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SPIRAL

Science-Policy Interfaces for Biodiversity: Research, Action and Learning

Recommendations for the improvement of the science-policy process for developing the integration of indicators and other mechanisms for influencing behaviour to reduce negative human impacts on biodiversity

Simo Sarkki , Jari Niemelä, Rob Tinch, and the SPIRAL team

SEVENTH FRAMEWORK PROGRAMME

SPIRAL
Interfacing Biodiversity and Policy

SPIRAL Deliverable 3.2

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Summary

Human behaviour is causing increasing pressures on biodiversity and ecosystem services, and is the main cause of biodiversity loss. Societal responses to fight these problems are accelerating, but they are still insufficient to halt biodiversity loss and deterioration of ecosystem services. Science can contribute to halting biodiversity loss by informing policy-makers and other stakeholders of the causes and consequences of biodiversity loss, of the options to prevent it and their costs and benefits. Various science-policy interfaces (SPIs) have been established to facilitate science-policy interactions. SPIs can influence human behaviour directly by leading to raised awareness and to behavioural changes. SPIs can also impact on human behaviour indirectly, via policy decisions taken by policy makers influenced by the SPI. The changed behaviour of policy makers may lead to development, initiation and implementation of instruments or policies, such as indicators, targets, scenarios, market-based instruments, or regulations, that impact on biodiversity-related behaviour of various target audiences.

This report addresses these issues and develops recommendations on how SPIs can better support instruments to change behaviour or directly initiate learning leading to changed behaviour. The recommendations are based primarily on empirical findings from two workshops (March and December 2011) with over 20 external participants and from eight expert interviews (see SPIRAL Deliverable 3.1). Insights from a literature review on SPIs and instruments (SPIRAL Task Indicator 3.1) were also used. The main part of the report is divided into two sections. We first develop recommendations on how SPIs could arrange knowledge production and science-policy interaction processes and develop outputs better to support instruments and influence behaviour. Secondly, we build a set of recommendations of how SPIs could support specific instruments, including scenarios, targets and indicators and market based instruments.

Our conclusion is that there may not be 'one size fits all' recommendations for improving SPIs, and their links to instruments and behaviour. This is because specific purposes of SPIs, their target groups and contexts differ. Furthermore, we note that SPIs may not be able to apply all the proposed recommendations simultaneously, because there are trade-offs among the recommendations (for example between providing timely policy advice and the use of time-consuming quality control measures). Nevertheless, the recommendations developed do provide a useful checklist of factors to consider, and can provide valuable insights for those working with SPIs and aiming to support the development and implementation of instruments influencing biodiversity related behaviour.

1. Introduction

Environmental decision-making aims at securing biodiversity and ecosystem services, and decision-makers need a solid knowledge base to reach informed decisions. There is an urgent need to enhance complex two-way relationships between science and policy and to improve the use of scientific knowledge as a basis for decision-making (Turnhout et al. 2008). To bridge this gap, various science-policy interfaces (SPIs) have been established, institutionalizing science-policy relationships, through various assessment processes, science-policy platforms, projects and initiatives. Science-policy interfaces refer to 'social processes which encompass relations between scientists and other actors in the policy process, and which allow for exchanges, co-evolution, and joint construction of knowledge with the aim of enriching decision-making' (van den Hove 2007: 807).

The aim of this report is to make 'recommendations for the improvement of the science-policy process for developing the integration of indicators and other mechanisms for influencing behaviour to reduce negative human impacts on biodiversity, including recommendations relevant to the improvement of science-policy interfaces generally' (SPIRAL DoW 2010).

To fulfil this aim, we first outline the role SPIs can play in sustainably managing biodiversity and ecosystem services. The key challenge is to change human behaviour which currently contributes to deteriorating biodiversity and ecosystem services. SPIs can contribute to behavioural change both directly (by awareness raising) and indirectly (by supporting policy makers to develop new policies and instruments for changing human behaviour). We develop recommendations on how to improve SPIs and on how SPIs can support various policy instruments for changing biodiversity-related behaviour of various target groups. General 'one size fits all' recommendations for improving SPIs cannot be made, because various contextual issues determine the appropriate design features for an SPI in a given context, purpose and target group (such contextual considerations are further elaborated in SPIRAL Deliverable 3.1). Nevertheless, it is possible to identify key factors and trade-offs that should be considered in any case.

The recommendations presented in this report are based on empirical material collected in two workshops with 22 scientists and policy makers having wide ranging experience on SPIs, and eight interviews with additional experts. These workshops and interviews are reported more extensively in SPIRAL Deliverable 3.1. A literature review on the links between SPIs and instruments to protect biodiversity is used as additional background.

The report starts by outlining how SPIs can have direct and indirect influences on biodiversity related behaviour (Section 2). The remaining part is divided into two main sections. Firstly, recommendations are made on how SPIs can better support policy instruments in general by their outputs and processes (Section 3). Secondly, we discuss the relationship between different kinds of instruments (scenarios, targets and indicators and market based instruments) and SPIs, and develop recommendations on how SPIs could better support these instruments for influencing biodiversity-related behaviour (Section 4). We end with brief general conclusions for SPIs to improve their capacity to influence behaviour (Section 5).

2. SPIs, policy makers, instruments and biodiversity related behaviour

Human behaviour related to biodiversity can be influenced through various instruments, including for example market-based instruments, regulations, targets and indicators. Behavioural changes can result in reduced pressures on biodiversity and ecosystem services, improved state of biodiversity, or increased and successful societal responses to address loss of biodiversity.

SPIs can have a variety of roles regarding the instruments. They can support, develop, use or be part of various kinds of instruments. They can contribute to changing biodiversity related behaviour directly by influencing various target audiences, and/or indirectly by changing policy makers' behaviour, which leads to further development of instruments having impacts on biodiversity related behaviour. SPIs' direct and indirect impacts take place via social learning[1] by policy makers or other target audiences.

SPIs and their participants use various review, assessment and communication tools to foster interactions between scientists, knowledge holders, and policy makers. These tools may include literature reviews, reports, policy briefs, indicators, charts and figures, narratives or scenario storylines and pictures. The changed behaviour of policy makers may lead to development, initiation and implementation of instruments (market-based instruments, regulatory policies, policy targets…), which impact on biodiversity related behaviour of various target audiences.

SPIs can also launch social learning directly in groups, such as public and business, whose behaviour has biodiversity impacts. These direct influences often take place through awareness raising, via variety of communication tools (media relations, outputs, figures, maps, scenarios), which leads to changes in behaviour at the individual or organisational level (for example recycling, water and energy conservation, adopting environmental certification, changing corporate rules and practices).

SPIs can be planned, assessed, and improved with the help of assessment attributes, as developed in SPIRAL Deliverable 3.1. These attributes are used in this report as a basis for recommendations to increase SPIs' effectiveness in influence behaviour (Figure 1).

[1] Social learning is understood as "*a process of change on a society level that is based on newly acquired knowledge, a change in predominant value structures, or of social norms which results in practical outcomes*" (Luks & Siebenhüner 2007: 420)

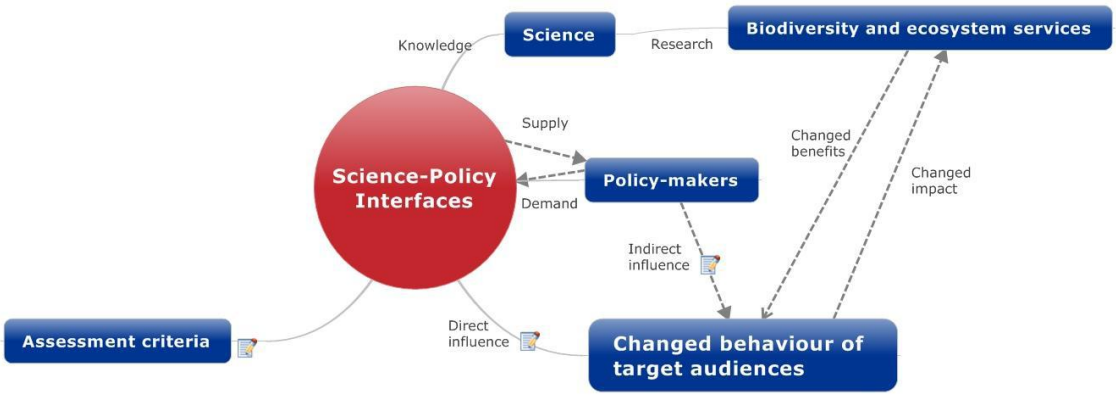

Figure 1: SPIs' direct and indirect influences on biodiversity related behaviour.

3. SPI processes and outputs supporting policy development and instruments

Following the typology set out in previous SPIRAL work (SPIRAL Deliverable 1.1), SPI 'processes' are the ways in which the SPI uses its 'structures' to achieve its 'objectives and functions', via production of 'outputs'. Processes will often be defined by procedural rules and guidelines, but there are often additions to or variations from 'official' codified procedures, and in some cases most interaction may be ad hoc. SPI outputs are the tangible products emerging from the process, for example reports, workshops, websites, indicators, policy briefs, declarations, press releases and so on.

SPIs support policy instruments through their processes and outputs. High quality outputs and constructive processes are required in order to support instruments and policy development effectively. Below, we outline ways in which SPI processes and outputs can contribute to instrument and policy development through capacity building and facilitating consensus building. We also outline how outputs link to various instruments and make recommendations on how these outputs could be developed to have better potential to influence behaviour.

3.1 Processes to change behaviour

3.1.1 Capacity building processes

SPIs often aim to build capacities in their target audiences, through training and educational materials, and the central importance of capacity building activities, in parallel to SPI development was widely acknowledged in our workshops and interviews. Usually capacity building is understood in terms of helping policy makers and other stakeholders to develop the skills needed to comprehend and use science. This is often discussed in the context of the developing world, but a more general view on capacity building is needed: it is not just actors in the developing world who need improved capacities, but actors in all societies; and it is not only policy makers who need new skills, but all stakeholders, including scientists. Scientists across the world need better understanding of policy processes and contexts, of how science is used within them, and of how to communicate, interact with and impact on policy and policy makers in effective ways. This is reflected in Strategic Goal E of the Aichi Targets, "Enhance implementation through participatory planning, knowledge management and capacity building."[2]

Three main types of capacity building can be distinguished:

1) Building capacities for (local and regional) actors and policy makers to take account biodiversity and understand related science
2) build capacities for further SPI work, and
3) building capacities for scientists to better comprehend policy and knowledge users needs.

[2] http://www.cbd.int/sp/targets/

- As these capacities are enhanced, the potential for SPIs to influence biodiversity related behaviour is increased. Recommendations for enhancing capacity building in the context of influencing behaviour include:
- Capacity building for policy makers and for scientists should be **iterative and joint**. Two-way learning process will generally be more efficient, leading to increased capacities for SPI work and better policy decisions.
- Capacity building should consider the **evolving needs of the SPI**. Iterative and parallel processes of capacity building and SPI development create a sense of continuity and commitment and ensure that capacities are in line with future requirements.
- Sectoral integration by **joint learning with/from other sectors** can build capacities to mainstream biodiversity conservation, moving from conservation focus to wider environmental and other policy spheres. This is vital for achieving the Aichi Targets Strategic Goal A: Address the underlying causes of biodiversity loss by mainstreaming biodiversity across government and society[3].
- **Integrating capacity building with dissemination** strategies, and **enhancing capacity for future SPI work** for example by combining capacity building with data collection, communicating what data is available and how to access and update it, feeding back from capacity building to assess evolving needs and skill shortages on all sides, saving the data produced for further use.
- Capacity building needs to be context-sensitive and consider the needs, values and goals of specific target group.

3.1.2 Processes to support consensus building

Many SPIs have processes based around creating consensual agreements among participants - for example under UN settings. Once agreed, the consensus decisions have a strongly legitimate status to influence various policy makers at national and local scales, and thus the agreements can play a central role in shaping policy makers' behaviours aiming to achieve agreed targets or objectives through the design and implementation of policy instruments. But, particularly in the context of mainstreaming biodiversity across government and society, it is important for messages, agreements and targets to be communicated effectively to the right people in all sectors. Many SPIs play a vital role at this stage through their outputs, activities and capacity building efforts (see above). SPIs can also contribute to consensus building, and to broadening / mainstreaming consensus outside the original forum, through trust-building and conflict management methods. The following recommendations can be made regarding conflict management and trust building:

- **Understanding diverse cultural values and 'stakes'** of policy makers, scientists, member institutions and target audiences helps to create mutual trust and enhance possibilities to build agreement.

[3] http://www.cbd.int/sp/targets/

- (Informal) **multi-stakeholder dialogue** including local communities as appropriate is needed for building trust and relationships.
- Even if aiming for consensus, there needs to be space for open dialogue for exploring various perspectives, paradigms and interests. Constructive conflicts may move the issue forward and help to explore it from a variety of perspectives.
- **Staged processes** with early opportunities to flag problems, defined contact points for participants to voice their concerns and recourse to an **internal ombudsman**, may help to ensure fair roles of involved parties and avoid dynamics leading to conflict.
- Using **external and independent conciliation** may improve chances for reaching agreement.
- **Agreed procedures for approving external statements** are important. Clear rules for participation increase trust and create sense of commitment.
- At formal meetings, **the potential to 'park' or suspend discussions on points that prove difficult** can allow consensus to be reached on broad lines, representing success for the meeting, with details and problems to be ironed out later, often through intersessional work.
- Clearly stated and appropriate methods are needed to prevent and manage conflicts and power plays in consensus based negotiations. This may be especially challenging if some delegates have strong positions and vested interests and seek to undermine consensus by exercising veto rights. Potential ways to manage such situations vary from case to case but may include limiting veto rights or adopting majority-based (rather than full consensus) approaches.
- **Open access to outputs and statements** increases transparency and trust.

3.2 Outputs and quality control for supporting instruments

SPIs may link to policy instruments through various kinds of outputs that supporting policy development generally, or specific instruments. Their outputs often play a major role, and therefore ultimately have a correspondingly substantial influence over biodiversity-related behaviour. For example SPIs can

- produce principles and attributes on which certification and labelling processes are based.
- quantify biodiversity, its loss and the impacts on society, and more generally translate ecological knowledge into formats that can be used in legal and market settings, for example for biodiversity offsets, mitigation banking and payments for ecosystem services.
- quantify the impacts of pollution and acceptable emissions limits, feeding in to negotiated policy process, supporting environmental regulation and pollution control
- measure and model the state of natural resource stocks and the implications of harvesting, feeding in to negotiated policy processes determining natural resource managment policies such as fisheries quotas

- develop and produce indicators for measuring progress towards targets

We can make several recommendations on how SPIs should produce the outputs and what kind of features make outputs effective:

- A **clear communication and outreach strategy** is a key to effective promotion of outputs, and helps to build effective relations with media and other communication partners.
- **Outputs tailored for target audiences and policy contexts** increase accessibility of knowledge and its relevance. **Use of brief summaries** increases accessibility to policy makers and expands audience.
- Outputs are promoted in **strategically appropriate forums**, for example launching outputs in high-profile relevant events, with widely respected and effective presenters for the audience.
- Policy often needs input on a pre-determined timeframe, and so a balance must often be struck between maintaining scientific credibility through thorough data collection, analysis and quality control, and the ability to contribute to a policy process in a timely fashion by providing the best available information to date. Here **planning in advance for anticipated needs** is important, for example by **communicating policy deadlines early** to scientists so that they are prepared to provide input. **Mechanisms for quality-controlled rapid response** are also needed. Sometimes discretion is the better part of valour, and it can be better to say "we don't know yet" than to publishing premature or speculative results that could decrease trust and credibility.
- **Communication of uncertainties**, divergent views and knowledge gaps increases credibility.
- System for **continuous or periodic quality review of research and knowledge** used in the SPI increases reliability, credibility and quality of produced outputs. **Formal procedures for peer review** increase credibility. **Extended/stakeholder review** increases legitimacy and relevance.
- **Transparency and traceability** of the origins of each piece of knowledge increases credibility.
- Using the **full variety of existing data sources**, while assessing their reliability, widens the knowledge base and ensures quality of knowledge. Consideration is required on how to combine different types of knowledge – for example, using 'traditional' / local knowledge to set research questions for analysis using scientific methods, and applying methods to combine quantitative and qualitative information in reaching overall conclusions.

3.3 Resources and continuity supporting processes and outputs

The quality of processes and outputs can be enhanced by SPI work that has continuity and adequate resourcing. It was widely noted in our workshops and interviews that SPIs need resources for their work, and that continuity of SPI work is a key issue determining SPIs' influence on policy makers and ultimately on biodiversity-related behaviour. It is important that SPIs provide iterative support to instruments and policy to maintain a credible position as knowledge provider. Resources include for example money, people, networks and time. Even for one-off SPIs, resources are important, and though long-term continuity is not relevant, sustaining a short burst of intense effort to achieve the one-off output can be a major challenge.

Recommendations regarding continuity are:

- **Continuous and iterative policy support**, for example through periodic and regular policy advice, briefs, newsletters, or meetings, is important for building efficient SPIs and well working interaction between science and policy.
- SPIs need to **build and maintain collaboration networks** to increase possibilities for continuity and establishment of an SPI as an influential player in its domain.
- Some **continuity in membership of SPIs** is useful to maintain relationships and trust.
- SPI's continuity may be challenged by changing policy priorities and funding situations. Thus adaptive measures need to be planned and policy contexts scanned to plan for potential requirements for change.

Recommendations regarding resources are:

- Motivations for SPI participants can be created for example by incentives, clear policy demand, or other **mechanisms that attract participation** and action by relevant scientists, policy makers, and other stakeholders.
- **Good leadership** helps to move the science-policy process forward, for example by motivating others, and by drawing more resources to SPI, facilitating compromises, reaching out to policy side, providing expertise and credibility.
- Well-respected and high-placed members are **key human resources** of an SPI. 'Champions' in strategic organisations, translators, and charismatic 'ambassadors' improve visibility and credibility and facilitate access to other resources.
- **Adequate and sustained financing** enables the SPI to achieve objectives; inadequate funding endangers continuity and motivation.
- **Sufficient amount of time** is allocated for SPI members to perform their tasks.
- **Networks are an important resource** to diffuse knowledge and influence behaviour.

4. SPIs and their contribution to instruments to change behaviour

4.1 Scenarios

Scenarios help policy makers and other actors to understand the importance and implications of environmental trends and changes under various possible future conditions. SPIs may use scenarios to raise awareness, highlighting the consequences of different courses of action, encouraging stakeholders to reflect on policy and behaviour changes that may be needed in order to avoid negative outcomes. Scenarios may also be used by SPIs to support policy design.

Examples of recent scenario exercises include CBD's Global Biodiversity Outlook[4], UNEP's Global Environmental Outlook[5], and scenarios by Millennium Ecosystem Assessment[6]. Many other projects use scenarios as research tools and to initiate learning and change in biodiversity related behaviour.

Scenarios influence policy makers and other stakeholders in various ways. Scenarios can improve the understanding of environmental change and related threats for various actors. They can flag up possible dangers in the future, and identify points of intervention for different stakeholders. Large scale scenario assessments can introduce new concepts and thereby influence ways in which, for example, biodiversity and its relevance for people is perceived. A good example is the concept of ecosystem services which gained wider recognition via the Millennium Ecosystem Assessment, and is now widely accepted by many organisations and instruments. Through scenarios, information may become more accessible and personal, leading to learning, awareness raising and changes in the practices of various actors.

The following recommendations can be made regarding SPIs use of scenarios to influence human behaviour:

- **Including stakeholders and knowledge users in scenario making** processes can enhance the scenarios and also lead to learning and the potential that knowledge users adopt the results and use them in their own work. Alternatively, they can be included via **extended review processes**, or collecting questions to be addressed by scenarios from potential knowledge users.
- Scenario storylines can **translate complex scientific knowledge into forms understandable for policy makers and stakeholders**. This can be enhanced if storylines are modified to be salient to the interests of target audiences. Some concepts

[4] http://www.cbd.int/gbo/

[5] http://www.unep.org/geo/

[6] http://www.maweb.org/en/index.aspx

widely used in scenario thinking, such as the DPSIR (Drivers-Pressures-State-Impacts-Responses) model, may be confusing for policy makers and stakeholders without thorough explanation: it is worth considering if the use of such approaches is essential, or if storylines could be developed in an intuitive way without the academic framing.

- Although scenarios often aim at raising public awareness, for example by communicating emerging issues, and can contain quite extreme possibilities, they are more likely to influence behaviour of policy makers if they **assess plausible future consequences of real policy choices**. "Closing-down" forms of communication (e.g. showing only limited amount of options from rather narrow perspective) could be used in cases where scenarios are strongly linked to a certain policy development, and the policy cycle is turning towards implementation.
- Communication of uncertainties and opening up various perspectives and options is useful for scenario exercises aiming to raising awareness. **Communication of uncertainties should be done carefully,** as scenario storylines may produce overly simplified accounts of environmental change, for example in the form of assumptions about tipping points that are in reality highly uncertain.

4.2 Targets and indicators

Targets and indicators can help to drive major changes if they are properly integrated in policy across sectors. SPIs play important roles in developing indicators, promoting them, building capacity to use them, facilitating their integration in policies and measuring progress.

SPIs can contribute to the development and implementation of targets and indicators at all stages of the policy cycle. At the design stage, SPIs can foster the development and communication of measurable and robust indicators, and promote policy evaluations for setting and justifying targets. Indicators play multiple roles. They are necessary for monitoring progress against targets, and they help to raise awareness and understanding of biodiversity among policy-makers and others. Furthermore, they can communicate new concepts and emerging issues, perhaps leading to the development of new targets.

An example of the use of targets and indicators in SPIs is the 2010 target to halt the loss of biodiversity, now replaced by the Aichi Targets (mostly) for 2020. There is wide consensus that the 2010 target was not met, and this has been also recognized by CBD. But even though the 2010 target has not been met, many instruments and capacities to combat biodiversity loss in the future have been set in place. The requirement to report progress towards the 2010 biodiversity target has been a major driver in promoting the development of biodiversity indicators. The international indicator frameworks, offered for example by CBD[7] and Biodiversity Indicators Partnership[8], and

[7] http://www.cbd.int/indicators/intro.shtml

[8] http://www.bipindicators.net/

adapted for use in specific countries, have in turn resulted in increased capacities to monitor biodiversity and establish nationally relevant targets. The use and profile of biodiversity indicators have increased considerably since the adoption of the 2010 target, and work is currently ongoing on the indicators to be used for the Aichi targets. This should lead to increasing awareness of biodiversity, threats to it, and the consequences for humans, at least among policy makers, across all sectors of government, helping to transform knowledge into action.

Recommendations to enhance the potential of SPIs related to targets and indicators to influence on behaviour can be made:

- The work on biodiversity targets and indicators need to **address wide policy communities, market actors and the general public** for a more successful mainstreaming of biodiversity issues. Different audiences have different stakes and interests and indicators need to be meaningful for the target groups. So using distinct indicators tailored to audiences could help in mainstreaming efforts.
- **Indicators can be used in mainstreaming** efforts, especially if they show relevant trends in biodiversity and ecosystem services for other policy domains than environmental administration. Ecosystem services provide one potential avenue to make biodiversity issues meaningful for other policy domains.
- Indicators able to measure progress towards a certain policy target are needed. It is important to **match scales** between issues addressed by indicators and policy communities.
- Indicators have better potential to influence policy if the effects of changing policies can be measured by indicators: **indicators should be responsive to changing policies**.
- Indicators need to **address biodiversity holistically** - not just the state of biodiversity but also the underlying drivers and pressures, and the impacts on ecosystem services and human populations, as well as societal responses initiated to tackle biodiversity loss. These issues help policy makers to see causes and consequences of biodiversity loss and to evaluate the effectiveness of policy responses, and thus help ongoing processes of policy development and improvement.
- Where possible, indicator sets should attempt to take account of and address trade-offs and synergies between different indicators, and incorporate issues that are hard to quantify.
- SPIs aiming to build capacities to improve indicator development should be involved in **two-way interaction between global and national indicator developments**. One possibility is to arrange meetings or workshops with participants from various national indicator platforms and larger scale indicator programmes and projects.

4.3 Market-based instruments

Market-based instruments modify prices, information or market rules to change incentives and behaviour of societal actors (including the private and public sector and individuals). Market-based instruments can be seen as complementary to regulatory mechanisms. Some regulatory structures are necessary to frame the broad lines of behaviour impacting biodiversity, while market-based mechanisms can achieve certain outcomes in more cost-efficient and flexible ways. SPIs need to provide information for designing instruments, setting quantities, monitoring and evaluating impacts.

The design and implementation of market-based instruments requires scientific and socio-economic knowledge of various kinds, and SPIs play important roles. Science underpins the principles and attributes used by certifications, the calculation of equivalence in biodiversity offset schemes, the modelling and monitoring of animal and plant populations, the benefits and damages associated with them, and the costs and effects of measures to conserve or control them. However, science is not generated or used in 'stand-alone' format, but rather alongside policy and management considerations. SPIs play a core function in supporting the necessary interactions between knowledge generation and policy processes.

Some SPIs play wider roles regarding market-based instruments. TEEB[9] in particular highlights the role of economic valuation of ecosystem services and aims at bringing the current and future potential values of ecosystem services and biodiversity into policy decisions, encouraging a progressive shift from 'recognising' value, to 'demonstrating' and measuring it, and ultimately to 'capturing' value through market-based instruments for management (but recognising that the appropriate choice of recognising, demonstrating, or capturing is context-specific). The Business@Biodiversity platform[10] aims to establish partnerships among various kinds of private and public stakeholders to promote and raise awareness about potential synergies between business and biodiversity. The function of this platform is to support market-based instruments for biodiversity via partnerships and networks consisting of business actors as well as NGOs.

Recommendations regarding the role of SPIs in supporting the deployment of market-based instruments include:

- **Involvement of local stakeholders and knowledge** is important, from an equity and buy-in perspective, but also for the day-to-day running of schemes and provision of management information and practical knowledge. SPIs can play an important facilitating role here, and foster communication between local and national management structures.
- Market-based instruments often need to measure the state of environment or biodiversity and quantify it in forms that can be used in legal and market structures. One challenge for SPIs is to develop ways of **quantifying biodiversity in simple ways without compromising scientific credibility**, while taking account of uncertainties, and building in 'safety margins' such that the instrument can achieve its goals. Another challenge is to communicate these requirements to policy makers so that the instrument design takes account of scientific limitations.
- SPIs need to help the policy development process in striking a balance between regulation and market solutions by communicating what is known, what is feasible, and what stakeholders views are.
- Market-based instruments will require specific information in certain legal formats, that may be hard to alter once established. SPIs are important in ensuring that the uncertainties, costs,

[9] http://www.teebweb.org/

[10] http://ec.europa.eu/environment/biodiversity/business/index_en.html

and time constraints of knowledge provision are taken into account during instrument design and review.

- There is a balance to be struck between producing knowledge rapidly in format required by the instrument and at the same time maintaining scientific credibility.

5. Conclusions

In this report we have made recommendations on how to improve SPIs in their efforts to link science and policy. When these recommendations are taken into account SPIs can enhance their potential to support instruments and influence biodiversity-related behaviour. However, the right balance to strike is context-dependent, so there is no single set of recommendations for improving the link from SPIs to instruments. We have presented recommendations particularly relevant to specific instruments, and discussion of the kind of issues that need to be considered when developing processes and outputs to support instruments and behavioural change: these recommendations form a guide to key features to consider, but ultimately the best configuration for any specific case will depend on a wide range of factors. It depends on the scale, the policy framework, the type of natural environment, and the types of human behaviour, views and culture.

Nevertheless, it is possible to pick out some general themes that crop up across the board, for SPI processes and for their support of instruments. These include stressing the importance of:

- capacity building, at all levels
- iterative and joint processes and learning, with science and policy communities mutually enriched by their participation in the activities of SPIs
- understanding, trust-building and inclusiveness at all levels
- translating information for communication between science and policy contexts, and the tailoring of information and outputs to the intended audiences
- quality control, and balancing the needs of scientific credibility and caution with the time pressures of the policy process
- holistic approaches to biodiversity and the causes and consequences of its loss, as a vital step towards the mainstreaming that is an essential feature of stopping biodiversity loss

These are issues that featured strongly in workshops and interviews and commanded broad support from participants. Although there can be no one-size-fits-all approach to the details, these ambitions provide an excellent general starting point for any SPI seeking to influence biodiversity-related behaviour.

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