a wider range of actors, including younger generations, the wider public and the media. National decision-makers also have a role to play, by understanding and responding to the roles and constraints of local-decision-makers and of scientists involved at the local scale.

> *"as a gamekeeper or a stalker, people that don't know what we do think we're out there with a tweed suit on, killing things 24/7"* - ***Mr P, gamekeeper***

Looking for more information on science-policy interfaces?

For more SPIRAL results, see companion SPIRAL briefs at http://www.spiral-project.eu/content/documents

This brief is a result of research and interactions within and around the SPIRAL project. This brief was written by Kerry Waylen (JHI) and Juliette Young (CEH).

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SPIRAL
Interfacing Biodiversity and Policy

Reflections on recent experience with the Water Framework Directive

The brief in brief

This brief identifies insights about communication between science and policy stemming from processes of implementing the Water Framework Directive (WFD) through River Basin Planning. This brief builds on general experiences with the WFD, as well as specific experiences of WFD implementation in Scotland.

Why look at the WFD?

The Water Framework Directive (2000/60/EC)[1] is the most substantial piece of water legislation ever adopted by the European Union. This major driver for sustainable water management is also very relevant to protecting biodiversity and ecosystem services: beyond focusing on improving aquatic ecology, WFD implementation must also maintain or restore the status of Natura 2000 conservation sites (designated under the European Habitats and Birds Directives). The WFD is unusual in that it sets out ambitious timescales for achieving good ecological status of water bodies and also specifies how this should be achieved through the establishment of river basin management plans (RBMPs) created through mandatory public participation. The first RBMPs were published in 2009, and the next are due for publication in 2015. Since the WFD is ambitious and reflects much current thinking about how to achieve economically efficient, equitable and sustainable resource management, its experiences offer valuable insights for other processes.

How did we look at the WFD?

Our reflections from Scotland synthesise observations of planning meetings in Scotland together with six interviews with individuals connected with WFD planning, whilst our general observations are based on academic literature and observations of publically-available websites and other information.

Supporting science-policy communication for the WFD

Since the WFD came into force in December 2000, the need to promote links between science and policy has been recognised[2]. It was immediately perceived that input from scientists (with a focus on natural sciences) was needed in order to allow planning (for example, to identify and measure indicators of ecological status, to identify the causes of problems, to identify effective solutions). EU funding of research and support (e.g. through the Framework Programmes for Research) also reflected perceived gaps in the communication between science and policy for WFD implementation. However, a decade on, considerable science gaps still remain, including the need for a better understanding of the socio-economic components of WFD implementation[3].

Concurrent with these efforts, came the challenge of ensuring that the knowledge resulting from research would be available and accessible to those charged with implementing the WFD. A particular response has been a specific mechanism for streamlining information collection and exchange called 'WISE' (Water Information System for Europe)[4], described as 'a gateway to information on European water issues'. WISE has been continually developed with the aim of improving the 'flow' of information from the scientific community to policy decision-makers. A myriad of projects are available and linked to its portal at www.wise-rtd.info, together with experiences of implementation and policy documents. WISE is intended to allow different users to search according to their needs, but the results can be confusing. It may always be challenging for users to identify and make sense of the sheer quantity, variety and complexity of relevant information, but this is especially true if those users were not previously involved in processes to share learning and build conceptual understanding. Dealing with complexity is similarly a challenge for efforts to promote SPIs on biodiversity and ecosystem service topics. Therefore, learning positive and negative lessons from initiatives such as WISE may be useful for any comparable efforts to make biodiversity data accessible via web-portals, such as BISE, the Biodiversity Information System for Europe[5], which is

[1] http://ec.europa.eu/environment/water

[2] E.g. Quevauviller P. et al. (2005). Science-policy integration needs in support of the implementation of the EU Water Framework Directive, Environmental Science & Policy, 8(3), 203-211.

[3] Hering D. et al. (2010). The European Water Framework Directive at the age of 10: A critical review of the achievements with recommendations for the future. *Science of the Total Environment*, 408, 4007-4019.

[4] http://water.europa.eu/ and Vaes G. et al. (2009). Science-policy interfacing in support of the Water Framework Directive implementation, Water Science & Technology, 60(1), 47-54.

[5] BISE: http://biodiversity.europa.eu/

discussed in a companion SPIRAL brief[6]. We suggest that investment in on-going shared learning and knowledge co-production by science and policy is needed, in addition to efforts to package and present research outputs.

The benefit of focusing resources on planning and process

Unlike some other processes, the WFD is unusual in the amount of time and direction it gave to planning for implementation of the mandatory River Basin Management plans (RBMPs). The specifications about how to plan and the mandatory targets helped to highlight where information would be needed: for example, information about drivers of ecological status, or the cost-effectiveness of measures. This process therefore explicitly highlighted many information gaps that the science base in 2000 was not able to provide answers to. The timescale also allowed research to be commissioned to fill some of these gaps necessary for implementation. As such, the relatively long time scale allowed for planning can be seen as a facilitating factor for promoting good links between science and policy. However, despite the investment in planning and resources on River Basin Management plans, there are still research gaps[7]. This illustrates that it can take a long time for science to respond when such a radical change to environmental management occurs.

Policy can 'drive' science

Some conceptions of science-policy interactions suggest that science should 'push' information to policy-makers in order to provide new ideas as well as provide answers to questions. However, in this case, it is clear that the ambitions of policy 'pulled' the scientific research to answer new policy relevant questions. Historically, efforts to regulate the water environment, and hence much research, had been focused on chemical standards and/or pollution[8] but the WFD prompted a shift in focus towards more holistic understanding of aquatic ecology and the interaction between abiotic stressors and biotic responses. The complexity of ecological systems and the need for new tools and knowledge was perhaps not appreciated by those who drafted the WFD, probably linked to the fact that those tasked with its implementation are not the same groups who were lobbying to influence the WFD ten years ago[9]. This 'push-pull' may provide both short-term evidence for immediate decision making and strategic research to inform policy of future challenges[10].

Science and policy are not two simple categories

The WFD RBMP processes demonstrate why 'science' and 'policy' should not be assumed as discrete or distinct categories. Firstly, although those working in agencies responsible for water management are not typically categorised as policy-makers, they do contribute to decision-making. In each European member state the discussions about how to implement and monitor implementation is generally devolved to responsible authorities, who are usually existing regulatory agencies. In addition, the task of coordinating standards across the EU required discussion and negotiation between similar actors from all member states. Secondly, whilst many agency members may label themselves as scientists, their work goals and practices differ from academic scientists, in that they are typically more concerned with applying existing methods and tools to comply with regulation and monitor performance by standards. These 'regulatory scientists' may or may not have close links with academic scientists advancing new ideas and knowledge (indeed, different disciplines from hydrology to economics may vary in the extent to which their knowledge is linked to regulation and policy). So it is not sufficient to accept 'scientist' or 'policy-maker' as a category explaining an individual's role. If we wish to understand – and improve – science-policy interfaces, we should instead expect to identify and work with multiple actors who may have multiple identities, interests and values. For example, a current approach to promoting science-policy interfaces in the UK water sector recognised the need for a network of actors who have both science and policy understanding, by developing a community of problem-solvers sharing a common world view[11]. Many other initiatives exist across Europe: in future it may be valuable to share experiences and insights about promoting SPIs between the water and biodiversity sectors.

Looking for more information on science-policy interfaces?

For more SPIRAL results, including references related to SPIs, see companion SPIRAL briefs at http://www.spiral-project.eu/content/documents. This brief is a result of research and interactions within and around the SPIRAL project. This brief was written by Kerry Waylen and Kirsty Blackstock (The James Hutton Institute), Juliette Young and Allan Watt (Centre for Ecology and Hydrology), and Sybille van den Hove (Median).

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[6] The SPIRAL brief "Tools for Science-Policy Interfaces: Recommendations on BISE and Eye on Earth" is available from http://www.spiral-project.eu/content/documents

[7] Quevauviller P et al. (2012). Integration of research advances in modelling and monitoring in support of WFD river basin management planning in the context of climate change. Science of The Total Environment 440: 167-177

[8] Newson, M. D. (1992). Land, water, and development: river basin systems and their sustainable management, Routledge.

[9] Kaika M. and Page B. (2003). The EU Water Framework Directive: part 1. European policy-making and the changing topography of lobbying, European Environment, 13(6), 314-327

[10] McGonigle D.F. et al. (2012). Towards a more strategic approach to research to support catchment-based policy approaches to mitigate agricultural water pollution: A UK case-study. Environmental Science & Policy, http://dx.doi.org/10.1016/j.envsci.2012.07.016

[11] Jasanoff S. (1994). The fifth branch: Science advisers as policymakers, Harvard University Press.

SPIRAL Briefs
SCIENCE POLICY INTERFACES: RESEARCH, ACTION & LEARNING

Reflections on Science-Policy Interfaces in the development of National Biodiversity Strategies

The Brief in brief

This brief outlines lessons learned from the Science-Policy Interfaces (SPIs) in the development of National Biodiversity Strategies (NBSs) in Germany, Switzerland, Romania, Belgium, Finland and Scotland.

What are National Biodiversity Strategies, and why study their Science-Policy Interfaces?

Signatory states of the Convention on Biological Diversity (CBD) are required to develop National Biodiversity Strategies (NBSs) to implement the CBD at the national level. Developing policy to conserve and sustainably use biodiversity requires a considerable amount of scientific knowledge, and knowledge about the national policy-making system and the implementation context. Therefore, the development of NBSs can profit from a well-designed SPI that can join up these different types of expertise.

Science can be pro-active in driving NBS processes

Bringing biodiversity onto the policy agenda is a key starting point in science-policy interactions. Although the decision to develop or revise an NBS is most often driven by political actors or by interest groups, science and its interactions with these actors can play a significant role in starting the NBS process. In Switzerland, for example, the Swiss Biodiversity Forum, representing the Swiss biodiversity science community, wrote a range of publications summarizing the status of biodiversity in Switzerland and recommending that a Swiss NBS be developed. The forum communicated these publications during meetings with parliamentarians, and their message was also taken up by NGOs. In other countries such a pro-active approach from the science community was less obvious or non-existent.

Be clear about the NBS process

Whether driven by science or policy, it is essential once the NBS development process is up and running to clarify the role and the processes leading to the NBS. Although such processes may be obvious to those involved or familiar with policy-making, they are opaque to most scientists. Unclear arrangements can lead to working practices that do not adequately match the purpose of the NBS. It is therefore very important to be clear about what the NBS is and is not, and also to be transparent about the process leading to NBSs.

Although using existing structures and policies can be cost-effective and adequate, it is worth considering whether new structures or activities are needed for the purpose of the NBS development and implementation. There is a risk, for example, that existing structures like advisory bodies on nature conservation, if poorly adapted to the tasks at hand, end up being allocated isolated tasks leading to confusing and inefficient work, with groups following their own line of interest. Pulling all these disparate groups back together in the formulation of NBSs will be difficult. In the same way, broadening the implementation to cover not only existing/ongoing policy activities but also new ones or policy activities in other sectors may maximise the potential of NBSs.

Encourage participation

Our case studies highlighted that a favoured strategy in the development of NBSs was to start the process by restrictively including parties holding similar values and knowledge about the environment in order to specify and refine issues. Following on from this more restrictive approach, participation was then broadened to include groups beyond the environmental community. While this helped in the case of Germany to enhance productive problem-oriented work and strengthen support of a policy process by the biodiversity community, it also increased opposition among those excluded or only included in later phases (such as NGOs, non-environmental sectors etc).

During the design and formulation of (draft) strategy documents, establishing a participatory process may be key. It is important, however, that participatory processes are not used merely to legitimise policy, but are genuine efforts to integrate a variety of constructive views and knowledges in the process. This will require willingness from governments to support such processes, as well as willingness from other potential stakeholders to contribute. While this is not new, it is not trivial to achieve in practice since willingness of governments and participants to engage in a serious participation process depend on a range of factors.

An important aspect of successful participation is the need for feedback. Our case studies showed that processes were evaluated more positively when stakeholders felt their input had been taken into consideration. This is not to say that all input should be included in draft documents, but rather that feedback should be provided to stakeholders, explaining whether input was used in the NBS or not, and why.

A key consideration with participatory processes is cost. Good participation processes require dedicated resources, including moderation/mediation capacities.

Increase mutual understanding of science and policy

To work together productively, particularly under time-bound limiting circumstances like the design of a NBS, requires mutual understanding of constraints that scientists and policy-makers have to deal with.

This requires on the one hand that scientists have a better understanding of the policy-making processes at play in the development of the NBS, and on the other hand that scientific knowledge be presented in a form that fits the specific context set by the ministries and agencies leading the process in order to increase the likelihood of uptake. Another important issue is the need to understand where biodiversity goals may be conflicting with goals in other sectors. Indeed, an NBS process will inevitably highlight different agendas, which need to be considered by policy. Scientific justification is only one facet of a complex social issue, and may lead to scientists becoming "advocates" of one side of the political debate. Formulating policies using transparent discursive processes that can lead to compromises (or ideally to consensus) will therefore be more likely to make policies more palatable to wider interests. This is important in the case of NBSs, where implementation through national biodiversity planning will require input from a range of organisations and individuals.

Mutual understanding of science and policy can be helped through the involvement of people and institutions acting as bridges ("knowledge brokers" or linkers). Informal face-to-face interactions between scientists, administrators and NGOs can also be immensely helpful.

Handling different representations of nature and the environment

Many different representations or framings of nature and/or the environment can make collaboration around the development of environment policies difficult.

In our case studies we observed two strategies to deal with different representations. The first strategy was to establish or strengthen a community around the representation of 'Nature' as 'Biodiversity'. In Germany for example, the process leading to the NBS was restricted to a group with shared representations and values of nature and environmental problems, with the objective of solving constructively a common issue (biodiversity loss) and not engaging in conflicts about the nature of the issue. This strengthened and contributed to build a "biodiversity community". A similar process was observed in Switzerland where scientists engaged in a long process of building a biodiversity community including scientists, NGOs, politicians and policy-makers. This created a strong community feeling within the group. The second strategy (for example in Scotland) was to combine different and often conflicting representations of nature. These included biodiversity versus nature, holistic versus more focused concepts (e.g. ecosystem management versus species and habitats), concepts with a utilitarian emphasis (ecosystem services) versus concepts including a broader value perspective (intrinsic value). To bring together people with different representations of nature, they needed to be discussed and negotiated together in a careful way, for example, by not excluding species or habitat approaches or ecosystem services approaches but rather by linking them. Whilst none of these two strategies can be deemed "better", the issue of different representations of nature does need to be considered, and appropriate strategies identified to address this issue.

Looking for more information on science-policy interfaces?

For more SPIRAL results, including separate briefs focussing on lessons learned from other SPI processes, see companion SPIRAL briefs at http://www.spiral-project.eu/content/documents

This brief is a result of research and interactions within and around the SPIRAL project. This brief was written by Johannes Timaeus, Carsten Neßhöver & Heidi Wittmer (UFZ); Juliette Young & Allan Watt (Centre for Ecology and Hydrology); and Sybille van den Hove (Median).

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SCIENCE POLICY INTERFACES: RESEARCH, ACTION & LEARNING

Tools for Science-Policy Interfaces: Recommendations on BISE and Eye on Earth

The Brief in brief

This brief explores the role of the Biodiversity Information System for Europe (BISE) and Eye on Earth and their potential as tools for reinforcing the science-policy interfaces of research projects.

Information availability and exchange

Environmental policy-makers and other societal actors need up-to-date and high quality information. In recent years, several key developments have taken place to increase the information basis, availability and exchange. These include dedicated information systems such as The Water Information System for Europe (WISE) and the Biodiversity Information System for Europe (BISE, http://biodiversity.europa.eu/), and innovative data presentation tools such as Eye on Earth (EoE, http://www.eyeonearth.org).

Focusing on the latter two, it appears that the links to data, information and knowledge from EU research projects through BISE are still underdeveloped and need to be improved. Similarly, EoE has a broad potential as a science-policy interface tool. Practitioners and researchers at a SPIRAL workshop explored ways and options to make best use of these tools to reinforce the science-policy interfaces of research projects, and came up with the following recommendations for BISE and Eye on Earth[1].

Recommendations for BISE

The Biodiversity Information System for Europe (BISE) is a single entry point for data and information on biodiversity in Europe. It is a partnership between the European Commission (DG Environment, Joint Research Centre and Eurostat) and the European Environment Agency (EEA). Bringing together facts and figures on biodiversity and ecosystem services, it links to related policies, environmental data centres, assessments and research findings from various sources. It is being developed to strengthen the knowledge base and support decision-making on biodiversity. One of the five entry points of the BISE portal is research. That part of BISE is still in its infancy and input from both researchers and users of research results on how to develop it could ensure that it is adapted to needs and that it is relevant, credible, legitimate, and ultimately helpful for biodiversity-related policy and management.

The following recommendations may help to further develop BISE:

- ***BISE as a standard entry point***. With its general approach, BISE has the best potential to become the starting place for all biodiversity-related information in Europe. In particular, it can become the central and long-term access point for policy-relevant research outputs. It is also a potentially powerful way to increase the visibility of research projects.
- ***Networking beyond BISE***. Although BISE should be an entry point for research information and knowledge, further networking in research will be needed outside BISE to strengthen science-policy activities.
- ***Sharing data from projects***. Beyond the formal data flows managed by the EEA and available via BISE, BISE could also allow for long-term availability of data and knowledge from research projects as an additional resource. The following initial activities should be considered to further explore their potential of their products:
  - Explore the use of indicator-related projects and the data produced by them to support the work on indicators for the EU Biodiversity Strategy.
  - Develop or use existing data storage standards to develop a standard system for storing data from research projects in a platform where they could be linked to BISE. Accordingly, key elements for such a joint platform and the related BISE standards need to be identified.
  - Conduct a feasibility study with biodiversity as potential case study for other areas of data needs in the work of the EEA.
  - Consider making project "speed-presentations" (e.g., videos, overview slides) on projects available through BISE.
  - Explore further the links to data-related projects and infrastructures, e.g. LifeWatch.

[1] The following recommendations were developed at a workshop on "Better interfacing EU research projects and EU policy-making", organised by SPIRAL jointly with the European Commission Directorate General for Research and Innovation (DG RTD), with the participation of the European Environmental Agency (EEA). More detailed recommendations can be found in the workshop report available at: http://www.spiral-project.eu/contents/documents

- Further develop the recently established database of research projects in BISE. This effort would benefit from additional elements such as:
  - mandatory minimum input from all EU-funded biodiversity projects, with clear guidelines;
  - direct links to project websites (and their products pages);
  - direct upload/download possibility for policy briefs and other products (using a DOI approach);
  - policy-focused project description in a standard format, accessible to a broad audience, and stressing policy and societal relevance of research;
  - standard list of keywords, including "policy-related" ones;
  - a list of project contact point to which policy-makers can address their requests.
- ***Managing the project section of BISE***. This section of the BISE website could be opened by a guided content management system for projects to post their material. New content would need to be checked by a "research hub" facility in order to ensure quality and coherence. Network projects could help here.
- ***Long-term archiving of project knowledge***. Explore whether BISE could become a long-term archive of the results, products and website contents after completion of projects. The EEA is currently developing Data Stewardship Agreements with a series of projects.
- ***Explore the option of a BISE-RTD project*** to help implement the above mentioned actions, similar to the WISE-RTD project in the water area.
- ***Include data from other sectors***. As biodiversity and ecosystem issues require broader environment data, BISE could host/mirror some data from other sectors (e.g. agriculture) that would be of use to biodiversity researchers. For certain official data, this would require dialogue with other DGs.
- ***Promote BISE in the research community***. The research community should be made more aware of BISE. This could be done through promotional material and newsletters and presentations at specific biodiversity-research workshops and conferences.
- ***BISE as provider of research-relevant information on policy.*** A function in BISE that could be developed is the provision of an entry point for researchers to better understand the policy context of their research.
- ***Create an Assessment Panel for BISE***. At a later stage, an assessment panel of users could help improve its relevance, quality and user-friendliness.

Recommendations for Eye on Earth

Eye on Earth (EoE), facilitated by the European Environment Agency (EEA), is a 'social data website' for creating and sharing environmental information. Data and information can come in a variety of formats such as maps, graphs and tabular spreadsheets, alongside various tools. Maps can be viewed, created, interacted with, manipulated and shared. Users can choose to share information with closed groups or everyone. Examples of potential users include policy makers, environmental organizations, emergency responders, GIS professionals, communities and citizens. Eye on Earth has a high potential for use by research projects. It can serve (i) in the dissemination of results; (ii) as a science-policy interface tool; (ii) for joint work in projects and with stakeholders, and (iv) in involving the wider society. These potential functions need to be further explored and demonstrated through practical examples (success stories). The following recommendations may help to further develop EoE:

- ***Highlight the added value of EoE for research compared to other tools***. For this, better promotional material on EoE aiming at environmental researchers should be developed, which highlights advantages of EoE (e.g., data property right remains with researchers, restricted communities possible).
- ***Develop showcase examples.*** Examples on the use of EoE by projects would help to develop EoE further and adapt it to user needs. The HERMIONE collection of EoE Map Books on anthropogenic impacts in the deep sea is a good example[2].
- ***Use EoE for European Ecosystem Assessment***. EoE is potentially a very useful tool and platform on which to develop the European Mapping and Assessment of Ecosystems and their Services (MAES).
- ***Increase training***. Training options including: (i) better tutorial and help functions; (ii) specific sessions at EoE user conferences; (iii) specific workshops which could serve the triple purpose of promoting EoE as a tool for research projects, training research users on how to use EoE, and allow for these users to suggest formats and functions that would be useful to them; (iv) a summer school on EoE.
- ***Implement a dataset citation system***. In order to make EoE attractive for researchers and to encourage researchers to add and share data and use EoE to its full potential, it is essential to implement a dataset citation system (e.g., DOIs) and clarify property rights issues.
- ***Promote early uptake of EoE by projects***.
- ***Ensure connections between LifeWatch and EoE*** to explore joint work and services and avoid duplication of work (e.g., developing separate spatial data interfaces).

Looking for more information on science-policy interfaces?

For more SPIRAL results, including separate briefs focussing on recommendations to funders, policy-makers, and research projects, see companion SPIRAL briefs at http://www.spiral-project.eu/content/documents

This brief is a result of research and interactions within and around the SPIRAL project. This brief was written by Johannes Timaeus, Carsten Neßhöver & Heidi Wittmer (UFZ); Juliette Young & Allan Watt (Centre for Ecology and Hydrology); and Sybille van den Hove (Median).

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[2] Available at: http://eyeonearth.org/templates/Group_Gallery/index.html?group=f770875114ac4792b049d293cf46f16c

SPIRAL Briefs
SCIENCE POLICY INTERFACES: RESEARCH, ACTION & LEARNING

Towards strengthening environment science-policy interfaces at EU level: the SEPI exploration

The Brief in brief

This brief describes a process whereby the European Commission Directorate General for Environment (DG ENV) sought to better understand the issues underlying interactions between scientists and environment policy-makers. A complementary SPIRAL test case considers the process of strengthening the science-policy interface in relation to EU biodiversity policy.[1]

Setting the scene

SEPI (Science for EU Environment Policy Interface) was launched in 2010, reflecting the wish of the Environment Commissioner to improve the acquisition of science to be used as evidence for policy. Currently, DG ENV acquires scientific evidence to support policy from a variety of sources. However, there is no systematic approach towards gathering evidence for cross-cutting and emerging issues. Under the SEPI process, DG ENV explored options for a stronger framework at the intersection between science and EU environment policy.

The SEPI process featured a series of events:

- An inaugural workshop on "*Strengthening the knowledge base for environmental policy making and implementation*" (Brussels, December 2010), to gather experts' views about good practices and practical innovations, building towards strengthening the interface between scientists and policy-makers.
- A study contract with two consultancies, to review existing practices within and outside DG ENV.[2]
- A workshop on "Assessing and Strengthening the Interface between Science and EU Environment Policy" (Brussels, September 2011), bringing together practitioners from both science and policy to identify practical and innovative additional approaches.
- Two sessions on "Science in support of evidence-based environmental policy making", focusing on inland, marine and coastal water issues, organised jointly by DG ENV and DG RTD during the 2012 EU Green Week event.

Despite SEPI being a demand-led, exploratory process, formal changes in working practices – in terms of designing and implementing new interface processes for DG ENV – have not so far been specified.

Approach taken in SPIRAL to study the test case

SPIRAL team members contributed to the SEPI process as informal advisors and participated in the various events. This case was about exploring issues and options rather than actually setting up a SPI. As a consequence, of the six dimensions used by SPIRAL to analyse SPIs (Objectives & Functions; Context; Structure; Processes; Outputs; and Effects) the first two were the most discussed, with some attention to potential structures and processes. At the meta-level, the SEPI process can also be seen as an example of a SPI where experts/scientists connected with policy makers to inform and influence the processes by which DG ENV gathers and uses evidence.

The SPIRAL approach has been to reflect on the justifications for strengthening SPIs, and on the constraints, notably those stemming from (or inherent in) the institutional context. We also looked at the objectives and functional changes under discussion.

Justification for the SEPI approach

For DG ENV, the justification for the SEPI approach lies in the recognition that[3]:

[1] See companion brief 'A Biodiversity Science-Policy Interface Mechanism for Europe?'

[2] EC 2012. Assessing and Strengthening the Science and EU Environment Policy Interface. DG ENV Technical Report 2012-059.

- Environmental issues are often: driven by science; holistic; characterised by complexities and uncertainties; and potentially long-term with irreversible consequences;
- Environment policy is largely driven by, and dependent on, science (for issue identification and assessment, notably at the EU level; development of solutions and monitoring strategies; generating public and political acceptance; and legitimising policy direction);
- Environmental policies pose particular challenges as they often deal with highly complex and interlinked issues;
- An evolution of the knowledge management model in DG ENV could be beneficial, i.e. a "more strategic, forward looking and integrated approach";
- Science-policy interactions are sometimes hindered by: (i) uneven approaches to risk and uncertainty; (ii) lack of incentives for policy research compared to basic and industrial research; (iii) difficulty presenting the case for funding policy research; (iv) inertia / lack of foresight in research planning; (v) policy demand for quick "certainties"/definitive truths, generated by political demand for the same; and (vi) lack of effective dissemination, exploitation and interpretation of policy-relevant research results; (vii) the myriad of sources of research/science, making it quasi-impossible for policy-makers to know whether they are accessing the 'best' or latest information; (viii) the weight of history: science and (government) policy sectors have tended to be wary of each other.

Objectives and functions

A series of needs was identified from the policy-making viewpoint: supporting (mandatory) policy impact assessments; providing evidence for the acceptance and legitimacy of policies; providing grounds to counter policy 'disruption' by vested interests and/or lobbyists; need for lawyer-proof scientific evidence in support of legal cases; and an awareness of policy-makers' operating domain and the political environment.

The following specific objectives and potential functions[4] were explored during the SEPI process, building on those needs:

- Better matching knowledge provision with (timing of) policy cycles;
- 'Translation' of research output into 'policy-speak';
- A new, durable framework for on-going, policy-led dialogue between scientists, policy-makers and other stakeholders;
- Provision of access to information "on the ground", including information coming from Member States, and access to a broad variety of relevant knowledge holders (including citizens' science);
- Systematic methods for identification of uncertainties and gaps in knowledge;
- Provision of high quality science in cases of litigation over complex issues;
- Timely access to credible knowledge in controversial areas and science to support the precautionary principle;
- Allowing DG ENV to keep track of new technologies for policy implementation, reporting and monitoring;
- Alerting policy makers about emerging issues, including early warnings on potential environmental, social and economic impacts;
- Structured foresight activities embedded in the strategic environment policy planning process;
- Contribution to the establishment of a long term vision based on best available scientific evidence and consensus.

Key lessons learned from the Test Case

One striking aspect in this case is the challenge posed by the EU institutional context and by the broad remit of a potential SPI for EU environment policy, including in particular:

- The need for integration of environment policy across other policy areas, both inside DG ENV and across different EU policy areas, in a context where the 'silo mentality' remains inherent in the EC structure;
- The need for integration and comparability at various scales, from local to member state to regional to EU level;
- The fact that environment policies build on an evolving mosaic of SPIs and the need to build on those that work and fill gaps in a flexible manner with the active consent of those involved.

Together, these three challenges present significant difficulties, but their definition already helps in identify action to address them.

Other notable hindering factors include:

- The persistent dominance of the linear model (one-way transfer of knowledge from science to policy) which hinders the development of more dynamic and dialogic SPIs. This may lead to a lack of credibility for the very process that ought to improve the evidence base for environment policy: key players need to understand and feel comfortable with the concept of developing an

[3] See in particular EC 2012, op. cit.
[4] 2010 workshop summary, op.cit.

interactive interfacing model for science-policy interactions. One possible solution here is to set up a pilot iterative process, trying out more dynamic SPIs in one or two areas of policy, demonstrating the substantive value added and cost-efficiency available from better practices.

- The lack of a clear high-level mandate to effectively set-up the sort of SPIs considered during the SEPI process. This seems counter-productive and leads to a lack of legitimacy which hinders policy progress.

The SEPI process provided worthwhile reflections and understanding of the stakes, and many positive suggestions for progress. But it did not (as yet) lead to much practical action. The explanations may lie partly in the fact that the vision for EU environment policy that existed in 2010 and the appetite for radical paradigm changes in the conception and management of science-policy interactions both seemed rather weak. This situation should change in the future with the 7th Environment Action Programme.[5] The broader current context of budgetary cuts and constraints on the European Commission (5% staff cuts looming) triggered by the economic crisis will also have had an effect, in particular for DG ENV, facing ever stronger scepticism and struggling to keep environment issues on the political agenda. In such a climate, many may consider that 'details' such as renewed SPIs cannot be a priority.

[5] COM(2012) 710 final, available at: http://ec.europa.eu/environment/newprg/pdf/7EAP_Proposal/en.pdf

Looking for more information on science-policy interfaces?

For more SPIRAL results, including separate briefs focussing on results from other test cases, see companion SPIRAL briefs at http://www.spiral-project.eu/content/documents

This brief is a result of research and interactions within and around the SPIRAL project. This brief was written by Sybille van den Hove, Rob Tinch and Estelle Balian (Median), and Allan Watt (CEH),

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SPIRAL Briefs
SCIENCE POLICY INTERFACES: RESEARCH, ACTION & LEARNING

Afribes: Towards a social network of scientific and technical information for Africa

The Brief in brief

The Afribes network is a social network of scientific and technical information on biodiversity and ecosystem services for Africa (www.afribes.net). This brief presents Afribes, its current functions and its possible evolution as a Science-Policy Interface (SPI).

Setting the scene

Afribes emerged from the consultative process on an International Mechanism of Scientific Expertise on Biodiversity (IMoSEB) and its regional consultations. The 2007 African consultation held in Yaoundé highlighted that information transfer and ownership and the capacity to find the "right information at the right place" were pressing needs of African biodiversity stakeholders. The development of a social pilot network for Africa was considered, to 1) develop a spirit of information sharing, potentially using a wiki type system; 2) create synergies between holders of traditional knowledge and scientists; and 3) promote South–South and North-South cooperation. Afribes was therefore developed as a possible SPI on African biodiversity, to help in the development of a potential future African IPBES[1] and to build collective and shared intelligence with African biodiversity stakeholders.

Its main goal is to foster better sharing of and access to relevant information on biodiversity as well as better access to African expertise and experts.

To overcome institutional and political constraints and to be a reactive network, Afribes would:

i) Focus on personal competencies and experiences and expertise of its members;

ii) Involve all stakeholders (scientists, policy-makers managers, private sector, local communities, NGOs…);

iii) Have low operating costs: by using open source technologies and cooperative tools to build Afribes and copyright licenses free of charge to the public (Creative commons).

[1] IPBES is the Intergovernmental Science-Policy Platform for Biodiversity and Ecosystem Services. See companion SPIRAL Brief SPIRALing IPBES.

Approach taken in SPIRAL to study the test case

Building a prototype network

To build the Afribes as a real social network, a bottom-up and a 'form-follows-functions' approach were promoted. Hence Afribes started by:

- focussing on the major needs identified by its members: Questionnaires were sent to biodiversity stakeholders. Some specific needs were underlined and a first set of key functions of the network were developed step by step.
- promoting the concept of the network and getting feedback from potential members.

Based on the answers and feedback, a "beta prototype" of Afriseb was established using intuitive tools (wiki system, pad, maps…) easy to use and free of charge.

This first prototype was presented to several audiences (CTA[2] workshop, DIVERSITAS Open Science conference, IAALD[3], TDWG[4] conferences) in 2009-2011. The concept of a social network was generally well accepted by potential members (African and others).

Promoting and highlighting the network

Since 2011, the network has been open to everybody and several functions are available to its members. Two workshops were organized within SPIRAL. The first one in Tunis, Tunisia in April 2012 gathered around 25 participants from different countries. This workshop allowed the identification of improvements in the network and means to implement them. It also gave the opportunity of training sessions on some of the cooperative tools. Participant accepted to be Afribes ambassadors and promote the network.

The second workshop was held in Dakar, Senegal. Mixing improvements of the network and training sessions, the main points raised related to Afribes governance and the position of Afribes within the current landscape of biodiversity institutions. A task force of Afriseb members was set up in Dakar to develop options on these topics.

Afribes was also presented by its members at several conferences and discussions in Africa (Algeria, Cameroon, Gabon, Senegal, South Africa) and also in Water and Forestry Engineering schools (Gabon).

What Afribes can offer

- A voluntary skill directory with maps where each member can add its competencies and experiences;

2 Technical Centre for Agricultural and Rural Cooperation

3 International Association of Agricultural Information Specialists

4 TDWG - Biodiversity Information Standards

- A Web portal to share information: publications, proceedings, calls for proposals, events, jobs;
- Search engines to find information on the Afribes website (experts from countries, competencies, groups of discussion…) and also on databases, websites, open archives connected to Afribes (based on SIST Cirad technologies);
- Projects/discussion rooms where cooperative tools are at the disposal of members and projects to i) develop common actions and ii) create communities of work (thematic, geographic…).

Key lessons learned from the Test Case

Afribes is filling a gap

Even though Afribes is not yet a fully-operational SPI and is sometimes perceived as a "UFO" in the biodiversity arena, it has, with a limited budget, brought added value for biodiversity stakeholders and knowledge holders who decided to be part of the network, by increasing relations and communication and promoting their expertise. This demonstrates that the initial idea in 2007 was good and deserves to be further developed.

Developing a bottom-up approach is not easy

The development of the bottom-up approach in Afribes requires a strong members base and active coordination to maintain the dynamic network. It was hard to involve foreign and African scientists mainly due to a lack of time, even when they were interested by some functions (e.g. skill directory). An operational coordination team has to be set up to work regularly for the network (follow group activities, fostering initiatives of members). This coordination cannot be done only by a volunteer team and should be professionalised.

Developing a 'form-follows-functions' approach is not easy

Afribes was developed as a network with a very light governance (a small coordination team). Being more and more active, the governance issue appears frequently in the discussions. This was especially the case during the Dakar workshop. It appears that some actors are not comfortable when formal institutional bodies (Board, scientific council) are not established. More training on the functioning of social/participatory network should have been done (and will be done). At the same time Afribes should be clearer in its vision, mission and status and its governance should evolve accordingly.

Cooperative tools, Web 2.0 and Creative Commons, are powerful tools

Most actors involved or interested in the development of Afribes agree on one point: the tools presented and used in Afriseb (wiki, etherpad, freeplane…) are tools that fill a gap and help them to work in a cooperative way. Several training sessions on these tools have been requested and some have been carried out.

With the current blooming of the use of Internet in Africa, these tools will be increasingly used. Training to facilitate their use is an important task for Afriseb (e-learning, specific courses…).

The use of free copyright licence in Afribes also encourages the cooperation and work between members.

There is a need to better promote the network with African partners

The success of Afribes depends upon a deeper involvement in Africa. The two Afribes workshops were clearly a success in term of promoting of the platform, discussing its future and training.

The presentations and talks given in Africa at conferences or in universities have allowed some actors to discover what Afribes can do for them and to get feedback on the network.

Efforts should be done to allow Afribes members (or the coordination team) to present the network in their schools, and institutions in Africa but also in Northern countries.

Afribes should develop more small actions with rapid added value

Small actions in Afribes at local level --e.g. creation of projects groups, digitalization of existing reports/thesis-- are beneficial to demonstrate value. It allows Afribes members to be more active and to "take ownership" of the network and later develop their own actions. Afribes could therefore be used as a catalyst of initiatives (e.g. the Medivercities network which was an Afribes group before it became an official initiative).

Increasing relations with African and international biodiversity institutions

Afribes should strive to get more recognition from existing institutions and countries as a potential partner with high added value. Collaboration within GBIF[5] Africa has started. Afribes should also link with others partners from the North (development agencies) and from Africa (national/regional). Afribes contributed in July 2013 to the IPBES African regional consultation meeting and links with IPBES will be further explored.

Looking for more information on science-policy interfaces?

For more SPIRAL results, including separate briefs focussing on results from other test cases, see companion SPIRAL briefs at http://www.spiral-project.eu/content/documents

This brief is a result of research and interactions within and around the SPIRAL project. Maxime Thibon, BiodivNet, wrote this brief.

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[5] Global Biodiversity Information Facility

SPIRAL Briefs
SCIENCE POLICY INTERFACES: RESEARCH, ACTION & LEARNING

The Economics of Ecosystems and Biodiversity – TEEB

The Brief in brief

This Spiral brief reflects on how the TEEB initiative has functioned as a Science-Policy-Interface and how its role has evolved over the different phases of its existence. Independence combined with intense collaboration between different sectors and very active communication and outreach work were key success factors.

Setting the scene

In 2007 the G8+5 Environment Ministers called for a study on the economic significance of biodiversity loss. In its first phase until the 9th conference of the parties (COP) of the Convention on Biological Diversity (CBD) an interim report was written by the study leader, a team of scientists, and administrators from EEA and DG Environment of the European Commission to size the problem and make clear how an economic approach could contribute to better understanding and addressing biodiversity loss. At COP 9 there was a call for more elaborate information and presenting it for different levels of decision making until COP 10 in October 2010. Several other countries including the UK, Norway and the Netherlands joined Germany and the EC in funding the TEEB initiative during this second phase. Japan and South Africa funded several TEEB activities as well thus broadening the funding base beyond European countries. During Phase 2 there was intense collaboration via a coordination group including TEEB management and its funders via weekly conference calls.

The strategic plan adopted at COP 10 includes several TEEB-related topics particularly in Aichi targets 2, and 3[1]. After COP 10 and half a year of intense outreach including a series of workshop across the globe, TEEB entered its current Phase 3 of facilitation and supporting country level implementation.

[1] http://www.cbd.int/sp/

Since then several TEEB country studies have been started, some with the support and sometimes funding of UNEP TEEB office and/or the TEEB funders, others independently. The European Union has included TEEB related tasks in its Biodiversity Strategy.

Approach taken in SPIRAL to study the test case

The authors were directly involved in the TEEB initiative during its second phase and are still affiliated in the current third phase. They have thus participated in many relevant meetings and the ongoing telephone conferences. The process was reflected via the Spiral project and results were fed into the ongoing discussions.

Key lessons learned from the Test Case

Regarding TEEB Phase 1 and 2, there are three key lessons learned:

1. Relevance was achieved through the strong mandate from policy and the direct and personal links to policy makers both via the conference calls and via direct interaction with a much broader set of policy makers at many different events. This helped formulate the reports for different contexts and in relevant language. A broad and strong advisory board, representing academia, civil society, high level policy makers as well as business also helped TEEB to coordinate with other initiatives as well as taylor, finetune and mainstream the messages to the different target audiences.

2. Maintaining independence was crucial in this situation. Here the initiative benefited from a very open structure, with different coordinators and core teams for each of the reports and a broad advisory board as well as calls for evidence allowing all interested parties to contribute,. To counterbalance the dominance of European funding, it was helpful that UNEP hosted the initiative.

In addition, the mix of a charismatic leadership (Pavan Sukdev, a former banker) and a reliable knowledge base (through the involvement in particular of UFZ in the coordination group) created balance and sufficient momentum.

3. Leadership and knowledge in process management at the interface were crucial elements of success. They resulted from the combination of

- The personality and dedication of the study leader with his background in banking and a very active approach to communication, bringing in new ideas

and a broad understanding of the needs and demands from the different target audiences, counterbalanced by

- a coordination group with broad experience in process management and different organizational cultures (at the level of international organizations, international negotiations, public administration, private sector, coordination of large and heterogeneous transdisciplinary projects);
- Discursive and consensus-oriented discussion style, seeking for pragmatic solutions and carefully balancing credibility and timely delivery.

TEEB was started due to a clear demand from policy (G8+5 Environment Ministers). The basic intention was that environmental policy makers wanted a compilation of scientific evidence to make their case towards other policy sectors. This has led to intense collaboration between parts of the policy community (environmental policy) and the emerging group of scientists. Now in Phase 3, where a main focus is on country-level studies, it is more challenging to maintain this direct link and immediate interest from policy, particularly if there is a change of government while the country study is ongoing. Most country initiatives are, however, succeeding in at least maintaining close links to environmental policy and the global initiative still counts on very close links, due to the trust and personal relationships built in Phase 2 –even though several of the people have changed.

An open architecture format was chosen in phases 1 and 2, where anyone could contribute evidence (via calls for evidence). There was active recruitment of chapter authors for all the reports and another part of the scientific and wider community was involved through review requests. Phase 3 is maintaining this format, but it becomes more difficult to continue mobilizing the wider community to contribute/react to the more focused products and several of the country studies are working with smaller groups of authors, conducting either expert-group or consultant-type studies rather than broader assessments.

TEEB phase 3 has maintained important parts of the operating structure that ensures close links between environmental policy, project management and scientific coordination. The wider scientific community is now involved much more sporadically. So it is shifting from a temporal structure to synthesize scientific results (mainly by compiling state-of-the-art methodologies and a wide set of examples) into a semi-permanent structure to support country-level initiatives to replicate similar efforts at the country level.

At the country-level the important challenge now consists in establishing and balancing the social processes necessary to not only produce specific studies but to enable change on the ground.

Looking for more information on science-policy interfaces?

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This brief is a result of research and interactions within and around the SPIRAL project. This brief was written by Heidi Wittmer and Carsten Neßhöver, Helmholtz Centre for Environmental Research, UFZ.

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SCIENCE POLICY INTERFACES: RESEARCH, ACTION & LEARNING

SPIRALing IPBES

The Brief in brief

The Intergovernmental Platform for Biodiversity and Ecosystem Services (IPBES) was established in 2012. This brief presents the IPBES and outlines some recommendations based on SPIRAL expertise and SPI tools.

Setting the scene

IPBES was established after years of consultations and negotiations (including the IMoSEB-process[1], and three multi-stakeholder meetings from 2008 to 2011[2]) in a plenary meeting held in Panama in April 2012. ***The overarching objective of IPBES is "to strengthen the science-policy interface for biodiversity and ecosystem services for the conservation and sustainable use of biodiversity, long-term human well-being and sustainable development"***. The structure of IPBES includes: a small Secretariat based in Bonn, Germany; a decision-making Plenary composed of members (governments) and observers, a Bureau and a Multidisciplinary Expert Panel (MEP)

The IPBES has four functions:

1- Knowledge generation

The first objective of the knowledge generation function is to develop common frameworks, methodologies and basic understanding to support decisions-making processes. The second objective is to make sure knowledge gaps are addressed and relevant research strategies are implemented. Finally this function should address issues relating to including various types of knowledge (e.g. indigenous), supporting observation and monitoring programmes and ensuring open access to existing data.

2 - Assessments

The objective here is to address user needs by carrying out assessments of existing knowledge including different types of knowledge (scientific, traditional, grey literature, citizen science…)

Discussions are on-going as to the scale at which assessments will be performed and how assessment topics will be identified, prioritized and their scoping[3] defined.

3- Policy support

The objective is to promote a better use of existing knowledge by identifying and promoting tools to transfer knowledge to policy makers in an efficient way, e.g.scenarios, indicators or models. The overarching challenge is to achieve one of the founding objectives of IPBES: to provide knowledge which is "policy relevant but not prescriptive"[4]

4- Capacity building

The objective is to catalyse and build the capacity at various levels to implement effective science-policy interfaces and to enable all actors to contribute efficiently to the different functions of the IPBES.

The intended structure and processes

Regarding the structure, concern has been raised about the composition of the MEP (See below key lessons learned). Potential problems still remain due to significant outstanding issues concerning decision making procedures (based or not on consensus), the role of UN bodies as host institutions for IPBES, and the question of membership of regional economic integration organizations (REIOs such as the EU). In addition, IPBES still needs to address issues related to how the work programme will be defined and implemented (e.g. through a more regional approach).

Additional key issues under discussion include the engagement into IPBES processes of stakeholders, such as other intergovernmental organizations, international and regional scientific organizations, environment trust funds, non-governmental organizations and the private sector. A Stakeholder Engagement Strategy is under development and will be discussed at the next plenary in December 2013.

The expected outputs

[1] The consultation on an International Mechanism of Scientific Expertise on Biodiversity (IMoSEB) was initiated after the conference Biodiversity: Science and Governance, held in Paris in January 2005 and lasted for three years until 2008

[2] all information on meetings are available at: http://www.ipbes.net/ (resources/previous meetings)

[3] Scoping is still under definition and can encompass the review of currently available information, relevant scale, cost estimates of assessments, etc.

[4] See Busan outcome at http://www.ipbes.net/resources/previous-ipbes-meetings/3rd-meeting-on-ipbes.html

We can expect IPBES to produce, or trigger the production of, not only assessment reports on a global scale but also assessments at other scales and on thematic issues. Main challenges are related to how stakeholders and different knowledge types will be involved in designing the outputs and what communication tools and methodologies will be used.

The expected effects

At the current state of negotiations no precise judgement concerning the impact of IPBES on global biodiversity policy is possible.

Approach taken in SPIRAL to study the test case

SPIRAL members were present at most of the steps of the preparatory/consultation process: from the Science and Governance conference in Paris, in 2005 to the IMOSEB consultations and the multi-stakeholder meetings since 2008 (Putrajaya 2008, Nairobi 2009, Busan 2010), SPIRAL members also attended the two sessions of a plenary meeting of IPBES (3-7 October 2011, 16-21 April 2012), organised a workshop on the policy support function as part of the intersessional process in December 2011 as well as various workshops and meetings organised in Europe during intersessions. In addition, SPIRAL workshops provided an informal opportunity for several representatives from EC-DG RTD, EC-DG ENV, national delegates and UNEP-IPBES Secretariat to further discuss SPI concepts and attributes.

As SPIRAL members followed closely all IPBES developments, they could feed some recommendations during intersessional workshops and consultations. Results of SPIRAL research on SPIs were used to develop these recommendations, hence bringing SPIRAL work to the attention of those designing IPBES structure and processes.

Key lessons learned from the Test Case

We address three main key aspects for which SPIRAL approach, tools and expertise can provide interesting insights:

➢ An important aspect of IPBES is the tension between its legitimacy (political mandate, intergovernmental process) and its credibility, which heavily depends on the independence, composition and operation of its Multidisciplinary Expert Panel (MEP) and on the rules and procedures framing the interactions of the MEP with the political bodies of IPBES (the Plenary and Bureau).

At the IPBES plenary in Bonn, nominations of MEP members raised concerns regarding the fair representation of social sciences and other knowledge holders (indigenous and local knowledge). Gender balance is also far from being implemented. A key recommendation would be to ensure that this panel reaches out beyond the "usual suspects", i.e. the biodiversity experts already involved in the CBD/SBSTTA[5] in order to ensure a good representation of disciplines but also new kinds of expertise.

In terms of independence, the challenge comes from the Intergovernmental status of IPBES, which implies that politics is decisive for all rules of procedures and has a strong influence on the questions selected ("scoping"). What this will mean in practice is still unclear as one important element of the rules of procedures is still under negotiations: whether decisions in plenary should or must be made by consensus, which would give each single member state control of the assessments and their use. - The intergovernmental plenary represents both a risk as the questions addressed in assessments might be biased by countries' political agendas, and an opportunity as the "adoption"[6] of assessment reports conclusions will have a powerful impact on policy development and implementation at national and international level. To safeguard independence of IPBES, the structure and processes should allow for the working groups and the MEP to work without pressure and independently from the intergovernmental plenary and that the procedures to select questions/assessment topic be open and transparent, and allow contribution from stakeholders. In addition, ways should be found for stakeholders to contribute and to participate actively in the plenary, helping to ensure that the process is transparent, inclusive, balanced and relevant.

- A key question also concerns the flexibility of the complex process of IPBES and its adaptability to unforeseen changes in the socio-economic landscape. This relates directly to the way requests will be brought to IPBES and how the scoping process will function. As IPBES will address complex interrelated biophysical, socioeconomic and institutional issues, it needs to be established as a learning institution, adapted to dealing with complexity, uncertainty, ambiguity and ignorance. It thus needs a mechanism for external monitoring, evaluation of its internal structures and procedures (e.g. to ensure transparency), quality control of its outputs, and any additional aspects relevant to its self-evaluation and adaptive management.
- Another striking aspect is the issue of scaling and how a global intergovernmental platform will be able to tackle biodiversity issues that are usually quite context-dependent both in terms of knowledge availability (including different type of knowledge) and in terms of policy development and implementation. A key question remains regarding possible regional hubs that would provide a better link to the regional political structures and scientific communities/networks and encourage

[5] Subsidiary Body on Scientific, Technical and Technological Advice (SBSTTA) of the Convention on Biological Diversity (CBD)

[6] Procedure of adoption has not yet been agreed upon

bottom up processes: regional hubs would ensure assessments are pertinent to the levels at which results are most needed.

We can also identify some additional recommendations based on SPIRAL work:

- Adequate and sustained financing is a requirement to enable any SPI to achieve objectives and it will be key for IPBES.
- Strong leadership is needed to move IPBES forward (e.g. by drawing more resources to IPBES, facilitating compromises, reaching out to the policy side, providing expertise and credibility, motivating others).
- The use of 'champions' or charismatic 'ambassadors' who are well-respected and highly-placed could contribute to improving visibility and credibility of IPBES and facilitate access to other resources.
- Inclusiveness is important, especially in processes such as scoping, strengthens relevance and legitimacy. To ensure inclusiveness, IPBES will need to build and maintain collaboration with existing networks to increase possibilities for continuity but also ensure necessary engagement of additional stakeholders and knowledge holders.
- Conflict management (including policy on conflict of interests) is also a key process that will require clearly stated and appropriate methods. The use of open scientific debate should be promoted as a constructive 'conflict' can also be seen as a healthy sign of open dialogue

Looking for more information on science-policy interfaces?

For more SPIRAL results, including separate briefs focussing on results from other test cases, see companion SPIRAL briefs at http://www.spiral-project.eu/content/documents

This brief is a result of research and interactions within and around the SPIRAL project. This brief was written by Estelle Balian and Sybille van den Hove (Median), Juliette Young and Allan Watt (CEH), Christoph Görg (UFZ)

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SPIRAL
Interfacing Biodiversity and Policy

Moving from interfaces to alliances

SPIRAL Briefs
SCIENCE POLICY INTERFACES: RESEARCH, ACTION & LEARNING

From interfaces to alliances: a shift in how we do science and policy

The Brief in brief

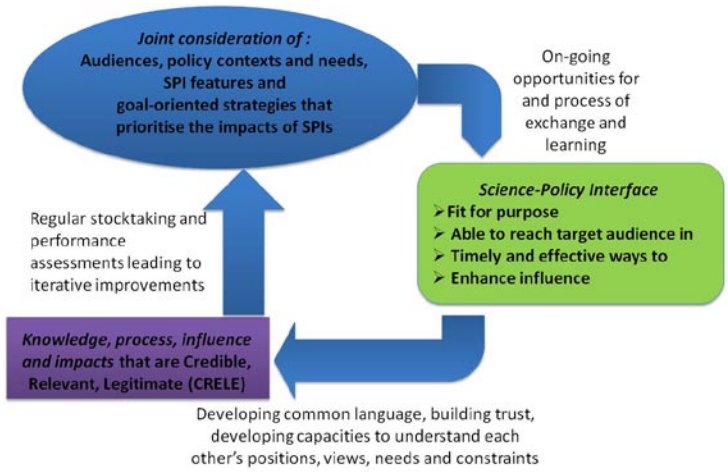
Silo mentalities and myths continue to prevail and hinder the development of more effective science-policy interfaces (SPIs). The SPIRAL project identified a number of ways to better design, maintain and improve science-policy interfaces. Realising improvement, however, will depend on a complete shift in how we perceive the science and policy domains and their intersection. We need to move from "science-policy interfaces" to alliances where policy and science know each other and act together for improved research and decision-making.

Setting the scene

We know that improved **science-policy interfaces**[1] **are needed and beneficial**. Practice and research have demonstrated that well-designed SPIs can[2]:

- Allow for dynamic exchange and co-evolution of scientific and policy knowledges;
- Contribute to the scientific quality control process;
- Facilitate timely and coherent input of research into policy options or advice;
- Facilitate rapid uptake of research results by stakeholders;
- Alert decision-makers and other stakeholders about emerging issues and new perspectives;
- Ensure strategic orientation of research in support of policies and societal issues;
- Raise public awareness of research and societal issues;
- Raise willingness to act and to support policy amongst the public and stakeholders.

Although 'no one size fits all' in SPIs, we know what features can lead to more successful SPIs[3]. For example, we know there should be joint consideration of context and ongoing opportunities for learning, leading to fit for purpose and effective SPIs that build understanding and trust to produce credible, relevant and legitimate processes and outcomes, which can be improved through iterative processes (see figure below).



We know, however, that some **SPI initiatives continue to be inefficient and/or insufficient**. This is because some of those involved in SPIs unconsciously follow and perpetuate the **myths** that:

- Science and policy are two independent domains;
- SPIs are about a one-way flow in which science speaks simple 'truth' to 'power' (policy);
- SPIs are simple forums through which reporting of unequivocal scientific knowledge leads to the development of policy through optimisation, in clear, controllable and unproblematic ways.

These myths, combined with a lack of systems thinking, continue to be fuelled by and lead to **silo mentalities.** In addition to these problems in the way we think about SPIs, there are also institutional barriers. For example, science career structures do not necessarily reward collaboration beyond disciplines or with policy-makers, whilst different policy teams also find it hard to integrate across sectors and collaborate with scientists. The reasons why this happens are well known: working beyond silos is hard work, time-consuming, takes us outside our comfort zone and is rarely rewarded.

Moving beyond myths and silos

SPIs depend on the interest and commitment from individuals and teams, therefore improving and making resources available for such dialogue will require systematic and systemic organisational-level support in both science and policy arenas.

Incentives

Incentives for scientists and policy-makers to engage with each other are insufficient. There is a need for increased

[1] SPIs are the many ways in which scientists, decision makers and others link up to communicate, exchange ideas, and jointly develop knowledge to enrich policy and decision-making processes and/or research.

[2] van den hove, S., Chabason, L. (2009) The Debate on an Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES): Exploring gaps and needs. Idées pour le débat N° 01/2009, Iddri, Paris, on-line at: www.iddri.org

[3] See companion SPIRAL brief "Key features of effective SPIs" available at http://www.spiral-project.eu/content/documents

resources and incentives from institutions and funders to recruit train and encourage both scientists and policy-makers to engage efficiently with each other and with counterparts from other disciplines, as well as with the media and popular audiences. Organisational support for these staff could be aided by the development of organisations' communication and interfacing strategies, particularly if these strategies included an explicit recognition of the need for greater engagement of scientists and policy-makers. In addition, an acknowledgement and promotion of boundary roles and tasks would help to break the silo thinking in science and policy and enhance cross-domain communication.

Aligning research and policy agendas

Not all research will be directly policy-relevant, and conversely some research will prove unexpectedly relevant. Discussing research and policy issues together can lead to identification of potential points of connection, and common shared problems, such as policy "problems" that require a new approach. This can lead to research designs adapted to, and engaged with, relevant policy-making, which, when regularly discussed with policy, can lead to relevant outputs. This will require decision-makers who are transparent about their policy needs, and open to discussion about the formulation and answering of questions.

Transparency

The science community often admits not knowing how policy-makers acquire information, and, in turn, how to feed their research into the policy-making process. Increased transparency with regards to routes into (and from) policy-making would be beneficial. Equally, there needs to be transparency on routes from policy to research. Support for such initiatives within organisations and from funders is essential.

Inter- and trans-disciplinary research

The way in which research is commissioned should be adapted to promote inter-disciplinarity to provide more robust and credible knowledge. Although the rhetoric of funding of research projects is increasingly putting an emphasis on interdisciplinarity, all too often, different disciplines working on the same project actually focus on their own 'sub-projects' with little interaction between groups of different disciplines. Funding focused on cross-cutting issues could help and could be fostered through mechanisms that require groups that would not normally come together to do so, e.g. EU research programmes, multi-funder thematic programmes and, potentially, the research that will be triggered by the Intergovernmental Platform for Biodiversity and Ecosystem Services (IPBES)[4]. Policy mainstreaming should also be encouraged, for example by seeking and promoting governmental mandates for various policy sectors to take biodiversity and ecosystem services into account, and also through "multi-domain" working groups that include both scientists and policy makers from various fields and sectors.

There is little doubt that science needs to be more visible and its processes better understood, not just by the policy communities in terms of developing effective policies, but by society as a whole. This is necessary to justify and encourage continued funding towards the scientific research that is essential to the transition to sustainability. Scientists, as key knowledge-holders, are well placed to make the scientific process and its potential role in ensuring a sustainable future for our societies more visible. 'Indirect' science-policy-society links, via actors other than scientists and policy-makers (e.g. NGOs, civil societies, businesses) who shape the way research is carried out and contribute to policy processes are also of crucial importance.

Strategic and long-term science-policy dialogues

Lack of coordinated planning between science and policy can lead to 'closed' thinking and a focus on immediate priorities for policy. Supporting strategic thinking explicitly - including work on long term visions for sustainability - can help to identify opportunities to connect science and policy agendas, lead to a better understanding of what science might be able to offer within a particular timeframe, and reduce the risks of neglecting emerging issues. Horizon scanning and scenario-planning tools may help in thinking strategically about long term futures, and inform longer term policy agendas.

The way forward: from interfaces to alliances

The move towards an alliance between science and policy requires a shift in how we do science and policy, creativity and resources. To move beyond silos and myths will require more incentives for individuals to improve the way in which science and policy operate and interact, increased transparency, real and high quality inter- and trans-disciplinary research, and strategic long-term visions. All this will be dependent on significant changes in training, supporting and incentivising those scientists and policy actors enthusiastic about crossing boundaries and carrying out activities at the science-policy-society interface. A genuine move away from silo approaches is needed to begin building alliances between science, policy and ultimately society. Only then will we see the increase in the quality of both science and decision-making needed to address the societal and environmental challenges of the 21st Century.

Looking for more information on science-policy interfaces?

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[4] www.ipbes.net/

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