

PROJECT FINAL REPORT



Creating a Network of Knowledge
for biodiversity and ecosystem services in
Europe

www.biodiversityknowledge.eu

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1 Executive summary

The KNEU project, a coordinated action, had the objective to develop a recommended design for a scientific Network of Knowledge (NoK) on biodiversity and ecosystem services to make knowledge easily accessible for policy makers and other societal actors. The context in which the KNEU project has evolved is a complex one. While the need for better informed decision-making has been increasingly voiced it was neither clear which potential functions nor what specific role such a NoK could best fulfil within the landscape of already existing actors. As one of its main principles, the project wanted to avoid duplication and chose an inclusive approach so as to make use of all potentially relevant stakeholders and knowledge sources. In line with this, key principles of openness, quality assurance, transparency, and reflexivity were followed throughout the project and incorporated into the proposed design. The project has achieved all its objectives, it succeeded (i) to gain a broad overview of existing knowledge holders and (potential) requesters on biodiversity issues, (ii) to develop a procedure to identify and access expertise ready to answer policy-relevant questions including a set of rules and processes to ensure operating under the principles mentioned above, (iii) to test the procedures in three practical cases, (iv) to implement a process of learning by doing permitting continuous improvement throughout the project and within the proposed design and finally (v) to distil and communicate a set of lessons learned and based on all of this develop a recommended design for a NoK.

Through 42 months of strong communication efforts, three demonstration cases drawing on specific expertise, three European conferences, numerous workshops and side events, the involvement of more than 300 stakeholders in the process and/or the outputs was achieved and a Network of knowledge has begun to emerge. In this collaborative effort the project has carved out the two main identified functions for a NoK: a networking and capacity-building function (NET) and an answering-decision-making-needs function (ADN). Implementing these can significantly enhance the science-policy interface landscape and would constitute an essential part of a future European mechanism on biodiversity and ecosystem services.

The outputs from the project are very diverse including policy briefs from the test cases and a popular video targeting a large audience. The main and final product is the NoK white paper, where the main results and the recommended design of the NoK are presented in detail and the major steps that would be needed to set up the NoK are outlined. Beyond its products and through its inclusive approach, KNEU succeeded to raise awareness and enthusiasm on Science-Policy interface issues and more importantly it created a momentum and expectations in the growing NoK community (including researchers, practitioners, policy makers, NGOS, organisations from the private sector, etc...) that a European mechanism supporting decision making on biodiversity and ecosystem services could soon be established. With such an open approach, a NoK would actively contribute to a broader societal awareness raising and a better understanding of issues related to biodiversity and ecosystem services, and consequently enable a broader participation of stakeholders and society at large.

2 Context and main objectives

2.1 Context

The need for better informed decision-making, especially in the environmental sector has gained increased recognition over the last decade, as exemplified by the discussions around the Intergovernmental Panel on Climate Change (IPCC), and by the launch of the Intergovernmental Platform on Biodiversity and Ecosystem Services (IPBES) in 2012, which explicitly addresses the area of biodiversity and ecosystem services and their role in ensuring human well-being. With increasing complexities in the sector, the risks of making inadequate and/or contested decisions increases as do the risks of not properly implementing policies and thus not achieving their targets. This calls for a more reflexive involvement of knowledge holders into the design and the implementation of decisions, and consequently for more credible, relevant and easily accessible knowledge. The field of biodiversity and ecosystem services and its development over the last decades is especially challenging in this respect.

In Europe, a discussion on how to improve the science-policy-interface (SPI) in this area was triggered by the EU Biodiversity Strategy for 2010, launched in 2006, which called for an “EU mechanism on biodiversity expertise”. This was re-emphasized more recently in the 7th Environmental Action Programme¹. At the same time, Europe has a huge number and diversity of institutions that hold relevant knowledge on biodiversity and ecosystem services, and/ or already play an active role in integrating and disseminating this knowledge to policy- and other decision-makers (e.g., The European Environment Agency, The Joint Research Centre, research networks like ALTER-Net and MARBEF). In this context, the concept of a “Network of Knowledge” was developed by the European Platform for Biodiversity Research Strategy (EPBRS) in 2009, which set a theoretical framework to better integrate this diversity of knowledge forms and their holders. The KNEU project was set up to further specify this networking approach into a concrete design proposal. Based on discussions with policy-makers and other stakeholders during a focus group organized by a service contract with DG Environment three areas where decision-making could profit directly from an improved knowledge input were highlighted²:

- The joint formulation of questions building on an integral and more holistic understanding of all relevant factors should identify distinct policy-relevant questions that science and other forms of relevant knowledge³ are able to address and provide concrete answers to;
- A better understanding of concrete policy impacts on the ground, to allow for the development of implementation-oriented concrete proposals for tools and options to bring about desired change in practice;
- Coherent and independent analysis able to inform, raise awareness and trigger action beyond the environmental sector, in all relevant policy domains.

¹ See <http://ec.europa.eu/environment/newprg/proposal.htm>

² Results from a focus group with high level policy makers, organized by a service contract with DG Env, entitled “Towards an EU mechanism interfacing science and policy on biodiversity and ecosystem services”

³ When talking about “knowledge”, this document often refers to “science and other forms of knowledge” in order to stress the fact, that often, scientific knowledge is not sufficient to address specific questions. If the document sometimes refers to “science” alone, this doesn’t mean that other forms of knowledge are excluded in that specific context, see also definitions in Annex 2.

Parts of these needs are addressed by EU institutions from a policy as well as research policy perspective. On the policy side, for example, the role of the European Environment Agency was strengthened, including its leading role in setting up and further developing the Biodiversity Information System Europe (BISE).

2.2 Main objectives

The overall aim of the KNEU project was to develop a recommended design for a scientific Network of Knowledge (NoK) on biodiversity and ecosystem services to inform policy-makers and other societal actors. This network should be open, transparent, flexible, equally accessible to all, independent, be scientifically- and evidence-based and have a robust structure. The coordination action, with its 18 partners from across Europe, therefore aimed to develop a new form of interaction between knowledge holders on biodiversity and ecosystem services and potential knowledge users from society, acknowledging the fact that a continuous open dialogue between a large set of players is needed to achieve this. For this, the project followed 6 objectives, namely to:

1. **Gain a broad overview** of existing knowledge holders in biodiversity issues in Europe and on potential measures to link them for the Network of Knowledge approach (see 3.1)
2. **Develop a mechanism** to identify and access expertise ready to answer a wide range of policy-relevant questions on biodiversity and ecosystem services (the NoK), **and use that mechanism** to develop a flexible and appropriate network of knowledge holders (see 3.2)
3. **Develop sets of rights, roles, rules and procedures** to identify, access, assemble and synthesize information relevant to questions posed to the network (see 3.2 and 3.4)
4. **Test the procedures** in practical cases (see 3.2)
5. **Implement a process of learning by doing** to permit an iterative improvement of the rights, roles, rules and procedures to achieve more effective responses of the network (see 3.3)
6. **Distil and communicate a set of lessons learned** and best practice from the prototype and develop a recommended design of a Network of Knowledge on biodiversity and ecosystem services in Europe (see 3.4)

3 S & T results and foregrounds

The detailed results of all KNEU work packages can be found in the Deliverables of the project, which can be accessed via the project website⁴. Here, we only address some major highlights from these reports, following some guiding questions, in order to allow an overview of the picture emerging from the projects work and how this led to the NoK's recommended design (see chapter 3.4).

3.1 Overview of knowledge holders and the needs of knowledge requesters (WP 1)

The first activity of the project was to gain an overview of the biodiversity and ecosystem services knowledge holders and knowledge requesters in Europe, to map biodiversity knowledge key hubs, to understand and visualize the knowledge flow between these hubs and finally to screen for IT and electronic tools for use in the Networking context of the NoK.

The current biodiversity landscape in Europe is diverse in terms of experts, existing networks and knowledge holders. Due to the complexity of the task, two parallel approaches were carried out: KNEU partners were requested to identify and map the main actors for biodiversity knowledge and individual interviews were used to capture how knowledge is generated and transferred between these key players. In addition to gaining a first broad overview via data collection of relevant knowledge hubs, interviews with potential requesters of the NoK were conducted in order to get their views, needs and preferences in relation to the NoK and their needs towards the knowledge community.

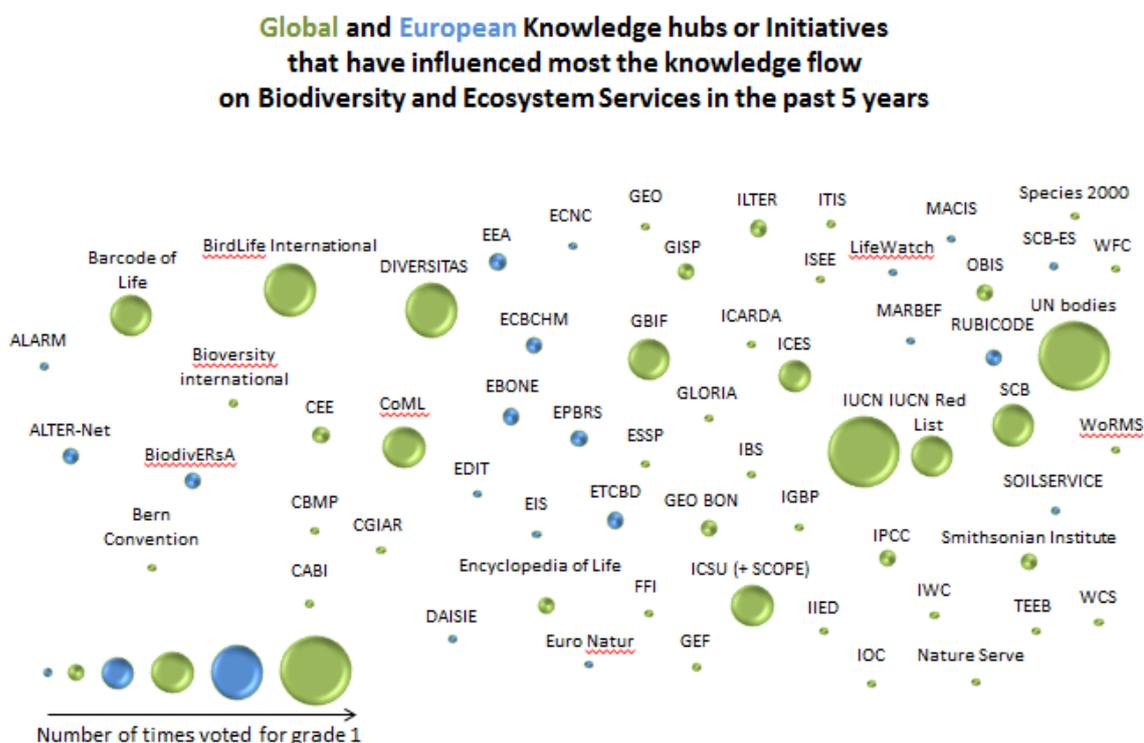
Regarding barriers to knowledge transfer, a literature review was carried out and complemented with the answers provided by the interviewees: 52 barriers were identified, from which 21 were unique to the responses given during the interviews. The work performed during this first period also highlighted the additional need to create and support a "Community of interest", via a web portal, which would require exploring further the possible technological approaches to achieve an active use of such tool.

3.1.1 Which knowledge holders are out there and how do they interact with requesters?

In order to gain a first overview of knowledge holders in Europe, the KNEU team conducted a broad compilation of potential knowledge holders across different levels, from national (selective for a number of member states), to European and global level (see Deliverable D.1.1 for details on methods and results). Following on from this, the team conducted a voting exercise on the influence of the 100 most known institutions. Although this was inevitably a time-bound exercise, Figure 3.1 showcases the perception of influence in 2011, when the survey was conducted. The picture might have changed today due to the constantly evolving institutional environment, for example, DIVERSITAS will soon be transferred into the Future Earth programme, and thus disappear from this landscape.

⁴ See <http://biodiversityknowledge.eu/documents>

Figure 3.1: Non-exhaustive cloud of global (in green) and European (blue) biodiversity knowledge hubs, which received at last 1 vote 1 ("I am sure it is influential, I have experienced it")



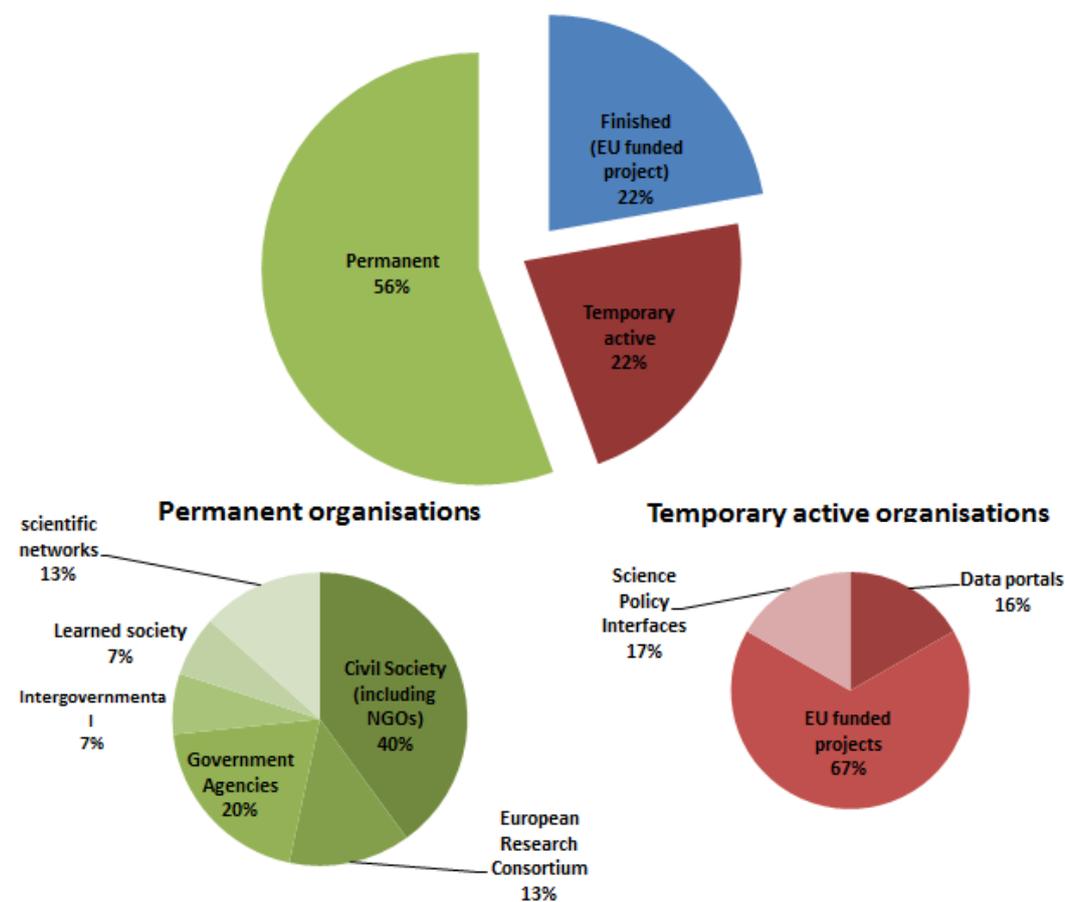
As a general pattern, participants voted more for global organisations than for European ones. They also graded more often 1 for the global organizations than for European ones, meaning that they might have more insights on/ experiences and linkages with global organizations. The most voted for global hubs were IUCN and UN bodies (i.e. UNEP-WCMC, FAO, UNFCCC, UNDP, UNESCO); for Europe the EEA and EU-funded projects were mentioned most often.

From our analysis of the databases at the European scale (See figure 3.2), an important part of the knowledge on biodiversity comes from temporary organisations among which half of them are not active anymore today but had obviously left important traces in the flow of knowledge. The main players within temporary organisation were EU-funded projects. This reveals two important points: the importance of financing EU projects to generate and boost the flow of knowledge, and the importance of collecting the findings of those projects (i.e. the need to centralise the main findings of the EU project, and to maintain connections with these projects network after the official end of the project see also the outcomes of the SPIRAL-project in this matter⁵). Among the permanent organisations, civil society plays a major role in the flow of knowledge on biodiversity and ecosystem services, and especially international NGOs.

From analysing the database at the global level, most of the organisations/initiatives that the participants were familiar/experienced with were permanent ones. These permanent organisations included civil society, data portals/initiatives, learned society, scientific networks and research organisations.

⁵ See for example: Neßhöver et al.(2013): Improving the Science-Policy Interface of Biodiversity Research Projects.- Gaia 22: 99-103; SPIRAL briefs on "Improving the use and impact of your research: recommendations to EU research projects", see <http://www.spiral-project.eu/content/documents>

Figure 3.2: Types of European organisations/initiatives which have been the most voted for (grade 1) as the most influential **European hubs** for knowledge on biodiversity and ecosystem services.



To conclude, the perceived dominance of global institutions might be due to a relatively weak level of permanent European institutions active in this field beyond those of the EU itself (e.g., EEA, JRC).

3.1.2 What are the needs of knowledge requesters?

To better understand the actual needs of potential knowledge requesters, 24 in-depth interviews with individuals were conducted (see D.1.1, Part II for details). Whilst each interviewee fulfilled a unique role with specific responsibilities, broad categories of knowledge users were identified, including:

- **‘Briefers’**, who as a group were most actively engaged in the policy agenda;
- **‘Digesters’** who, while they may have some limited active engagement in the policy process (and there is indeed a level of overlap with the Briefers), tended to be mainly involved in “creating and collating”; and
- **‘Implementers’** who are more likely to be involved in the direct implementation (at various levels: regional, national, international, etc) of specific policy areas.

Their needs in terms of knowledge, information and data also varied according to their broad roles. Thus Briefers derived knowledge from a number of sources including their “immersion” in the policy process (including meetings, workshops, ad hoc and organised discussions, etc) where knowledge is developed and communicated in a highly ‘organic’ and

dynamic way and information is largely conveyed (from and to them) verbally; Digesters tended to need their knowledge related to the basic subject material (information and data) required to develop briefs and digests; and Implementers were more likely to need practical knowledge and related information in the form of how to implement process in the context of national and international policy.

It was possible to identify a set of generic skills common to all groups including: where to find information; where to find people who could find / provide information; and well-developed networking skills. For both the barriers and solutions to using knowledge, the responses (from the three groups) were generic and largely shared between the three groups. The main barriers were:

- Information overload
- Lack of time
- Fragmentation of information
- Poorly signposted information
- Restricted access
- Lack of coordination/collaboration
- Lack of knowledge
- Lack of/availability of data

The solutions were derived from the drivers provided by the barriers listed above. Most respondents recognised that there were probably few solutions for the current time pressures that they faced and that 'lack of time' was always likely to be an issue. However, many of the solutions were directly linked to increasing their efficiency and effectiveness (and therefore are timesaving solutions). The main suggestions included:

- Centralisation/ streamlining of information
- Thematic presentation of information
- Digests/briefings
- Filtered information
- Tools/mechanisms for information exchange
- Validation
- Database creation
- IT solutions
- Greater use of social media (e.g. Twitter, Facebook, etc)

The solutions to the barriers provided an important reference for the expressed preferences for, and expectations of the NoK. Thus the system should be Internet-based and it should be open access (and pertinent to civil society). Linked to this it should have no login or registration requirements or password protection and should be available to external stakeholders so that all users could have the same level of information. In general it should be easily accessible, fast, simple and reliable. As far as possible it should offer full coverage/ completeness in relation to the topics it included.

Specifically it should be a *portal based approach*, which provides clear and simple guidance on navigation to the user; supported by quality control and good management.

It should be a central repository of information which collates the information around a number of key areas or clusters. Primarily these should be directly linked to the current, live or emerging policy agenda. As far as possible it should represent a “one-stop shop”, comprehensive in its coverage; and deliver a high level of completeness (information about an available topic including policy, references, most up-to-date information, etc).

Where relevant it should also provide adequate links to websites featuring relevant live topics and information. It should also give details of key networks and projects (completed, on-going and future) of relevance to the policy topics; and indicate clearly how they may be accessed. It was felt that it might also provide a way to contact the right people quickly; by e-mail or chat. One interesting proposal was that it should take a social networking approach. From this perspective it could be organised in a way that resembles a social network such as LinkedIn or Facebook. Indeed the prominence of social networks as new and topical sources of information especially in terms of identifying and tracking emerging issues was an important and highly relevant finding.

3.1.3 Where do actors get their knowledge from?

Adding to the overview of knowledge holders and the insights on the needs of knowledge requesters in the previous section, knowledge about which knowledge sources actors (knowledge holders as well as requesters) actually use and base their work on, is not really available. So an additional task aimed to get more in-depth insight into and analyse the different sources of knowledge on biodiversity and ecosystem services used by researchers, policy makers and people who work actively in the science-policy-interface. To meet the information needs of the policy community and other decision makers and to translate research into policy, it is important to understand the information behaviour of policy-makers. Information behaviour can be defined as ‘[...] *the many ways in which human beings interact with information, in particular, the ways in which people seek and utilise information*’ (Bates 2010⁶, page 2381). It is well known that work roles and job-specific tasks highly influence information needs and therefore the information seeking process (see for example D.1.2). For this reason, the objective was to identify the different sources of knowledge on biodiversity and ecosystem services of the three groups; i.e. researchers, policy-makers and people who work in the science-policy-interface.

For this, a questionnaire was developed and completed by participants at a range of workshops and conferences. We compiled the results of three events: BiodiversityKnowledge Conference in Berlin, HIGRADE Course at the Helmholtz Centre for Environmental Research – UFZ, and a meeting at European Environment Agency (EEA). The main question was: “*Where do you get your knowledge from on biodiversity and ecosystem services for your daily work?*” In this context we used the term knowledge instead of information, clarifying in the questionnaire our definition of knowledge. Table 3.1 gives an overview of the questionnaire respondents’ fields of expertise and Table 3.2 summarizes how the three categories of respondents used the knowledge gathered.

⁶ Bates, M.J. (2010) Information Behavior. *Encyclopedia of Library and Information Sciences*, 3, pp. 2381-2391. (available online: <http://pages.gseis.ucla.edu/faculty/bates/articles/information-behavior.html>)

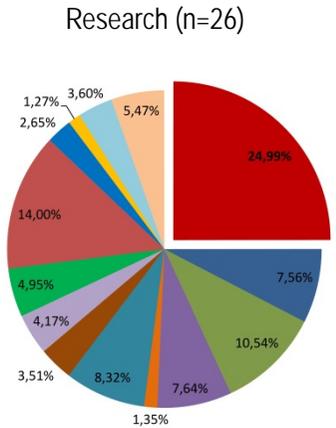
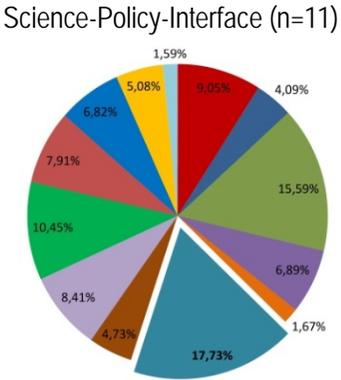
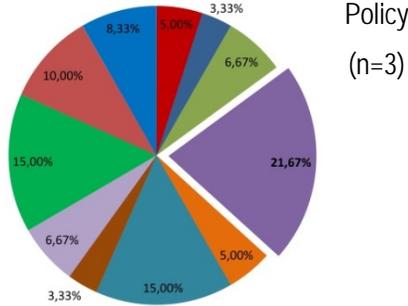
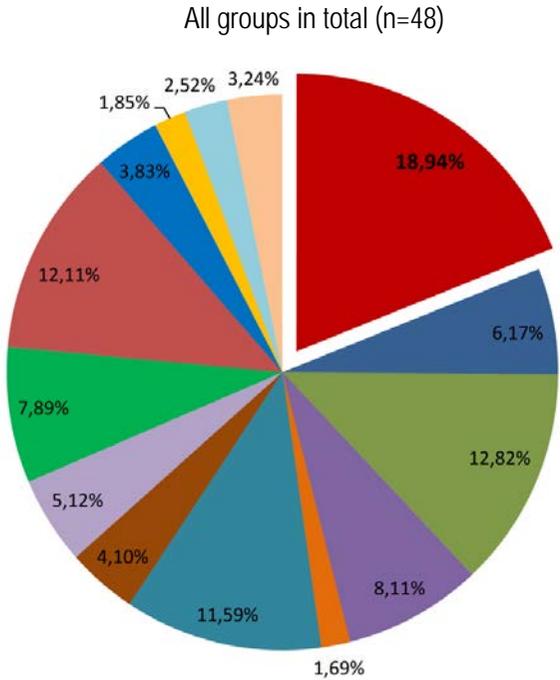
Table 3.1: Fields of expertise of questionnaire participants

policy	science-policy-interface	research
environmental policy, biodiversity related issues	ecology science-policy interface	environmental science
governance of biodiversity	science-policy-society interaction	landscape ecology
policy needs	biodiversity coordination	marine ecology

Table 3.2: Use of knowledge by respondents of the three different groups

policy	<p>write EU projects, write articles, books, participation in meetings. Conferences, giving presentations and lectures</p> <p>set standards for evidence quality, develop research agendas & influence other research funding bodies, advise government on research priorities</p> <p>[...] disseminate/communicate with others, work as expert (provide advice, assessment...)</p>
Science-Policy-interface	<p>link activities within organizations; develop ideas for assessments; support environmental assessments</p> <p>Use it for research, consultancy & education</p> <p>further development + implementation of CBD etc.; government advice; further development of science-policy-interface</p>
research	<p>preparing reports, studies, articles</p> <p>PhD research</p> <p>research; write papers; create collaborations, develop new research ideas</p>

Figure 3.3: Results on "Where do you get your knowledge from for your daily work?" exercise



Sources of Knowledge

- scientific journals
- books
- broadcast/media
- personal contacts
- social networks
- meetings
- grey literature
- official documents
- EU or National research projects
- personal and field experience
- specific institution or organizations
- newsletters
- courses/trainings/summer school
- other

DCA, executed with the software R 2.11.1: The category of the interviewee significantly explains the variation in sources of knowledge used (p-value=0.01399; R²=0.204)

For the analysis, we received 48 completed questionnaires. From the 48 respondents, eight did not answer the question "field of expertise". The differences between the groups (policy, science-policy-interface, and research) were evaluated using the detrended correspondence analysis (DCA) and were significantly ($p=0.014$) explained by the sources of knowledge as parameters. In figure 3.2-A, we present the results as pies for the groups researcher (26 respondents), policy maker (3 respondents), people who are working in the science-policy-interface (11 respondents), and one pie for all groups combined (48 respondents, including those where the field of expertise was missing).

For all groups combined (i.e. all field of expertise mixed) the most important sources of knowledge are *Scientific Journals* with 18.9 %, followed by the "*broadcast/media*" with 12.8 % and *personal/field experience* with 12,1 %. The least important sources of knowledge are *Social Networks* like Facebook or LinkedIn with 1.7 % and *Newsletters* with 1.9 %. For researchers the most often used sources are *Scientific Journals* with 25.0 %, *personal and field experience* with 14.00 % and *broadcast/media* with 10.5 %. The least used sources are *Newsletters* with 1.3 % and *social networks* with 1.4 %. Policy makers gather their knowledge mainly through *contacts* with 21.7 %, *meetings and EU or National projects* each with 15.0 %. *Books* as well as *grey literature* each with 3.3 % are the least important sources of knowledge for them. People who work in the science-policy-interface gain their knowledge mainly through *Meetings* with 17.7 %, *broadcast /media* with 15.6 % and *EU or National projects* with 10.55 %. The least important sources are *Courses/Trainings/Summer Schools* with 1.6 % and *social networks* with 1.7 %.

The results reveal that policy makers tend to use more oral sources like *contacts* or *meetings* and researchers tend to use more written sources like *scientific journals*, in their search for knowledge. This study showcases the mismatch of channel of communication used by both groups. Researchers mainly write articles and books, but policy makers simply do not read them. This implies that researchers should meet policy makers more often to *talk* about their results as *contacts* and *meetings* are very important sources of knowledge for policy makers. This could be one way to translate research into policy and to make knowledge available to policy and other decision makers. The results may look trivial but study, once published, may provide important insights for researchers and on their way of communicating their results should they wish to make more of an impact at the policy level. These results align with the earlier findings of the work package as well as with the results of the SPIRAL project⁷.

In the context of the NoK approach the study nonetheless gives important information on how results and products of a NoK should be communicated to policy makers. While written reports and policy briefs might remain an important element (including the fact that they ensure transparency and credibility of the results, e.g., when published via scientific articles), it is important to include the direct oral interactions in communication strategies, as proposed via the continuous exchange between knowledge holders and requesters in the NoK process. Also,

⁷ See www.spiral-project.eu and Young, J.C., Waylen, K., Sarkki, S., Albon, S., Bainbridge, I., Balian, E., Edwards, D., Davidson, J., Fairley, R., Margerison, C., McCracken, D., Owen, R., Quine, C., Stewart-Roper, C., Thompson, D., Tinch, R., van den Hove, S., Watt, A. 2014. Improving science-policy dialogue to meet the challenges of biodiversity conservation: having conversations rather than talking at one-another. *Biodiversity and Conservation* 23(2): 387-404.

a one-stop-shop as indicated earlier as a main need by the potential requesters (see 3.1.2) could play an important role linking these two modes of communication.

3.2 Developing and testing the prototype Network of Knowledge (WP 2 & 3)

3.2.1 How could a prototype Network of Knowledge serve the needs identified?

Based on the findings of WP1, and based on the multitude of experiences with science-policy-interfaces in Europe and beyond, the KNEU project team developed initial ideas on how a Network of Knowledge could work and serve different functions, thus addressing objectives 2-5 in an integrative way. The project team developed a draft NoK Green paper summarizing the initial ideas. The main element was a dedicated process description on how a Network of Knowledge would act to conduct assessments of knowledge on requests from decision-making actors (see Figure 3.4), starting with a joint scoping process between requesters and knowledge holders, followed by a joint decision on the methods and processes to use, including the involvement of relevant stakeholders in the complete conduction process. This would then be taken forward by a working group and would be reviewed by an extended peer-review approach, which would lead to the finalisation and adoption of the final report. Such a process is similar to other knowledge assessment processes, e.g. conducted by expert groups or in international assessments processes, but tries to combine their strengths with a more open and transparent communication of decisions and processes, including a choice of methods for each specific topic, depending on the nature of the topic and the availability of different knowledge formats. For example, a clearly set question with a good basis of quantitative data could use a systematic review approach, an applied management question could use an adaptive management approach (see KNEU D2.1 for details).

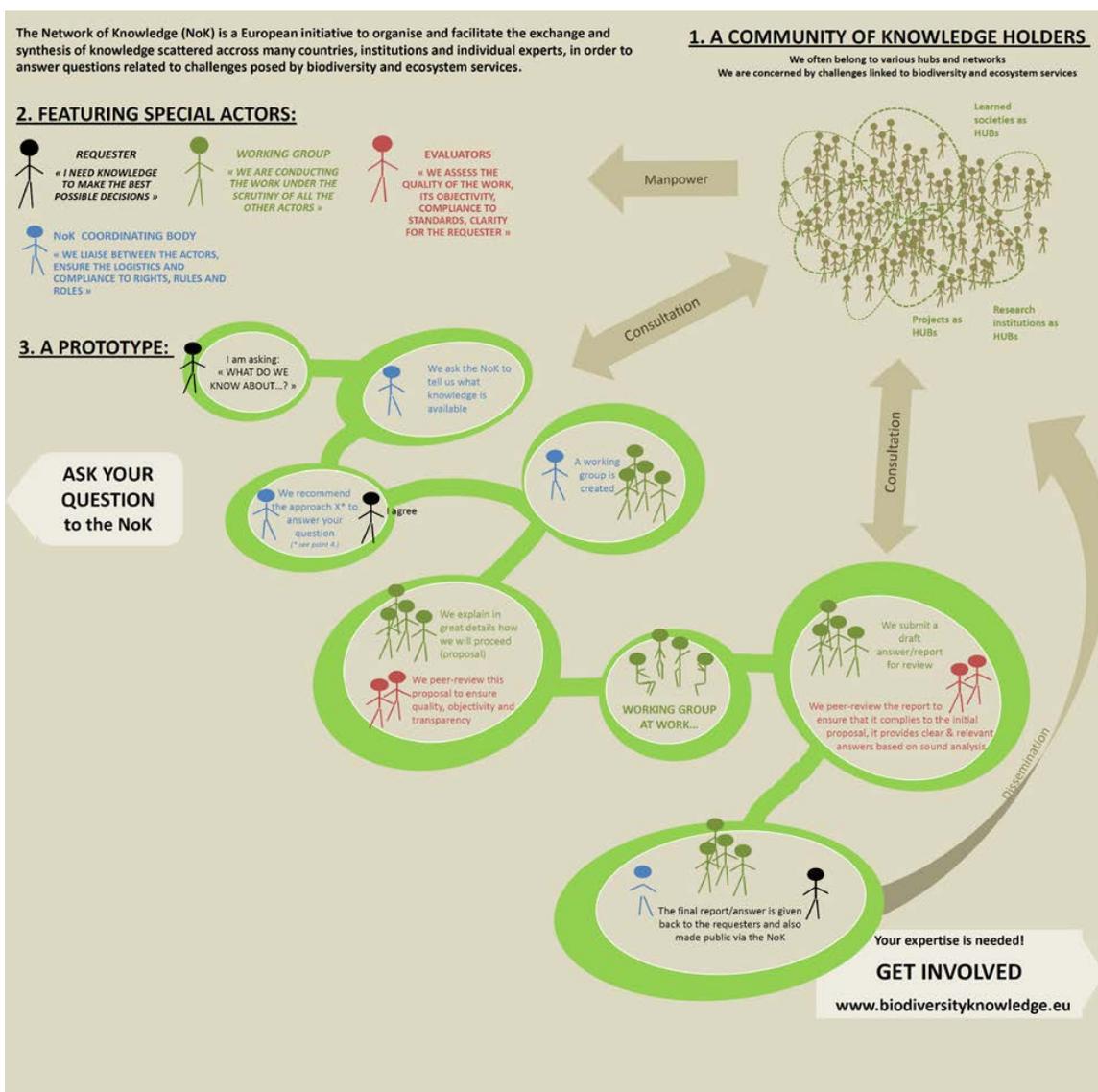


Figure 3.4: Diagram to illustrate on how the Network of Knowledge would operate to answer decision-making needs.

As it is important to involve as many relevant stakeholders as possible in this process, KNEU conducted a number of workshops, meetings and the first BiodiversityKnowledge conference (May 2012), as well as participated and presented at other events to jointly discuss these first ideas (see chapter 4.4 for list of main events). These discussions involved:

- Regional and national perspectives (three workshops in late 2011)
- Policy and user perspectives (regional workshops, KNEU dialogue group, 1st conference)
- Knowledge holder perspectives (regional workshops, 1st conference, and several presentations at scientific conference and meetings of other projects)

To give an example of the involvement of stakeholders, The 1st BiodiversityKnowledge conference in May 2012 had 86 participants from 20 countries. Participation was mixed in terms of institutional, but mainly from research background, with some exception from policy side, consultancy, business, NGOs. From a science perspective, a

dozen of key FP7 projects within biodiversity and ecosystem services, together with initiatives like Lifewatch, global research organisation such as IUCN or data portals such as GBIF and DAISIE participated. Presentations and discussions were shared through web-streaming with more than 500 people on the first conference day. All results were placed online for access on the project's website⁸.

For the NoK green paper, the following key messages were identified and then taken up in the revision of the NoK Green paper (KNEU Deliverable 2.1⁹), its application in the demonstration cases (see 3.2.2 below) and later on in the White paper (see chapter 3.4):

- **Enabling conditions for a NoK**
 - look at different groups
 - finances and acknowledgement crucial
- **Governance of the NoK**
 - Link up with existing institutions
 - Transparency of processes
- **Relevance**
 - Be clear about the policy side and its needs and interests (and the way of communication)
 - Specify the possible links to IPBES
- **Quality assurance**
 - Different levels to be addressed
 - Quality of input
 - Quality of process, ...
- **Different forms of knowledge**
 - Integration across the whole NoK process
 - Role in assessments to be clarified case by case
- **Evidence-based approaches**
 - Identify manageable questions
 - Use existing standards/ experiences
 - (check use of other approaches)
- **Building a Community of Interest**
 - Step by step approach
 - Explore existing IT-solutions for specific needs

3.2.2 Experiences and results from demonstration cases^{10, 11}

After the Green Paper had been finalised, the KNEU team conducted a set of three demonstration cases, where the prototype NoK approach was applied. The aim was to test the general process of the NoK approach and also test different methods of knowledge assessment in the demonstration cases.

The three case studies covered a broad range of relevant sectors of research and policy making:

⁸ <http://biodiversityknowledge.eu/conferences/first-conference-brussels-may-2012?layout=edit&id=50>

⁹ KNEU D2.1: The Network of Knowledge prototype: see, <http://biodiversityknowledge.eu/images/Documents/Deliverables/KNEU-D2-1NoKprototype.pdf>

¹⁰ This section is based on KNEU D3.1, and takes up this reports summary, see <http://biodiversityknowledge.eu/documents?layout=edit&id=88>

¹¹ We strongly acknowledge the voluntary contribution of all involved stakeholders in the demonstration cases, mainly requesters and experts such as scientists, researchers, policy-makers, decision-makers, and practitioners.

- marine case: *Current trends in kelp forests in Europe and evidence that these trends will affect the ecosystems biodiversity and the provision of ecosystem services;*
- agricultural case: *Effectiveness of interventions aiming at manipulating non-crop habitat or landscape features to maintain or support natural (indigenous) population of pest control agents;*
- conservation case: *Impact of multifunctional floodplain management on biodiversity*

The cases differed strongly in respect to the request and the choice of the topic. The marine case study was research-driven and provided an example of an important, urgent and policy-relevant question that was not considered by the current policy agenda. In the agricultural and the conservation case, policy-makers who were interested in being requesters for the case studies were identified. This procedure did not comply with the situation envisaged by the NoK-prototype, where a requester pro-actively contacts the NoK and its Knowledge Coordinating Body with a question. This led to several difficulties, because interest was low to participate in test cases for an approach that was untested, existed only on paper as a prototype, and for which it was unclear whether full implementation would ever be achieved. In the agricultural case, potential requesters were contacted at EU-level, in France and in Austria, while in the conservation case the focus was at the EU-level with some actors being approached also in Austria. This led to policy makers from France and Austria being requesters of the agricultural case and policy-makers from DG Environment for the conservation case.

Different methodological approaches were tested in the three case studies. In the marine case, testing the combination of different approaches was a clearly stated aim from the beginning. It started with an expert assessment to obtain a first overview of the emergent topic and to identify the necessity of going more in-depth on specific issues and their implications. A systematic review was added to address those implications for which there was a reasonable expectation to find enough published evidence in the scientific and grey literature, and the adaptive management approach was applied at the end to draft policy recommendations that would address current knowledge gaps and uncertainties by proposing robust management procedures specifically tailored to provide best-known-practices that accommodated conflicting interests among stakeholders and facilitated learning along their implementation.

In the agricultural case, the focus was at different aspects of reviewing procedures. A systematic review protocol was compiled and particular effort was dedicated to identify and screen the entire literature relevant for the chosen topic. A literature review was initiated on a subtopic of the question, and a systematic map was planned and the respecting work is currently conducted. During the agricultural case, a research team from Cambridge University working on the same topic and applying the reviewing approach termed 'synopsis of evidence' was identified.

In the conservation case, the focus was on a systematic review that should also consider non-English and grey literature. While compiling the systematic review protocol, we detected that two complementary expert consultations were required. One of them was required to cover non-English and grey literature because resources (e.g. time availability of voluntary experts) were much too low to cover these issues by the systematic review approach. The second was required to assess the multi-functionality of the interventions as this information was hardly reported in the primary literature. Given the broad topic that includes for instance all kinds

of floodplain interventions and all biological taxa), a systematic map was compiled in a preliminary version, while work on the systematic review was ongoing.

The main results of the marine case were that trends in kelp abundance were different depending on the region considered and the species of kelp. A map of trends in kelp forests in Europe was produced that revealed many gaps of knowledge, mainly due to lack of monitoring data, lack of coordinated studies at European scale, lack of time of the involved experts to deal with not easily available information, and problems of mapping general knowledge of experts that was based on their personal overall expertise rather than on spatially explicit data. In the systematic review 3886 records were retrieved, 78 of them were retained after reading the abstracts, and 44 were analysed. Most of them were completed rather recently in the US, and dealt with the impacts of changes in kelp forests on fisheries. 86% showed evidence for positive and 9% for negative relationships between kelp abundance and associated fish populations, respectively. These results support the important role of kelp for fisheries. The Adaptive Management of kelp forests was discussed in a workshop that aimed at bringing together a representation of different stakeholders. The workshop was preceded by a preparatory phase in which participants were interviewed using a semi-structured questionnaire. Techniques of collaborative modelling were applied to build a joint conceptual model to identify key constraints, knowledge gaps and uncertainties and a final set of recommendations was derived that included for instance the establishment of a European monitoring scheme for kelp forest sites, a coherent European system to record harvest effort and yield, a monitoring program based on citizen science, and a research program assessing the effects of kelp farms on neighbouring kelp forests and their ecosystem service provision.

In the agricultural case an extensive literature search based on a large set of search terms was performed and produced 39000 literature references, which provided the basis for the intervention classification and the evidence extraction. In a series of exclusion steps, based first solely on article titles, then also on abstracts, the selection was narrowed. 60 different interventions related to pest control in agricultural landscapes were identified and it became clear that the available evidence was highly heterogeneous, with some interventions having been treated extensively in a large amount of literature (e. g. organic farming), while other interventions having been largely neglected. Ten of these interventions were considered as highly important by experts and stakeholders, and a set of 15 interventions related to landscape patterns were finally chosen for a systematic map approach to classify the evidence referring to these measures. A small expert group was set up to deal with the topic of linear strips in agricultural landscapes in closer detail. Thirteen pest control interventions will become available by early June by the collaborating team of the University of Cambridge, and further 4-5 interventions will be added in the coming months up to September. The list of interventions will be also finalized and published along with the systematic map of references found for each intervention. Further preliminary results are that linear weed or flower strips seem to increase overall biodiversity within the landscape but that they also enhance the abundance of generalist predators. Ambiguous results were reported in respect to the spillover effects from weed/flower strips into adjacent fields. We found very few significant results showing the pest reduction effects of pest control agent's dispersal, and no study that investigated the pest control effects of landscape structures, in particular linear strips, on yields. Most studies inadequately controlled for confounding effects from the surrounding

landscape or had other shortcomings in study design. Some insignificant results are possibly caused by small sampling size, so a meta-analysis might yield a more consistent picture. In general, more research is needed to qualify landscape structures as pest control measures, but knowledge available to date indicates that such a role is possible. Establishing the evidence-base for this knowledge will require more work on the data and methods before reaching any conclusion.

The main result of the conservation case are that floodplain restoration and conservation lead to multifunctional landscapes that provide a big variety of ecosystem services and potentially clear positive effects on biodiversity. For the systematic review, we compiled and tested a comprehensive and still targeted search string and a tailor-made quality assessment scheme in the systematic review protocol, and 4131 hits were obtained in the databases Scopus and Thompson Reuters Web of Knowledge. As reported in the systematic map, 491 papers remained after screening titles and 70 after screening abstracts and full texts, most of the others could not be included at this stage for some missing information that would have been required. The journal *River Research and Applications* was the main source of evidence and most of the articles were published since 2008, reporting primarily about studies conducted in floodplains of the USA, Germany and France. Tested interventions were often related to restoration and production, and arthropods, fish and birds were the most commonly studied organisms. Most studies were carried out shortly after the intervention took place, while only a few of them evaluated long-term effects of interventions. The expert consultations provided examples for recent multifunctional management approaches and first evidence for their biodiversity effects for six European countries. Regional differences in management goals and approaches were detected, and multifunctional floodplain management seems to be possible under all strategies. Differences in size and number of projects mainly occur due to different levels of responsibility for water management, while there is a compelling common set of measures all over Europe, targeting not only the restoration of hydrological connectivity at different scales, but also the adaptation and extensification of land use in floodplains. Biodiversity may benefit from all these interventions but evidence is rare as only few projects have documented the respective impacts and responses. When assessing the impact on 21 ecosystem services of each of 38 floodplain management interventions, we uncovered that interventions related to restoration and rehabilitation strongly increased the multi-functionality of the floodplains and caused win-win situations for enhancing overall ecosystem service provision, but also the provision of multiple ecosystem services related to each of the sectors production, regulation and maintenance, and culture. Conventional regulation but also interventions related to extraction, infrastructure and intensive land use often caused lose-lose situations. We conclude that seemingly no alternative exists to multifunctional approaches in future floodplain management. To efficiently manage ecosystem services, win-win-situations need to be achieved and biodiversity has to play a crucial role. Multifunctional approaches mainly show success where stakeholders with diverse expertise and interests are involved in all stages of planning and implementation of regarding projects. Such participatory processes are recognized as being beneficial for environmental resource management, but implementation of is still dragging behind rhetoric.

The particular lessons learned in the three case studies were partly complementary, but had at the same time several important issues in common. For broad questions as posed by policy-makers, large amounts of evidence could be detected and much effort was needed for its screening and categorizing. However, given the variability of environmental issues, big knowledge gaps became obvious. For several specific interventions and even more for combinations of specific interventions and specific species, species groups or ecosystems, robust studies of high quality standards lacked entirely, and applied research on biodiversity and ecosystem services is heavily needed to enable evidence-based policy making.

A further important insight was that despite much dedication of effort and time at the first dialogue phase with requester and experts, questions and aims of the procedure were often too broad, not sufficiently focused and too heterogeneous to be tackled in a single knowledge assessment procedure. Thus, involved stakeholders (mainly study coordinators, participating experts, requesters, policy makers, and funders of such assessments) should be strongly aware of the need to re-discuss the setting of the questions in the light of new information about volume, heterogeneity and content of the related evidence. For questions raised by academia, lack of interest from policy-makers might be an obstacle for the adequate performance of the NoK-prototype.

Under the setting of voluntary expert contributions, recruiting experts to dedicate effort and time for the assessments was problematic. Some motivated experts were attracted by the networking possibilities offered by the process, the chance to participate in a larger international assessment that might be taken up by policy makers, and by the opportunity to participate in scientific publications. But despite big efforts dedicated by single experts, most potentially interested persons were too busy with their professional tasks and could not dedicate time for the case studies. A formal tendering process with clear terms and supporting infrastructure may be necessary in some cases to ensure expert involvement and contributions, and to enable continuity and efficient working processes.

Workshops and to a much lesser extent teleconferences were very important in this context. They led to a boost of motivation and were a very effective way of advancing in the assessments as they enabled deep interdisciplinary discussions, exchange of ideas and perspectives on the matter, and face-to-face networking opportunities. Generally, bridging the gap between scientists (primarily interested in disseminating and exchanging original research) and practitioners and managers (primarily interested in applying available knowledge and being successful with it) was a major challenge in the process. Scientific knowledge was also much easier to access than other forms of knowledge, such as practical experience or indigenous knowledge. None of the tools designed for the access of scientific knowledge, such as literature databases and search engines, worked well for alternative forms of knowledge. Modular approaches, where some aspects of knowledge were assessed by means of reviewing evidence and others by expert consultations might be a solution for this challenge, and could perform particularly well, when combined with collaborative adaptive management approaches.

Testing the NoK prototype was limited by resource constraints, which allowed only a simulation of the processes involved in knowledge assessments. We faced the challenge that despite considerable effort the project KNEU

and the NoK-approach was not enough well-known to be a priority issue for several potential requesters or potential members of expert groups.

The potential added values of the NoK-approach are as follows:

- The negotiation/scoping process with requesters under expert involvement can lead to a research question that is both scientifically achievable and politically relevant.
- Due to the high heterogeneity of environmental issues and the scattered nature of the knowledge landscape, inclusiveness is of particular importance for assessments of high credibility and can be improved by the NoK approach. In all stages of the assessment, from the framing of the question to the conclusions and recommendations of the obtained results, the broad contribution of a diversity of experts guarantees a high level of independence and a high probability of objective (methodological) choices.
- The NoK can also integrate knowledge (such as grey literature, local expert knowledge, and traditional knowledge) that is not accessible in ISI-journals.

For these reasons, the NoK offers a significant and cost-effective added value in terms of credibility, legitimacy and independence. However, to obtain these added values, the NoK must be adequately implemented. Therefore it is required a NoK that is based on a comprehensive, continuously actualized and user friendly database of knowledge holders, and for the rationale of the NoK and its benefits for all involved stakeholders to be strongly promoted. Potential funders must be aware that environmental assessments on broad topics that should enable evidence-based policy making require a low susceptibility for bias, high robustness and quality and the dedication of much effort. The NoK-approach will develop its full added value and deliver a cost-benefit performance once it is adequately funded and implemented.

3.3 Challenges for setting the NoK into action (WP4 & 5)¹²

As already outlined in the development of the Green Paper (see 3.2.1), a number of challenges comes with the development and set up of a NoK. To better identify and understand these challenges, and develop solutions in the White Paper, the KNEU project had an in-built-evaluation process that accompanied the steps of developing the Green paper, discussing it and testing it in the demonstration cases. This was carried out by an independent team within the project. The results are given in detail in KNEU D4.1.

The evaluation was designed to analyse the issues involved in developing and testing the prototype NoK. The evaluation was based on an evaluation framework and results from 89 semi structured interviews carried out with 79 participants and consortium members who contributed their expertise and ideas into the process of designing and testing the prototype NoK, and members of the Client Dialogue Group which had an advisory role in the project. The evaluation operated as an iterative process with findings disseminated to help inform progress of the project, and facilitate reflection and learning within the project consortium.

The evaluation focussed on the challenges and recommendations for the design and testing of a NoK. Five key

¹² This section is based on the executive summary and lessons learned from KNEU D4.1, see http://biodiversityknowledge.eu/images/Documents/Deliverables/KNEU_WP4_D4.1_final_subm-1.pdf

issues were identified in the findings which should be considered in the planning and implementation of a credible, relevant and legitimate NoK.

1. **The need to develop and maintain a strong focus on the process of the NoK** throughout its planning and during implementation to help ensure the NoK meets its objective to effectively transfer knowledge into the decision making process and influence the actions of policy makers. To achieve this it is essential in the NoK to bring all different but interrelated elements which make up the NoK process together, to clearly lay out from the start how things will be done to better transfer knowledge into the decision making process and to ensure the whole is greater than the sum of its parts.
2. **The need to include different groups in the planning and implementation of the NoK**, ensuring they are represented at all levels and from the very beginning. A wide range of expertise, skills, knowledge sources and knowledge types and perspectives are essential to ensure the overall success of the NoK. Expertise from social sciences and practitioners, particularly those working on science, policy and society interfaces were specifically identified as key. Skills such as facilitation, negotiation and advocacy were also identified as important to implementing the NoK processes. Once again this will require an understanding of the motivations of different groups that need to be engaged in the NoK.
3. **The important role of communication within and outside the NoK**: Different groups within the NoK may have different information needs and communication styles. The evaluation highlighted a link between communication and transparency, which is a key aspect of building trust in the NoK to help encourage individuals to contribute, use information produced from the NoK and promote the NoK within their networks.
4. **Ensure the outputs from the NoK are usable in the policy community**. To improve the policy usability of the outputs the evaluation suggested that the NoK seeks this information at the start of the process to help frame the question with the target audiences, consistently use language which is relevant and understandable in the policy community and selects and prepares appropriate tools to disseminate this information to the target audiences and wider.
5. **Capacity-building will be an important aspect of any future NoK**, requiring support not only from donors, but through strengthening links with different organisations, networks and initiatives at both the European and to a lesser extent national levels. A process of reflection and learning must be central to the NoK to help build bridges and reduce gaps between groups and move ever closer to collaborative working and information sharing.

The key five issues identified in the evaluation are interlinked and in order to achieve a credible, relevant and legitimate NoK all of these issues must be addressed together to strategically plan, implement and adapt the NoK as needs arise.

3.4 The recommended design for a Network of Knowledge (WP 5)

3.4.1 Introduction: Developing the NoK White Paper

The following summary is based on the executive summary of the final product of the KNEU project¹³, the NoK White paper, proposing “a recommended design for “BiodiversityKnowledge”, a Network of Knowledge to support decision making on biodiversity and ecosystem services in Europe”. It captures the basic approaches and principles that were derived during the final phase of the project, based on the work conducted in the previous work packages, and an extensive consultation process, which included the following steps:

- **September 2012: first document draft** prepared by the team of WP5 & 2, based on the work done in WP1, WP2 (Deliverable D.2.1), including the discussions at the first project conference in May 2012 (Brussels, 80 participants) as well as at several workshops
- **October 2012: First draft discussed within KNEU consortium**
- **November 2012: revised first draft discussed with stakeholders in Dialogue Group**
- **December 2012 - April 2013: Development of second draft**, completely revised and more focused to key functions of the NoK
- **April 2013: Consultation on second draft with Dialogue Group and with WP2, 3 and 5 of the KNEU team**
- **July 2013: revision second draft and consultation within the whole KNEU consortium**
- **August 2013: Development of third draft and launch for open consultation**, including direct feedback from institutions and use of workshops to discuss specific elements of the Biodiversity Knowledge structure
- **September 24-26, 2013 Berlin: 2nd BiodiversityKnowledge conference for detailed discussions of third draft**
- **January 2014: specific additional expert workshops** to specify issues on methods & questions in policy support function and governance models, wrap-up workshop of core team to derive NoK recommended design
- **March 2014: final consultation and preparation of final draft** with KNEU partners and external partners participating in discussions so far, requests for some specific final inputs
- **April 1, 2014 Brussels: European Parliament Science Policy Society conference** “Towards a consolidated Network of Knowledge on biodiversity and ecosystem services in Europe” (140 registered participants; meeting to present the NoK approach in a political setting and “ground check” its feasibility from a diversity of perspectives)
- **April 2014: Final full report and communication of result**

3.4.2 Background

Biodiversity, its related services and therefore human well-being, are at risk. This is the backdrop behind the need to better connect knowledge on biodiversity and ecosystem services with decision-making. We know a

¹³ see http://biodiversityknowledge.eu/images/PDF/BDK_ExecSum_prefinal.pdf

great deal about our natural environment, sufficient to halt its continuous loss, but “much of the available science and experience is not being effectively used” (EPBRS 2009¹⁴). The need to improve the interface between science and policy was highlighted in the 7th Environment Action Programme for 2020 in its priority objective 5 to improve the knowledge and evidence base for European Union environment policy¹⁵.

The challenge in improving the science-policy for Europe is two-fold. On one hand, scientists and other knowledge holders produce high quality knowledge, but access points to this knowledge are still scattered and poorly organized across disciplines and institutions. While some of this knowledge may indeed be used and fed into policy, via agencies, consultation processes and advisory boards, the majority remains unused. On the other hand, knowledge needs and interests of decision-makers are often diverse, can come at short notice and often, scientific ways of providing knowledge are not tailored to these needs.

To counteract these challenges, efforts to strengthen the science – and, more generally, the knowledge-policy interface¹⁶ on biodiversity and ecosystem services – have increased considerably over the last few years. These efforts are further enhanced by the launch of IPBES¹⁷ which starts its work at the global scale in 2014. As the word ‘interface’ indicates, what is needed is an operating space at which the two systems ‘knowledge’ and ‘policy’ (and other decision-making) interact. To create and enhance this interaction both complex systems have to be organized accordingly. If both sides are properly organized, facilitating their interaction may be sufficient, avoiding the need for a third complex system in between. The EU project KNEU was set up to help organize the ‘knowledge’ system, or community, through the creation of a ‘Network of Knowledge’, called BiodiversityKnowledge.

A Network of Knowledge (NoK) is understood as a ‘network of networks’ of existing institutions, initiatives and projects (EPBRS 2009¹). It acknowledges that many processes are already ongoing and that identifying and connecting them is crucial. Many institutions hold knowledge on biodiversity, but decision makers have difficulties finding the type of answers they need. BiodiversityKnowledge will improve this situation by providing an entry point for questions and collecting the available knowledge to answer a request for knowledge in the best possible manner (depending on means and time-frame) and thus also provide knowledge holders with a better pathway for providing their inputs into decision making. This NoK will integrate available knowledge and process it in a sound and reliable way to provide answers to decision makers in a format that they can readily use (see also back cover for the mission and principles of the NoK).

¹⁴ EPBRS (2009): Concept note on a European Network of Knowledge on Biodiversity, online at http://www.epbrs.org/PDF/2009%2009%2010%20Concept%20note%20on%20the%20network%20of%20knowledge_version%202-1.pdf

¹⁵ European Union (2014): General Union Environment Action Programme to 2020 – Living well, within the limits of our planet.- Luxembourg, Publications Office of the European Union

¹⁶ Today, the commonly used term is still “science-policy interface”, although the term “knowledge-policy interface” is more suited to the objectives and approaches of BiodiversityKnowledge, as it recognizes that different forms of knowledge (including but not only science) are relevant for policy and decision-making.

¹⁷ The Intergovernmental Platform for Biodiversity and Ecosystem Services, see www.ipbes.net

3.4.3 BiodiversityKnowledge: a tailored Network of Knowledge to meet policy and science needs

During the course of designing BiodiversityKnowledge, a broad consultation with scientific and policy experts identified four main functions which a NoK should address:

- (1) **a Networking and capacity building function (NET)**, to better network existing knowledge holders and their knowledge to improve access to this knowledge. This includes a strong element of capacity building activities to strengthen the community of knowledge holders and their ability to participate in the processes of the following functions.
- (2) **an Answering-Decision-making-Needs function (ADN)**, to improve the support of decision making through the provision of relevant knowledge on a request-driven basis with tested methods and protocols. The objective is to provide consolidated views on specific topics and to make use of relevant types of knowledge including practical and local knowledge.
- (3) **a Research Strategy function (RS)**, to identify policy-relevant research gaps and how the research landscape could be used to address them (see full report for description).
- (4) **an International Collaboration function (IC)**, to use and disseminate European knowledge into international science-policy processes like IPBES or SBSTTA-CBD, as well as foster European links to global research efforts (see full report for description).

Here, we focus on the first two functions, which correspond to the basic functions of a NoK. All four functions and their inter-linkages are further developed in the full report.

3.4.3.1 The Network and capacity building function (NET- function)

As a bottom-up approach, BiodiversityKnowledge should first provide the means for a more responsive biodiversity knowledge community. For many decision makers, reliable and rapid access to existing information, knowledge and expertise may be sufficient for some of their needs, but even such access is often lacking. Interviews on knowledge needs showed that an internet-based “one-stop-shop” or web-platform as entry point to this constantly evolving knowledge would be very helpful, providing access to existing data and information and the opportunity to address knowledge holders directly.

The Biodiversity Information System for Europe (BISE), established in 2010, is currently the most advanced starting point for such a portal, covering a broad range of biodiversity-relevant information. But it currently lacks an explicit link to the knowledge holder community (in science and practice). In this context, KNEU has mapped the biodiversity knowledge landscape and its flow, identifying key knowledge hubs and their respective networks. By linking these, BiodiversityKnowledge could create a ‘Network of Networks’ and add complementary value to the work of BISE, including:

- An **overview of finalised and on-going research activities at the European level**, including direct links, sorted by themes to existing information, knowledge and expert networks;
- A **‘knowledge holder’ area** where knowledge hubs are registered and able to present themselves and their work;
- A **‘thematic knowledge area’** to access knowledge from different policy-relevant perspectives. It could include digests of knowledge as entry points and then links to both the ‘project’ and the ‘knowledge holder’ area for further information and detail. Using thematic areas as main building blocks would also help build the platform step by step;

- An online ‘forum’ to allow knowledge users to ask questions to the community of knowledge holders and projects. It could be either open, or restricted (or anonymized) to allow requesters to pose controversial or ‘simple’ questions.

For all above elements, an analysis should be carried out to ascertain whether they can be included in BISE or addressed by existing networks¹⁸, with clear links to BISE.

The network will need a strong ‘**capacity-building**’ component to support mutual learning between knowledge holders and decision-makers about needs and restrictions in their respective work, but also capacity-building on methods for synthesising knowledge for decision-making needs (see 2.2). Capacity-building will also enhance the capacity and willingness across knowledge holders to get actively engaged in the Network of Knowledge.

Such a ‘Network of Networks’ of existing institutions would form the basis for both a broad engagement strategy of the knowledge community in the biodiversity science-policy dialogue in general, and for the second function a NoK should address: the Answering-Decision-making-Needs (ADN) function. The added value of the Networking function is summarized in Box 3.1.

BOX 3.1: The added value of actively developing the biodiversity knowledge community via the Network and capacity building function (NET-function)

***Knowing who is who:** by helping the knowledge holders organize themselves, the potential to identify right addressees for requests will be strongly increased. Similar approaches at the national scale have shown that this is an essential ingredient for success at the Science-Policy Interface.*

***Enhancing collaboration:** bringing together different disciplines and expertise across countries on a specific topic, will strengthen collaborative work. It will contribute to consolidating and better using existing databases. Knowledge holders will be able to have access to the work of others and build on it, thus contributing to tangible progress in biodiversity knowledge and policy.*

***Making the link between knowledge forms (including science) and policy more explicit** will help build a broad knowledge community and enhance the exchange between science and other knowledge holders, e.g. from practical biodiversity management via the thematic knowledge areas. Further developing this link is crucial for a better integration of knowledge.*

***Enhanced responsiveness:** in complement to existing platforms, a more diverse and mutual exchange of knowledge holders and requesters will increase awareness on both sides on “what is out there”.*

***Enhance cost-effectiveness** of investment in European research: The Network-function will enhance the ability to use knowledge gathered in European projects and beyond.*

3.4.3.2 Answering-decision-making-needs function (ADN-function)

The second function of the BiodiversityKnowledge NoK is to explicitly support European policy at different times in the policy cycle – in the development, design, implementation, monitoring, evaluation and reporting of policy and management strategies.

¹⁸ On the European level, the major networks include the former ‘Networks of Excellence’ on biodiversity topics and the common infrastructure LifeWatch (www.lifewatch.eu). On the global level, linkages will need to be explored in the context of the evolving work of IPBES.

Whenever a topic requires an in-depth analysis and a consolidated view from science, specific activities to synthesize and analyse existing knowledge will be needed. To serve this second function, BiodiversityKnowledge would provide an interface where knowledge holders are addressed and activated to jointly synthesize available knowledge on a given topic. The process is thus a request-driven knowledge-policy interface. Such a process has three phases: a preparing, a conducting and a finalising phase (see Figure 3.5)¹⁹.

Different types of actors will be involved in this interface: knowledge requesters, knowledge holders, organised in ad-hoc working groups or acting as evaluators, and a knowledge coordination body (KCB) to coordinate the whole process (see chapter 3 and 5.6 of full report).

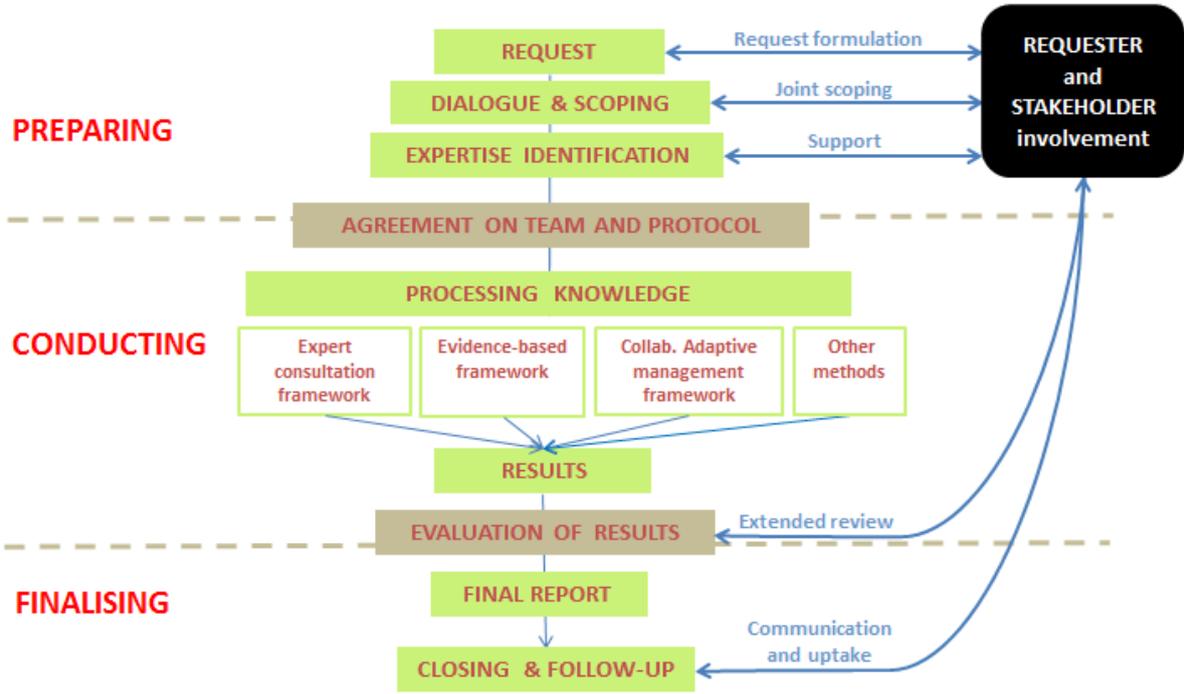


Figure 3.5: Workflow to address the Answering-decision-making-needs function and where requesters and other stakeholders might get involved. See text for short explanation. A complete narrative explaining the workflow can be found on www.biodiversityknowledge.eu

Through the Knowledge Coordinating Body, requests for policy-relevant knowledge are dealt with in a stepwise process, opening up a continuous dialogue between knowledge users and providers while ensuring a broad level of transparency.

For the **preparing phase**, a dialogue and scoping process between requesters and knowledge holders will be central to properly identifying the requester’s needs and how these can be framed in order to be answered.

The KCB will then convey the question to the NoK to identify what knowledge is available on the question raised. The question can then be dealt with in different ways, depending on the timeline of the policy process to be informed, the availability and type of knowledge needed (including for example practical management knowledge), and the resources available to conduct the work.

¹⁹ The general process presented here is similar to the one evolving for the work of IPBES. The BiodiversityKnowledge approach and governance add to this a high level of transparency and traceability and options for using different methodological approaches. The mechanism would thus further strengthen the credibility and legitimacy of the process.

Following the final acceptance of the request, a working group is created for the **conducting phase**. This group will assess the question in detail and double-check with the requester, if further specification is needed. The working group will discuss and determine the adequate methodological approach to be used. They can propose expert consultations, a systematic review, an adaptive management approach or other suitable methods. The approach will be outlined in a protocol which will be made publicly available for comment, to ensure transparency of the process. The working group will then use the agreed method(s) to compile relevant answers to the question raised. The draft response will be made available for an extended peer-review by both experts and decision makers, to ensure it provides clear and relevant information and is based on sound analysis. This step is important to ensure quality and credibility of the results, and will, as all other steps be documented transparently via the website.

BOX 3.2: The added values of establishing a clear process for answering decision-making needs are as follows:

***One entry point for requests:** The need for an entry point for requests from decision making to science and other forms of knowledge has been articulated clearly across the KNEU project by many stakeholders. The questions to be addressed will nonetheless be limited in number and only be addressed if they go beyond the scope of existing mechanisms like consultancy contracts and the work of responsible agencies and other bodies.*

***Ensuring broad and updated coverage of the available knowledge:** Knowledge synthesis within the NoK enables broad participation and includes an iterative process with several review loops and opportunities to provide feedback at all stages of the process as well as other means for controlling and increasing quality.*

***Ability to access knowledge at appropriate scales:** The direct link to the open 'network of networks' enables expertise to be targeted at the appropriate scales from local to global. It will also facilitate the inclusion of knowledge other than science, for example traditional ecological knowledge.*

***Using tested methodological approaches:** Although flexibility will be needed, a high level of credibility can only be achieved through sound methodological approaches. The methodological 'toolbox' proposed and tested in the NoK will be crucial for this and explicitly adds a new dimension of quality and transparency that enables the NoK to address different kinds of questions thereby going beyond a standard assessment process.*

***Transparency of processes:** In addition to using tested methods, the NoK process will clearly document every step in addressing a given request. It thus allows a broad participation and opens up to different perspectives in science and beyond.*

***Reducing reaction time:** for responding to policy needs and shortening the timeframes for information to reach policy makers. It will also facilitate rapid updating of synthesis by easy exchange of knowledge.*

Thus, BiodiversityKnowledge will be able to provide a consolidated view from science, and include other forms of knowledge as necessary.

In the **finalising phase**, the product, which might be for example a report tailored to the needs of the requester, a policy brief, a set of recommendations or scenarios is handed to the requester of knowledge, and is made publicly available. All contributors are widely acknowledged.

Decision-makers can then draw on a consolidated view from science (and other knowledge, as appropriate), which is directly relevant to their specific question, and can therefore make better-informed decisions. The added values of the process proposed for the NoK are summarized in Box 3.2.

3.4.3.3 How the functions work together

Figure 3.6 outlines how the two functions described above and the research strategy function would work together to provide a range of approaches: from direct answers (for example using BISE as web-platform) and access to readily available knowledge (upper part of the figure), down to more detailed, in-depth analysis, and/or synthesis using the approach presented above in the “Answering-decision-making needs” function.

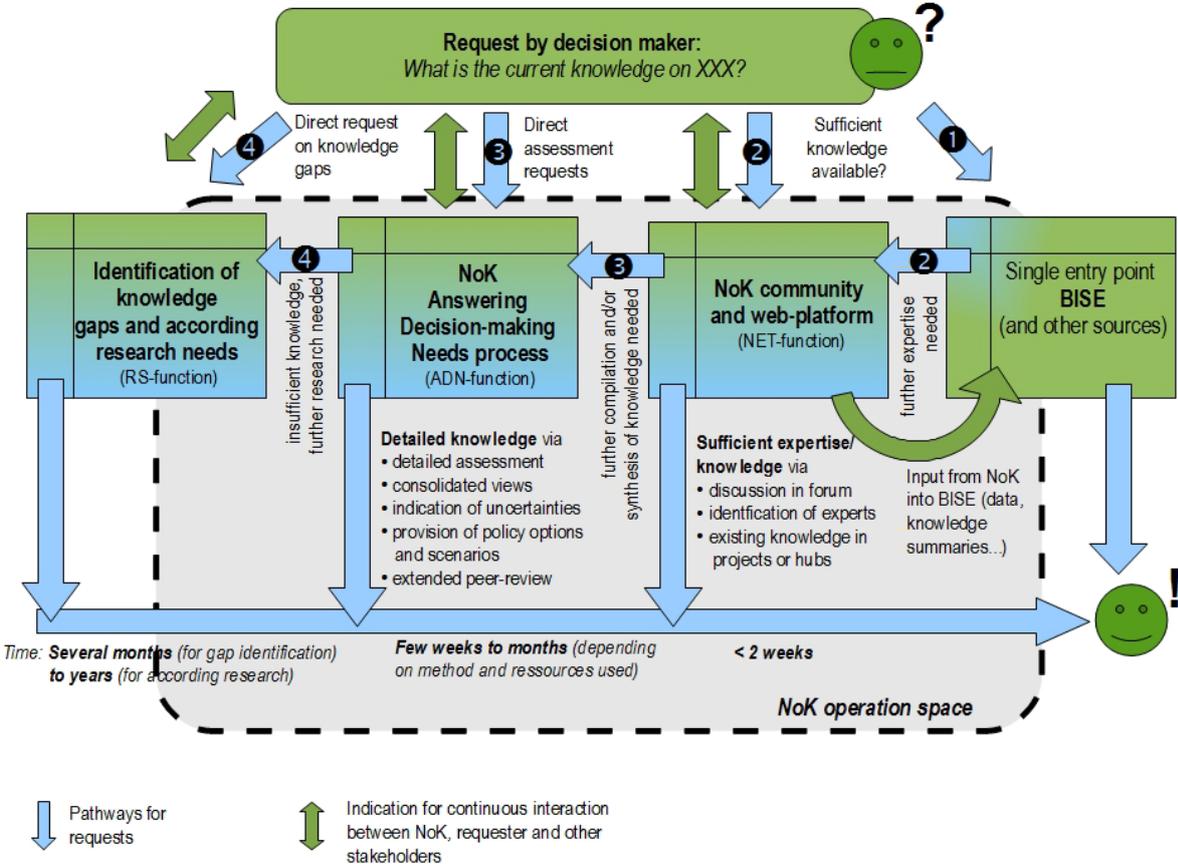


Figure 3.6: Flowchart of the entry points where the NoK can support decision making by identifying and collating relevant knowledge and thus integrating the three functions of networking the networks (2.1), answering decision making needs (2.2) and supporting the research strategy

Figure 3.6 outlines the potential general ‘pathway for requests’: A decision-making need is identified. If the requesters are not able to answer it using their usual means, they may use ❶ BISE (or other specific sources/platforms) as a single entry point to look for available knowledge. If this is not sufficient, a next step could lead them to the NoK with its three functions ❷ the NET-function to find quick answers via identification of existing synthesis work or direct contact with experts, ❸ the ADN-function for targeted knowledge synthesis activities and ❹ the RS-function to identify research needs (see full report for detailed description).

The latter approaches, i.e. entering the NoK operating space will lead to more in-depth and consolidated views from a knowledge perspective, and might lead to the identification of knowledge gaps and further research needs. Figure 2 also highlights that taking a topic beyond step 2 will take much more time and resources, but will significantly increase the credibility of the knowledge analysed to answer a request. The NET-function, by integrating across projects, disciplines and institutions, will in the medium-term strongly support the knowledge base available directly via the web platform/BISE (green feedback arrow from step 2 to step 1), ideally allowing for less questions to be posed directly to experts and the network and avoiding duplication of work.

3.4.4 A recommended design for the governance of the NoK

In designing the NoK and based on earlier experiences, a set of bodies, rules and procedures can be identified to enable the knowledge community on biodiversity and ecosystem services to enhance the credibility and relevance of the activities at the science-policy interface and serve the functions described (see chapter 5 of full report for further details).

A mandate from policy would help to communicate that the work and results of BiodiversityKnowledge are needed and acknowledged as an important input into decision-making processes.

Several **options** for the design of BiodiversityKnowledge have been developed, ranging from an option improving the networking model to an option of a platform model based on dedicated institutions with the capacity and mandate to answer requests (see chapter 5.5 of full report). From these options, the NoK recommended design was developed. It aims at balancing different challenges faced when setting up new innovative structures, including funding, avoiding overlap with existing institutions, fostering openness, transparency and inclusiveness of processes, considering timeframe and scale (see principles on back cover).

The recommended design proposes a governance structure with four main bodies:

- a decentralized **Knowledge Coordination Body (KCB)** of about ten members that cover with their expertise the whole range of functions, with a specific focus on thematic and methodological expertise for the answering of decision-making requests.
- a **Secretariat** overseeing the daily business and coordinating the NoK work flows and communications.
- an **Advisory Board** with eminent experts from knowledge holder institutions as well as decision-making institutions advising the KCB on strategic issues.
- an independent **Evaluation Body** that would actively support the KCB and the secretariat in their work regarding procedures and structures.

The KCB could be set up initially by a number of dedicated institutions in a pilot phase, which would ensure a broad involvement via existing networks, but would also guide the NoK into a permanent open structure mainly based on individual membership. Funding is anticipated to come from different sources, including project funding, contributions by members, but also direct support from policy institutions.

Central to the success of the NoK will be its direct link to decision-making in policy and beyond. For this, links need to be established, as discussed in the full report jointly with further details on governance and financing options. The Network of Knowledge is a proposal to better organise the knowledge side of the interface, within the wider context of improving the evidence base for policy making as recommended in the Seventh Environment Action Programme. How the policy side of the interface and the interaction between science and policy beyond specific requests could be structured needs to be determined in the discussions on an EU mechanism for improving knowledge on biodiversity and ecosystem services.

To conclude, an innovative approach like the NoK can only be set up in a stepwise approach, supported by core kick-off funding. Based on this, a detailed business model will need to be developed and set up. The full NoK report²⁰ provides the baseline for this, and first steps have been taken to bring together key partners in the discussions during the KNEU project.

4 Potential impacts

4.1 Introduction: Lessons learned from the KNEU project²¹

Besides the detailed insights summarized in the White Paper and its summary above (chapter 3), we highlight here some more general results and lessons learned from the KNEU project in the light of current developments at the science-policy interface. They represent a joint reflexion of results from all work packages of the KNEU project:

- **The NoK in the current and developing science-policy landscape:** Discussing the NoK with different actors from the knowledge holder and requester side, it became clear that there is clearly a need for such an approach, as a part of a European mechanism on biodiversity and ecosystem services. At the same time there is a 'niche' for a network of networks but this has to be carefully embedded within the wider landscape of existing institutions at the interface, including processes inside the European Commission and together with member states.
- **Increasing awareness and willingness on the knowledge holder side to get engaged at the SPI:** Many different knowledge holders (e.g. from research infrastructure, data provision, networks and learned societies) see the added value of a NoK to strengthen the SPI on biodiversity and ecosystem services beyond the current approaches. Especially from the perspective of EU-funded projects it became clear, that a 'one-stop entry point' for science-policy activities would be very welcome, also from a user perspective.

²⁰ See http://biodiversityknowledge.eu/images/PDF/WhitePaper_web.pdf

²¹ Based on lessons learned drawn in KNEU D5.1, see <http://biodiversityknowledge.eu/documents>

- **High need for capacity building on different levels:** The process for developing the NoK recommended design had a strong component of capacity building on science-policy-interface activities especially for involved scientists. Thus any future NoK would need a strong component of capacity building for enabling experts (from all stakeholder groups, including policy) to get engaged in NoK processes, especially in the answering-decision-making-needs function. This also applies for the use of specific methods in the function, for example specific collaborative methods like adaptive management, or the use of evidence-based frameworks.
- **Interaction across different kinds of knowledge holders – the role of ‘internal’ communication:** The principles of the NoK, as outlined in chapter 5.1 of the full report, are easily described, but heavily rely on being communicated openly and implemented in a transparent and traceable way. This puts a high emphasis, also in terms of resources on the communication to partners in the NoK (institutions as well as individuals). In the KNEU project, this task was underestimated in terms of resource needs, thus putting a high pressure on the coordination team and the WP leaders to go beyond the usual planned investment of time resources.
- **Making a new, complex approach accessible to all stakeholders – external communication:** As for internal communication, the same applies for ‘external’ communication with stakeholders from all levels to make the idea of a Network of Knowledge accessible to them and outline its added value compared to existing institutions and processes at the science-policy-interface. Ideally, different formats and tools would need to be designed to ensure that the NoK approach and its results are properly communicated to different audiences including society at large, but this will require substantial resources. The means and expertise needed for this goes beyond the experiences and approaches that usually exist in scientific organisations.
- **Resource needs for coordinating and implementing a NoK:** Besides the strong resource needs for internal and external communication, as outlined above, the discussions on the NoK also showed that a NoK needs specialised knowledge on interface activities. The knowledge to properly conduct (and make transparent) the steps in NoK processes require an excellent experience with the bodies of the NoK, on its tasks, which should be supported by excellent facilitators of complex processes, supported by high-level experts from relevant stakeholder groups.
- **The relationship to policy and other decision makers – the mandate issue:** Whether a NoK would need a continuous mandate from a policy body (embedded within a larger science-policy-interface like the discussed “EU mechanism on biodiversity expertise”, or independent of it) or on a case-by-case basis for single tasks (e.g., a certain request for a specific knowledge assessment), couldn’t be brought to a final conclusion during the KNEU project. This will of course depend on the policy-making community and how it decides to support a NoK if founded. Nonetheless it also became clear, that like in similar international processes, a policy mandate is somehow needed also to motivate knowledge holders to get engaged and provide their knowledge (and time).
- **Timeframe and financing for setting up and establishing a NoK:** The KNEU project has been able to provide the foundations for a potential future NoK, and also has raised a certain level of awareness and

willingness of actors to get engaged if a NoK is set up. But surely, setting-up and establishing such a new process in the current biodiversity landscape (and the current financial and political landscape), remains a challenge that can only be achieved in a mid-term perspective. Firstly, a setting-up phase of several years would need to further build the community, i.e. the network of knowledge holders (KNEU could only make a start here through its scoping work), and develop trust in the NoK processes, based on some strategically chosen requests addressed in the first years. Only then, after several years of development, a NoK can really become a self-standing process, either linked to an existing institution, or as an own entity.

From a financial perspective (see chapter 5.7 of full report), a NoK will need to be funded from a set of different sources, using existing funding mechanism (e.g., via EU projects) but also trying to find new ones, that are currently not on the screen for such activities (e.g., crowdfunding).

4.2 Socio-economic impact

Knowledge transfer activities, and specifically interfaces between knowledge holders and decision-making, are highly relevant from a socio-economic perspective. Such interface activities help to shape the knowledge basis and views on their topics. Especially on environmental issues, such activities have played an increasing role in the past in shaping policies and decision-making on different, e.g. in the context of the Climate Change and the role that the Intergovernmental Panel on Climate Change (IPCC) took in this context in raising the awareness on a topic and its challenges, and how potential reactions from policy and other decision-making entities, like the private sector, could look like.

Also in the area on biodiversity and ecosystem services, this development can be seen, starting with the Millennium Ecosystem Assessment (MA), the initiative on The Economics of Ecosystems and Biodiversity (TEEB) and only lately, the foundation of the Intergovernmental Platform on Biodiversity and Ecosystem Services (IPBES). Especially TEEB helped to shape the awareness in the private sector and in society on the risk and challenges that come with continued loss of biodiversity and ecosystem services. Many according activities are ongoing, globally and in Europe, to address these issues (e.g., the EU Business and Biodiversity Initiative), but often they still lack a proper, reflexive process to look at existing knowledge and how this can support existing and planned policies and decision-making.

During the final policy conference of the KNEU project on the 1st of April in European Parliament, these needs were raised by a number of participants: policy makers from the European Commission and other levels stressed their interest in a NoK to provide consolidated views from science on specific issues, but also a number of stakeholders from the private sector outlined their interest into a NoK supporting them in developing and analysing the feasibility and usefulness of tools to better account for natural capital in their decisions²².

In order to actively address the private sector, a NoK will nonetheless have to operate on a continuous basis, able to build trust in its methods and processes and having the right resources to communicate properly with different kinds of stakeholders. Although this was intended within the KNEU project (see chapter 4.4.), the effect on and

²² See report of the conference: <http://bit.ly/1iUMM3K>

exchange with the private sector remained small, as time-bound, development coordination actions are not the kind of activities that private sector actors easily engage in. But the interest expressed in the last phase of the project clearly shows an according potential.

4.3 Wider societal implications

Beyond the engagement and communication aspect with the private sector, the model proposed with the NoK approach has additional far-reaching consequences and implications for the wider society. To date, relevant knowledge as basis for policy decision is still often used in an interest-driven way, and the processes leading to this knowledge, via studies, reports, etc., are often not transparent which makes it hard to judge on their quality and balance.

Open approaches, based on the chances of transparency via electronic tools, joint with the possibilities of different knowledge assessment approaches, as it has been proposed in the NoK approach, showcase a possible pathway for a wider and fairer engagement of relevant stakeholders in such knowledge gathering processes. This has also been discussed in detail in the context of IPBES, where for example the involvement of indigenous and local knowledge holders in its processes is subject to an own task force.

With such an open approach, a NoK would actively contribute to a better understanding of issues related to biodiversity and ecosystem services, and enable a broader participation in according discussions for all stakeholders. With respect to biodiversity and ecosystem services, an important link here could also be developed around the issue of citizen science activities, which enable citizens to actively participate in monitoring biodiversity and contribute to according research. Here, a broader societal awareness raising function can be envisaged for a NoK by better linking knowledge gathered in such approaches (as well as in science itself) to societal decision making and monitoring.

Beyond this issue of improved awareness-raising, a NoK will also address a concern regularly raised on how science is actually used in policy and decision-making. Often, science is perceived as taking “one side” of a debate, and thus is also disregarded as being led by interests in the according policy debate. A NoK could provide a pathway to bring different views in science together in a more transparent way, and identify diverging views and interpretations more openly (see KNEU White paper, chapters 3 and 4).

4.4 Main dissemination activities (WP 6)

As outlined in chapter 3, the dissemination activities of the project have been effective throughout the project, aiming to involve a broad set of stakeholders into all stages of the project development, especially during the three conducted conferences, and during the demonstration cases. The main elements of this dissemination strategy were:

- 3 regional workshops at the beginning of the project (about 80 participants)
- 3 large conferences: 1st and 2nd BiodiversityKnowledge conference (May 2012, September 2013) addressing mainly knowledge holders, about 80 participants each, 3rd conference at the European Parliament presenting the outcome to a broad set of stakeholders (April 2014, 140 participants)

- Involvement of experts in 3 demonstration cases (about 75 experts)
- Call for comments on several versions of the NoK Green and White Paper in addition to input via conferences, meetings and interviews (about 40 contributions throughout the process)
- Special sessions, workshops and presentations at a number of conference, e.g. of ESP, ALTER-Net, BiodivERSA, LIAISE, IPBES-1 plenary and many more

Besides these directed interactions, the KNEU team used several means for broad communications:

- The regular updated website www.biodiversityknowledge.eu
- A newsletter with several issues per year, with about 2,800 subscribers
- A Twitter account (@BiodivKnowledge) actively distributing news on the project, on biodiversity research and science-policy interactions, followed globally by more than 650 people at the end of the project (and still growing and used by the project coordinators)
- An animated video (4 minutes) produced to describe the main elements of the Network of Knowledge approach to even a layman audience, which has been used at meetings and conference, and is available via the website (more than 500 views by the end of the project, now also translated in German, Spanish, French and Portuguese), see <http://vimeo.com/81720304>

With all these channels, a significant number of actors were reached, made aware of the project and became engaged in active discussions. Nonetheless, an even broader communication of approaches like the NoK remains a major challenge and is needed, in science and to all other stakeholders, as the evaluation within the project has clearly outlined²³. For example, as a main element, an interactive, and actively managed website would be crucial, thereby already addressing the first need for developing an active knowledge community on biodiversity and ecosystem services.

4.5 Plans for further exploitation

The KNEU project delivered in its final White Paper the blueprint for a Network of Knowledge on biodiversity and ecosystem services in Europe. Nonetheless, major steps to set it up would need to be taken. The final chapter of the White Paper (chapter 5.7) describes these potential steps which would need to be taken jointly by major actors (also beyond the KNEU consortium partners) in order to develop an according business plan. The potential steps, which are of course subject to discussions with according partners, are given in Table 4.1 below.

²³ See KNEU D4.1., chapter 3.2.2., available at:
http://biodiversityknowledge.eu/images/Documents/Deliverables/KNEU_WP4_D4.1_final_subm-1.pdf

Table 4.1: Steps to be taken to further develop and implement the NoK (taken from NoK White Paper)

Step		Timeline
1	Agreement on recommended design and its principles	End of KNEU project, April 2014
2	Set up of Interim KCB and Interim Advisory Board with core partners (and interim secretariat); joint development of "business plan" including in-kind contributions and financial needs	Constituting towards end of 2014 Business plan accepted beginning of 2015
3a	Implementation of NET-function: set up of joint (interim) working group, identify concrete needs/interests from BISe and relevant science networks; set up pilot areas of interaction and according e-infrastructure	Early 2015: main lines set Mid 2015: first implementation activities started, e.g. using existing platform to be further developed, or project outline for funding developed
3b	Implementation of ADN-function: Further development of general protocol and how to engage experts; identification of first tasks to be addressed (with requesters), organise first scoping processes and working groups	Early 2015: main lines set Mid-end 2015: first implementation actions started, e.g. specific request
3c	Implementation of RS-function: workplan and potential activities for 2015/2016 identified jointly with EPBRS and potential stakeholders; implementation of first activities in 2015	End 2014: first activities for 2015/16 outlined Mid-end 2015: first implementation actions started, e.g. planning for e-conference and meeting in late 2015
4	Official start of NoK with a set of MoUs between different partners, set up of interim web platform and first activities in ADN- and RS-function; set up of interim formative Evaluation Body	End of 2015

In addition to these implementation activities, further work of the consortium is planned to summarize the outcomes of the KNEU project and its different aspects in a set of scientific papers. This was not foreseen as deliverables in this coordination action, but the discussion and exchanges with many experts working on science-policy interfaces showed the high added value that the insights gained in KNEU could also contribute to the ongoing discussions among academics on the future of science-policy interactions to support better decision-making.

5 Photos from the project team



KNEU kick-off meeting, Brussels, February 11th 2011



KNEU/ SPIRAL / GEOBON' side event at IPBES 1, Bonn, January 2013



KNEU Final conference at the EU parliament, Brussels, April 1st 2014