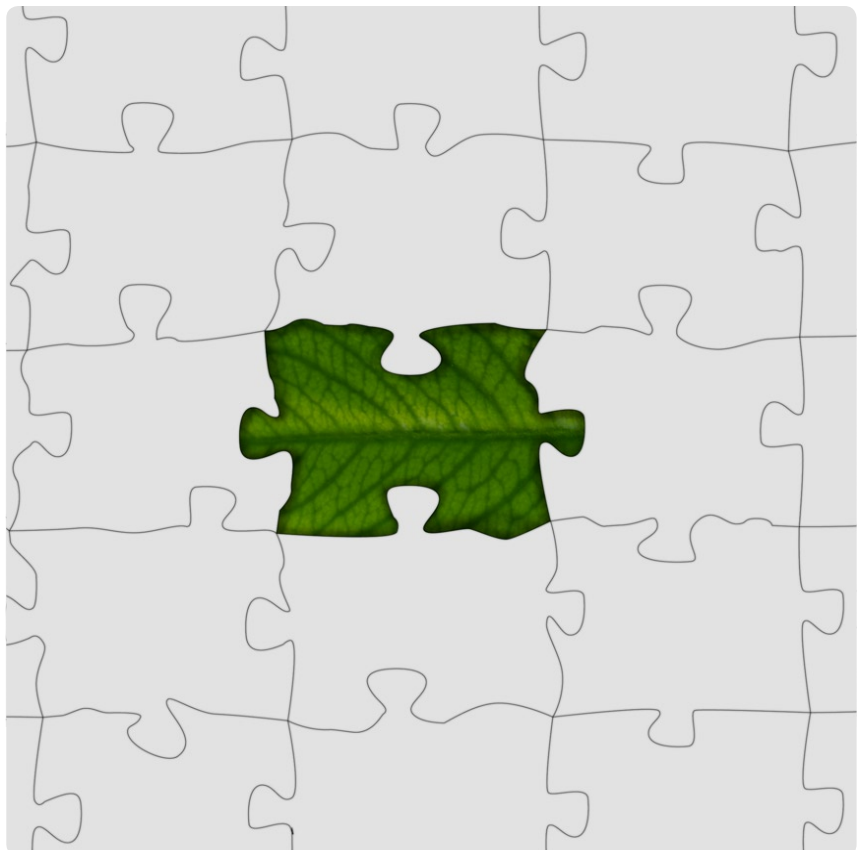


Dissemination and implementation of environmental research

– including guidelines for best practice

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DISSEMINATION AND IMPLEMENTATION OF ENVIRONMENTAL RESEARCH

INCLUDING GUIDELINES FOR BEST PRACTICE

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Preface

This report presents the findings of a study carried out by Dr. John Holmes on behalf of the Swedish Environmental Protection Agency (EPA) to establish the approaches to, and experiences of, research dissemination and implementation by SKEP (Scientific Knowledge for Environmental Protection) member organisations. The main source of information for the study has been interviews with 95 people in SKEP member organisations and associated bodies (33 organisations in total). A review of the literature was also carried out. Draft guidelines for the dissemination and implementation of environmental research were developed on the basis of the findings of the interviews. They were further developed following discussion at a SKEP workshop in April 2007 and are written with research funders in mind.

The SKEP ERA-NET 2005-2009 is a partnership of 17 government ministries and agencies, from 13 European countries, responsible for funding environmental research. The SKEP ERA-NET aims to improve the coordination of environmental research, including the dissemination and implementation of research results. The Swedish EPA leads the collaborative work within the SKEP programme to develop dissemination and implementation approaches. The ERA-NET scheme is designed to support the cooperation and coordination of national funding organisations, a way for the European Union to create an integrated European Research Area for innovative knowledge production.

The Swedish EPA would like to thank Dr. John Holmes for his excellent work on this study and all the SKEP members who participated in the interviews that provided the data for this report. We also would like to thank the SKEP ERA-NET coordination team and the EU for their financial support.

Swedish Environmental Protection Agency, February 2008

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Summary

This report presents the findings of a study of the approaches to, and experiences of, research dissemination and implementation by governmental ministries and agencies in Europe. The study has been carried out as part of the work programme of the SKEP (Scientific Knowledge for Environmental Protection) ERA-NET. SKEP is a partnership of seventeen governmental ministries and agencies, from thirteen European countries, responsible for funding environmental research.

While there are some differences across SKEP member organisations, the study has revealed that SKEP members have much in common: in terms of their approaches, experiences of what works and what doesn't, and in recognising remaining challenges that need to be addressed to improve the effectiveness of their research dissemination and implementation processes.

Key conclusions may be summarised as follows for the five areas of investigation of the study:

1. The **planning and management** of research programmes and projects is critical to successful dissemination and implementation. If research is to be used in policy-making and environmental management, users should be involved throughout the planning and execution stages to ensure the continuing coherence of the research questions and the answers that are needed. The dissemination and implementation of research needs to be properly thought through at the planning stage, and adequate resources and time allocated in project budgets and schedules.
2. With regard to the **communication of results**, the channel and content need to be tailored to the audience: one size does not fit all. An understanding of the audience should be developed, preferably through interactions during the research phase, so that messages can be conveyed in a way that is readily assimilated. In an age of information overload, succinct messages in clear language are required. Wherever possible, an opportunity should be provided for face-to-face interaction between researchers and users so that issues of interpretation can be resolved.
3. **Interpreters and intermediaries** can play an important role in synthesising results into a useful form, and in providing a balanced overview where there are competing claims to the “truth”. They need to put the science into context and in proportion, describing uncertainties in a way which is helpful to the users but true to the science. Interpreters need to develop good relationships with both users and researchers, understanding both and able to see the world through their eyes. Good social skills, a breadth of view, and the ability to synthesise information and communicate it clearly are all key skills for interpreters.

4. SKEP members are putting increasing emphasis on effective **engagement with stakeholders**: the wider group of organisations and people, including the general public, with an interest in the research beyond the direct users. The motivation is to ensure that they have the information that they need to be informed participants in robust debates about policy and environmental management decisions, and that those decisions are informed by a better appreciation of stakeholder views. The media will inevitably play a key intermediary role in communications with the public and need to be regarded as valued partners in stakeholder engagement.

5. **Evaluation** of research impact and of the effectiveness of dissemination processes is recognised as important but is, on the whole, a neglected area. There are some significant methodological difficulties involved in evaluation. However, where it is carried out systematically, it has proved to be a useful management tool. The approach needs to engender the active participation of users and researchers in the evaluation process, encourage honesty in responses, and ensure that lessons are taken on board in future research management activities.

Guidelines for research funders on research dissemination and implementation have been developed on the basis of the findings of the study.

1. Introduction

Government ministries and agencies in Europe make substantial investments in research projects and programmes to generate the knowledge, tools and techniques necessary to underpin effective environmental policy making and regulation. Key steps in realising the benefits from this investment are the dissemination of the research and its implementation in policy making and regulatory decision taking. This report summarises the findings of a study of the approaches to the dissemination and implementation of research in Government ministries and agencies responsible for funding environmental research in Europe.

The study has been carried out as part of the work programme of the SKEP (Scientific Knowledge for Environmental Protection) ERA-NET. SKEP is a partnership of 17 governmental ministries and agencies (listed in table 1), from 13 European countries, responsible for funding environmental research. Its objectives include: delivering better value for money from its research; encouraging innovation through more efficient use of research funding; and the improvement of environmental protection capability by setting down foundations for co-ordinating research programmes. More details are given on its website: www.skep-era.net.

The aims of the study have been to:

- compare and contrast approaches to dissemination and implementation of research in SKEP member organisations;
- identify what works (and what doesn't) and why; and
- develop guidelines for “good practice”.

The study has been concerned primarily with the research programmes commissioned by the SKEP member organisations, and consequently the full range of associated natural and social sciences. It explores the following five areas:

- the **planning and management** of research projects and programmes: in particular, the ways in which potential end-users of the research are involved in planning, project selection, project and programme management, and potentially the co-production of knowledge;
- the **communication of results**: the routes and mechanisms for bringing the research results to the attention of users;
- the roles of **interpreters and intermediaries** in making results available to users in a form which is useful;
- **engagement with stakeholders**: how to ensure that information is made available to stakeholders in a form which meets their information needs, enables them to play an effective role in the decision-making process, and that processes are transparent and build trust; and
- the **evaluation** of processes of dissemination and implementation.

Face-to-face interviews with staff from SKEP member organisations and associated bodies have been the main mechanism for exploring these areas. Taking a

semi-structured approach using the questions set out in table 2 as a guide, 95 people from 33 organisations have been interviewed. Mostly, the interviews were carried out on a one-to-one basis, but occasionally small groups of people were interviewed. In one or two cases the interviews were carried out by telephone.

Interviews were conducted with staff from 14 of the SKEP member organisations and also with staff from associated sponsoring and funding bodies, research institutes and groups, subsidiary agencies, sister organisations, and other relevant initiatives. Interviewees included researchers, research users, interpreters and intermediaries, funders and commissioners of research.

The report describes their approaches to, and experience of, research dissemination and implementation. Each organisation described constitutes a “case study” in its own right, but in addition, particular programmes, projects and initiatives are presented as case studies to illustrate specific issues. The ways in which approaches to research dissemination and implementation respond to different factors and “settings” are also examined.

In order to understand the context for research dissemination and implementation, the overall arrangements for environmental research management are described for each of the countries within which the participating SKEP member organisations are based. Similarly, the overall aims of, and significant constraining factors on, the research programmes of the SKEP members have been identified. A short literature review was carried out at the start of the project to inform the development of the questions for the interviews and their subsequent interpretation. This is summarised in the next section and presented in more detail in Annex 1. Sections 3 to 7 of the report summarise the findings of the study against the five areas identified above.

Draft guidelines for research funders on research dissemination and implementation were developed on the basis of the findings of the study, and presented to a SKEP workshop in Finland in April 2007. Discussion at the workshop enabled their further development. They are presented in Section 8.

The main report is completed by a short section on “Concluding remarks”. Twelve annexes then present a literature review and provide summary of the findings for each of the 11 European countries within which the SKEP member organisations participating in the study are based. These country annexes provide a rich source of information on their experiences.

This study has benefited from the work previously carried out by SKEP, and in particular the resulting report: “Experiences in the management of research funding programmes for environmental protection” available from the SKEP website: http://www.skepera.net/site/files/WP3_best_practice_guidelines_final.pdf. That report makes some tentative recommendations for good practice in research dissemination, but points to this study as the mechanism for SKEP to develop firmer recommendations.

2. Literature review

This section summarises the main points emerging from the literature review against the five areas of investigation for the study. Annex 1 provides more detail.

A consistent and strong message in respect of the **planning and management** of research projects and programmes is that the end-users of the research (policy makers, regulatory decision takers etc.) should interact closely with the researchers throughout the research process: from question definition, through research planning and execution, through to dissemination and utilisation. An important objective is to build mutual trust, and relationships that last beyond the research project. However, a note of caution is that such interactions and relationship building is not seen to compromise research impartiality and independence.

Project selection procedures should reflect a broader notion of quality, going beyond just scientific excellence as considered in an academic sense, and including factors such as policy relevance, timeliness and usefulness. The resource implications of this mode of working, involving close interaction between researchers and users, can be significant and should be built into research funding together with the necessary resources for dissemination.

With regard to the **communication of results**, several reports point to the need for greater weight to be put on the dissemination and synthesis of research results. The potential diversity of users should be recognised, and results presented in ways that will be understandable from their perspectives. Jargon should be avoided. The reviewed reports pointed to the need on the one hand, for short communications focusing on key messages, and on the other, for full accounts, explaining assumptions, methods, uncertainties etc.

Users will weigh the information according to their previous knowledge and experience, and in relation to their current views on the issues addressed. A sense of ownership of the research will help adoption of the results.

Dissemination activities should aim to make use of multiple channels of communication – formal and informal. Routes and mechanisms for bringing research results to the attention of users include:

- recognising the availability of information as a first step, better electronic, web-based databases of project reports;
- training, networks and person-embodied knowledge;
- face-to-face meetings enabling users to question researchers;
- policy briefs and science cafes;
- the media; and
- “hands-on” involvement of users in the final research project stages, testing prototypes of databases and models through simulation exercises etc.

Interpreters and intermediaries are considered to have a key role to play, but this is an under-resourced area and people with the necessary skills are in short supply. Scientists are frequently not adept at communicating across the divide between

science and policy. There is a need to create a “new race” of interpreters who are familiar with the research and policy worlds and are able to bridge between them.

Attributes of research which enhance its influence and utilisation are saliency, credibility and legitimacy. “Boundary organisations” have an important role in facilitating information transfer and in ensuring scientific credibility and policy saliency. Networks of researchers, intermediaries and users can also foster communication, creativity and consensus.

The communication of uncertainty in a way which is true to the science while useful to policy makers is also recognised as a major challenge.

In a society in which scientific expertise and the scientific underpinning of decisions is increasingly challenged, ensuring due process in the development, use and communication of science is a key dimension of **stakeholder engagement**. Openness and taking a proactive approach to communication are important factors. Stakeholder engagement should be seen as extending traditional approaches for assessing scientific quality.

Stakeholders need to be made aware of what information is available and how it may be obtained. Scientific information should be translated into suitable forms recognising the diversity of potential audiences. Care needs to be taken in disseminating non-definitive, controversial or alternative views to the public. Intermediary organisations, networks and workshops can play a useful role in facilitating interaction between experts, policy makers and the public.

The literature review identified rather little on the **evaluation** of processes of dissemination and utilisation, reflecting the finding of other studies (for example the preparatory study for the Science Meets Policy workshop held in London in November 2005) that this is recognised as an important, but neglected, area.

3. Planning and management

All organisations interviewed considered it important to involve potential users at an early stage in the planning of research programmes. However, the nature of that involvement varied across the organisations, reflecting their different roles and the different aims of their research programmes. The two ends of the spectrum may be characterised (not too strictly) as follows:

Funding body:	Research Council or Science Ministry	Environmental regulator
Potential users:	many and varied	few and tightly defined
Research questions:	broadly defined	tightly specified
Initiative for what research is done lies with:	the science community	the user community
Key project selection criterion:	quality of the science	whether it meets the specification

There are, of course, exceptions to such a broad differentiation and many points in between. The research programmes of the environmental ministries typically have elements or characteristics of both ends of the spectrum.

Research programmes generally have some form of steering committee responsible for refining programme objectives and defining research topics and themes. In some cases, the steering committee goes on to oversee the implementation of the programme, and in others a new committee is formed for the implementation phase. In one case encountered in the study, the steering committee focuses on the relevance of research and comprises potential users; a separate science committee comprises members of the science community and is responsible for ensuring the quality of the science.

There can be problems of ensuring appropriate representation on steering committees to achieve a good balance between research and user perspectives, and to minimise potential conflicts of interest. The latter point can be of particular concern in smaller countries where the science representation may consequently be drawn from other countries to reduce potential conflicts of interest in funding decisions. The effectiveness of all steering committees depends on the abilities of the chair and the commitment of committee members.

Workshops and consultations (very often web based) are frequently used to engage with a broader range of researchers, stakeholders and potential users. The development of the programme is usually iterative: successive drafts being commented on by the steering committee, or providing the starting point for further workshops or consultations.

In defining research programme objectives and research questions, a commonly encountered problem is to get users, particularly policy makers, to think beyond their immediate and sometimes rather narrowly drawn needs. It is therefore considered important that researchers and users jointly work up research topics and questions, tempering views of what is needed with what is possible. In many

cases, environmental ministries look to their agencies and research institutes to take the initiative in making research proposals. The agencies and research institutes are uniquely placed to do this given their familiarity with the research and policy communities.

A recurrent issue is to ensure that policy makers and other users devote quality time to working up research programmes and projects: this needs to be accepted as a core part of their job, recognising that it must compete with the many other demands on their time. Users are more likely to engage if the research relates directly to their immediate needs and is critical to their success. More generally, getting the involvement of stakeholders in workshops, questionnaires etc can be difficult: typically, it is people in the periods before or after their working lives that are more likely to engage.

Consistently with the findings of previous SKEP work, scientific quality and user relevance are key criteria for project selection. Other criteria are also used including, sometimes, a requirement to demonstrate the effective involvement of users. In one case, the selection panels include someone with communication competence. Some form of two-stage process may also be used in which outline proposals are elaborated with users after an initial selection phase, or a scoping exercise involves researchers and users to frame the research questions.

In some cases there is a requirement to set out a dissemination plan at the project proposal stage. But this tends to be rather weakly enforced: little guidance is given on what is required, and it does not count for much in the project selection process. However, there are some indications that more emphasis is being given to consideration of dissemination at the project planning stage, though it is recognised that dissemination plans will need to be refined as the project evolves. One organisation has a recent initiative requiring all new research projects to establish a “benefits realisation plan” setting out how the outcomes from the research will be taken up into the organisation's activities. A responsibility is placed on an identified user to take forward and embed the output of the research project.

A consistent message (echoing that from the literature review) is that users should be involved through both the project planning and execution stages. If not, the answers provided by the researchers may drift apart from the evolving questions of the users. However, there is significant variation in the closeness of interaction and the influence of the users over the direction of the research. This variation generally relates to where the research sits on the spectrum between longer-term, basic and shorter-term, applied research. At its closest, users contribute valuable know-how to the research and actively shape its direction, reflecting the concept of ‘co-production’ of knowledge. However, a tension is recognised that if the interaction is too close, the research may not be seen to be independent.

In many cases, a project steering committee (alternatively labelled a user or reference group) provides a mechanism for the interaction between the researchers and the users. The steering committee may comprise both users and relevant members of the science community. User members are often chosen to represent the relevant constituencies with an interest in the project. This may be more straightforward in smaller countries where personal networks and involvements

may readily ensure effective interaction with, and dissemination to, other relevant interests and initiatives. In one country an alternative approach is used in which a member of the programme steering committee is appointed as the “godfather” or “godmother” of each project and is responsible for ensuring that it meets the needs of the users.

Particularly where the research may lead to regulation, the appropriate representation of stakeholders, including for example the regulated industry and the “main critics”, can be important. If well-managed, the steering committee may then enable the resolution of conflicts during the execution of the research project and provide a solid base for consequent regulatory measures. It helps to develop a sense of identity with the group and adequate time must be allowed to build relationships between steering committee members and between the steering committee and researchers. All of this can be quite resource intensive, and a steering committee may not be appropriate for all projects.

4. Communication of results

Generally, the aim of research dissemination in SKEP member organisations is to ensure that research results are used to support better environmental decision-making. In some cases the targets for dissemination are those directly responsible for decision-making, in other cases research results need to be disseminated to a wider group of actors including regulated organisations, municipalities and NGOs.

It is recognised that there is not one best way for communication of research, and that the approach needs to be tailored to the audience and the circumstances. The approach to dissemination needs to be well thought through and planned in advance. In the past, the endpoint has sometimes been considered to be the sign off of the research report. This does not recognise that effective uptake needs to be a well planned and resourced process with clear ownership.

Reflecting a central theme of the previous section, the development of good relationships and understanding between the research and user communities is important to enable knowledge transfer. The involvement of users in project steering committees should ensure they are familiar with, and ready to receive research results: there should be no surprises. The key to successful dissemination and implementation of research is that the potential users really want to take the results on board.

The following paragraphs summarise the different channels used for research dissemination and views on their relative merits.

While some interviewees expressed reservations about their usefulness, most projects still generate a **technical report** recording project aims, research methods and results. Such reports generally present the research in the context of the policy and regulatory agenda which peer reviewed scientific publications may not do. They can be an effective mechanism for knowledge transfer if the information to be conveyed is essentially factual. Reservations are that they are resource intensive and have a limited audience. Different views were expressed about their effectiveness in ensuring the longevity of the record of research: there are concerns that retrieving reports can be an issue several years after project completion.

Increasingly, reports are made available as PDF's on web sites rather than in a printed form. But printed copies are often still produced, particularly where a large audience is identified. A print on demand service introduced by one organisation is being used less and less over time.

Preparation of the report may involve an iteration on drafts with the steering committee and/or sponsoring body. On occasion, a sensitive report may be delivered to the ministry or environmental agency some weeks before its general publication in order that ministers and senior staff can be briefed.

Many users, particularly policy makers, are unlikely to read the technical report which may run to 100 pages or more. **Non-technical and user-friendly summaries** are therefore generally produced and made available on the Web (sometimes in English as well as the national language). Summaries generated by researchers can be of variable quality and professional science writers may be used to ensure their readability. Different styles are adopted for summaries, ranging in

length from one page to 10-20 pages. They generally explain the policy relevance of the research but may go further in making recommendations, and identifying options, for policy. The view was expressed that it is unhelpful if they emphasise the difficulties and conclude that more research is needed. Rather, researchers should give their best view while setting out the premises behind the results.

Peer reviewed publications are considered to be the appropriate channel of communication with the science community. Environmental ministries and agencies generally recognise their importance in respect of the quality assurance of the work and to build confidence in using the results. However, some members of the research community expressed concern that the long timescales often involved in the peer review process reduce its value in this regard. Some ministries and agencies actively encourage researchers to publish and to make an explicit allowance for the preparation of peer reviewed papers in their project proposals. Others consider that they will do it anyway and need no encouragement. This can lead to a “squeeze” on research organisations which need to publish to sustain their scientific credibility and profile.

Professional journals are increasingly used as an effective channel of communication with practitioners. They are particularly relevant for engineers and people working in environmental management (but generally do not score so highly on measures of academic research such as impact factor, citations etc). In Ireland it was felt that there is a gap in the market for a journal aimed at practitioners and the user community which provides articles which are technical but not aimed at experts.

The role of the **Internet** as a key mechanism for accessing technical reports and their summaries on web sites has already been mentioned. However, a concern was expressed that the quality of web sites is variable and reports can be difficult to find. A well-designed website should present different levels of information and be designed to minimise the number of clicks required to access the high-level information of interest to the public and policy makers. Web sites can work well if people are actively looking for information but are not particularly good for getting information to a more passive audience. A problem with sending information by e-mails is that peoples’ in-boxes may already be overwhelmed by the volume of information received.

Newsletters are often used by organisations, and at the level of individual programmes, for keeping extended user and research communities up to date with developments. Time pressures on project and programme managers can make it difficult to get articles from them, and a communication professional may be employed to draft articles and manage the newsletter.

Many interviewees considered **face-to-face** communication to be the best option. A face-to-face meeting between the researcher and the user enables a proper understanding of the confidence of the conclusions and remaining uncertainties to be established. If the user has not understood something they can ask the researcher to explain.

Workshops and seminars are used by many projects and programmes to enable the dissemination and discussion of research results. Generally there is a preference for workshops and seminars focusing on a particular issue and with a targeted audience, rather than more general conferences. It is important to give time in the workshop for discussion and to create an atmosphere in which users and researchers can have an open and frank dialogue. “Buy-in” to the research requires that people feel that their views have been heard. A workshop size of around 30 people is considered by some to be an upper limit.

It can be difficult to get users to attend: the workshop needs to be seen as relevant to their current needs. Getting a senior person to attend helps: others will follow. Sometimes formal proceedings are published but some reservations were expressed about their utility. An important benefit of an effective workshop is the contacts and relationships developed, enabling users to follow-up with researchers afterwards.

A range of other mechanisms for research dissemination are also used as follows:

- the transfer of researchers to positions in the user community, taking with them their innate knowledge of the research and helping to build mutual understanding between the research and user communities;
- informal networks, for example with local authorities or on particular environmental issues, which may get together periodically to exchange information about what is going on;
- regular forums bringing together people from the research community, government and business to discuss a key issue such as climate change;
- training courses for younger scientists and engineers who are becoming practitioners in environmental management, and more generally, teaching of undergraduates and postgraduates in universities;
- the dissemination of protocols, particularly to the consulting profession; and
- excursions for users to research laboratories and field sites bringing the research to life and providing a good opportunity for the researchers and users to get to know each other.

A number of initiatives have been taken to support research programmes on dissemination and implementation:

- the letting of a contract, or creation of an organisation, to identify and develop links with the broader set of users and stakeholders, and to support the dissemination and communication of the research results;
- the creation of a team of professional science writers to edit reports to ensure they are more easily understood by their target audiences;
- support to the clustering of projects to foster cooperation between researchers and to enable synthesis of research results across programmes; and

- the creation of user-friendly databases of research outputs.

Concerns were expressed that there are insufficient incentives for researchers to communicate their work and that communication skills are underdeveloped. A project based approach to funding can also be an impediment to research uptake as funding may not be available for researchers to support the implementation of the research results after the project has been completed. This is less of a problem for research institutes with a close and ongoing relationship with the research user.

5. Interpreters and intermediaries

Several reasons were given for why there is a distinctive role for people and organisations to act as interpreters and intermediaries, making results available to users in a form which is helpful:

- policy makers do not have the time to read all the research reports or to find the particular information they need in the research literature;
- when an issue is on the policy agenda the different research groups and perspectives “shout as in a market square”: to discriminate between these different perspectives requires the synthesis of research with a view to the policy context;
- there can be a problem of the level of conceptualisation, for example between academics concerned with the bigger picture and operational people, as users of research, requiring a “quick fix”;
- there has been a shift in some ministries from specialists to generalists, leading to an outsourcing of the interfacing role, interpreting research results for policy-making;
- most people in academia are not interested in interpretation: the incentives in science are still excellence in science within single disciplines; and
- to most civil servants, even though many are fluent in English, it is an additional barrier to access the international scientific literature written in English.

A key challenge is to put scientific information into context and in proportion, using language that can be readily understood by policymakers and other stakeholders. This process can be particularly difficult if the issues are sensitive. Interpretation may often involve the preparation of a synthesis of the current state of knowledge, requiring a balanced overview to be presented, particularly where experts disagree. It may be that a consensus document is prepared with the research community. Development of indicators which are able to summarise complex information is another form of interpretation.

It was suggested that interpreters and intermediaries should work with projects and programmes from the initial planning stage. There are developments through projects and programmes and a lot of ideas can be generated which can be picked up and disseminated. Any recommendations should arise from a good dialogue between researchers and policy makers and be developed within a particular policy context.

Scientists and policymakers need to learn to communicate with each other: personal relationships are important which take time to develop. Such relationships are particularly effective with people working in the research institutes who have the experience of interacting with the policy world.

Processes of interpretation need to overcome the natural inclination of scientists to want to be correct rather than to be clear and simple. Scientists are understandably concerned that nuanced accounts and carefully framed uncertainties can easily be lost in translation, and that they may be asked to make recommendations beyond what the research can robustly support.

Interpretation may be carried out within the ministry or environmental agency, often by staff in the groups responsible for managing the research programmes. One ministry pointed to its in-house technical advisory group as its focus for interpretation. For several ministries there has been a trend to reduce the level of in-house expertise and they have become more reliant on dedicated research institutes and agencies to carry out interpretation. Close contact and sustained interaction over time means that these bodies have a good understanding of the policy processes and issues. Good networks of contacts and appropriate funding arrangements mean that interpretation and advice is often sourced informally and can be responsive to urgent needs. A challenge for the research institutes is to maintain the right balance, at both an organisational and individual level, between research and provision of advice.

Advisory committees and groups can be a cost-effective and efficient way of getting scientific advice. The independence of such committees can be very helpful when decisions and environmental standards are challenged. Consultants have an important intermediary role to play, particularly because regulated industries and local authorities very often turn to them for advice. It may be appropriate therefore to take the consultants along with you when developing new approaches and methodologies. They very often act as the link between the regulator and the regulated organisations. Professional bodies and industry associations sometimes also play an important role as intermediaries.

In Belgium platforms are being created for particular issues (for example biodiversity, climate change, and transport) to act as intermediaries in the transfer and translation of research knowledge to stakeholders. They are developing interfacing mechanisms such as reference meta-databases, thematic forums and workshops acting as catalysts for the integration of science into policy and environmental management.

Skills and capacities identified as important to be an effective interpreter are as follows:

- being a good mediator, able to produce a well-balanced synthesis;
- having a good sense of different arguments;
- having good social skills;
- being open and accessible to experts and with a good network of contacts;
- able to synthesise information into a structure which is meaningful;
- being familiar with the world of research and also aware of policy issues;
- able to put yourself in the shoes of the policy makers and stakeholders;

- having breadth as well as depth: needing to take a broader view of your research field than is normal and having exposure to the international context; and
- able to see the forest, not just the trees and able to say what things mean in practice.

Generally, the skills are developed through informal means rather than through formal training, but at least one of the SKEP member organisations intends to strengthen its training in interpretation. It was considered that spending time in the different worlds – of research, policy/regulation, and industry - is beneficial.

6. Engagement with stakeholders

Most organisations participating in the study considered engagement with a broad range of stakeholders, and with the general public, as increasingly important. Their aims in such engagement include:

- that all stakeholders have access to the information arising from research programmes;
- to enable all those with an interest in a particular issue to develop better-informed views leading to a more robust debate and consequently an improved policy-making process;
- to increase awareness of environmental problems, and to enable organisations and citizens to act in the best interests of the environment;
- to understand stakeholder views as an important precursor to addressing most environmental management issues;
- to avoid polarisation of views which in turn makes it easier to communicate the science; and
- to meet legislative requirements for freedom of information.

Environmental policy making and regulation is putting an increasing emphasis on changing the behaviour of the public as the means of achieving environmental improvements. This puts more onus on the effective communication of science. There is a move away from science as a “closed shop” to greater public participation, and hence the need for a language of science that can be understood by the non-specialist.

The communication of uncertainty is a big challenge: researchers do not always do this well. Environmental ministries and agencies have to give the arguments about why they are making a decision and be honest about the uncertainties. There is a balance to be struck between the precautionary principle and inspiring panic: you have to decide where on the spectrum you want to be. You have to be clear on the information and your confidence in it, so that if people disagree they can be sufficiently informed to make an educated decision for themselves.

The media (newspapers, magazines, TV and radio) play an important role in communication of research with broader audiences. In many cases it is prohibitively expensive to communicate directly with the public and it is necessary to get the media involved. This inevitably leads to some loss of control over the message but if relationships with journalists are good, and press releases are well prepared, the chances of unhelpful distortion are reduced.

In working with the media it is necessary to make complex things more understandable, to be good at visualising the message, and to find “grabbers” to ignite interest. The message needs to be focused - the media will take a maximum of three points - and it is important to give them an angle otherwise they will find one for themselves.

Many organisations have press offices or communication departments who develop relationships with the media and facilitate the interactions between researchers and journalists. Generally, the communications department will take a more controlling role in ministries and regulators than in research institutes.

There can be tensions between ministries and their research institutes arising from the need to present a consistent message on the one hand, but allowing the institutes their independence and own profile on the other. Journalists want the information in one package so generally the most effective way is a joint press release which makes clear who is saying what, who has done the research and who has funded it. It is important to avoid the Minister been taken by surprise as a result of the release of research findings.

Two initiatives in Norway are of particular note:

- the creation of a national website for journalists providing articles on research generated by members (the initiative is funded on a subscription basis) which are generally written by professional science writers; and
- schemes to enable researchers to spend time working with a newspaper and for journalists to learn about a particular topic or to visit a research institute etc.

Websites, for the organisation as a whole or for particular programmes or issues, can be an effective way of communicating. Some organisations produce newsletters or magazines which have wide circulation. Particularly if they are distributed electronically, they can provide links back to the website for more detailed information.

Several countries have national science weeks or fairs which provide a good opportunity to showcase research. In three cases films were cited as an innovative and effective mechanism for generating interest in research from audiences they could not normally reach. The value of informal communication in day-to-day interactions was stressed by one organisation.

In Austria a key concern for dissemination is to make research more useful at the level of schools and youth organisations, and each project is required to include cooperative activities with them. The aim is to ensure that young people get a better understanding of the research process - and what research can and cannot provide - which should improve the political decision-making process over time.

7. Evaluation

Most of the organisations participating in the study do not have a formal system for the systematic evaluation of the dissemination and implementation of results from research projects. To the extent that they do evaluate, they tend to use informal processes of feedback or to count things that can be readily measured, for example the number of publications, radio contributions etc. For research institutes, some limited evaluation of impact may be included in periodic evaluations of the organisation as a whole. Several organisations indicated that they intend to do more on evaluation and are currently trialling new approaches.

Two organisations described systematic approaches to evaluating dissemination and uptake of research projects:

- The Finnish Environment Ministry which evaluates the effectiveness of dissemination processes, and impacts on stakeholders, as elements of a broader set of evaluation criteria applied to all projects in its environmental cluster programmes. The criteria are scored independently by the project leader and the Ministry supervisor. There is generally a good match between the scores (having two scores is considered to make the evaluations more trustworthy), and where there are particularly high or low scores the project leader is interviewed (recognising that you tend to learn more from the most extreme cases).
- The Netherlands Environment Ministry has carried out two reviews using an external bureau in which all policymakers who had commissioned research in the year were required to respond to an exhaustive questionnaire about what research had been done, how it had been used, the extent of its use etc. The questionnaire was followed up with interviews.

There remain some significant methodological difficulties with evaluating impact and uptake:

- it is difficult to trace the uptake of research in policy-making and regulatory decision taking: the research result will be just one of the considerations taken into account and it may be the coalescence of outputs from several projects which has the influence;
- it can be some time after the completion of a research project before the impact is realised;
- a lot of research is aimed at building conceptual understanding rather than at instrumental use, which is generally easier to evaluate;
- the relevance of a project or programme may be reviewed against its starting conditions or the context pertaining when it is completed; and
- programme and project objectives tend not be precisely defined, making achievement of objectives difficult to evaluate.

8. Guidelines

Draft guidelines for the dissemination and implementation of environmental research were developed on the basis of the findings of the interviews. They were further developed following discussion at the SKEP workshop held in the Åland Islands in April 2007, and are presented in this section. They are written with research funders in mind and are divided into the five areas used elsewhere in the report:

- planning and management
- communication of results
- interpreters and intermediaries
- engagement with stakeholders
- evaluation

The guidelines are concerned with research commissioned with the intention of applying the results to support policy making and decision taking on environmental issues, as distinct from curiosity-driven or blue skies research.

Planning and Management

Involvement of users

In order to ensure that outputs meet their needs, potential users should be involved from the early planning stages of research programmes and projects. Identification of potential users, and an evaluation of their different needs and concerns, should therefore be carried out at the start of a programme or project. Their continued engagement through the research and dissemination stages is necessary to make sure that the answers generated by the researchers remain tuned to the evolving questions of the users.

Research topics and questions should be worked up jointly by researchers and users through a dialogue which enables their different perspectives to be combined in a clear definition of research questions and planned outputs. The development of research programme and project objectives and plans should be iterative, using workshops for face-to-face discussions and consultations to secure a wider range of inputs. Objectives, plans and outputs should be specific and measurable, overcoming any tendency of dialogue and consultation processes to result in specifications which are too broad and generic. Different kinds of people may need to be involved at different stages of the process (for development, execution etc.).

The closeness of the interaction between users and researchers, and the extent of influence of the users over the direction of research, should reflect the nature of the research: it will be closer for applied and near-term research than for longer-term, basic research. At its closest, users themselves may contribute valuable know-how reflecting the concept of co-production of knowledge. However, if the interaction is too close, the research may not be, or be seen to be, independent.

Relevant criteria should be used for the selection of projects. Scientific quality and user relevance will generally be key criteria. They, and other parameters, will need to be weighted appropriately in the selection process which should involve staff with the knowledge and experience needed to make the required judgements. Some form of two-stage process may be used in which outline proposals are elaborated with users after an initial selection phase, or a scoping exercise involves researchers and users to frame the research questions.

Steering Groups

Steering groups provide an appropriate mechanism for overseeing the planning and implementation of research programmes and projects. However, they can be resource intensive and may not be appropriate for smaller research projects. They should have clear terms of reference describing how the steering group operates and what decisions it can make.

They need to ensure appropriate representation to achieve a good balance between research and user perspectives, and to minimise potential conflicts of interest. Representation may evolve over the course of the project or programme to reflect changing needs. Users should be chosen to represent the relevant constituencies with an interest in the project. It may be helpful to involve experts from other countries.

Particularly where the research may lead to regulation, the steering group may helpfully include representation of key stakeholders, including the regulated organisations and the main “critics”. The steering group should aim to resolve conflicts during the execution of the research project or programme in order to provide a solid base for consequent regulatory measures.

It helps to develop a sense of identity with the group, and adequate time should be allowed to build relationships between steering group members and with the researchers. An effective chair, and the commitment of members, are also needed.

Allocated resources

It is important that users, particularly policy makers and regulators, devote quality time to developing and overseeing the implementation of research programmes and projects. Their engagement needs to be secured at key stages and they need to be appropriately motivated, not least by the value they attach to securing the research results. Their involvement needs to be accepted as a core part of their job, recognising that it must compete with the many other demands on their time. Science advisers, who may be in-house or in closely linked agencies or institutes, may be able to shoulder some of the load of such engagement.

Provisional plans for dissemination and uptake should be developed at the project planning stage and adequately resourced in the budgeting process. Such plans will need to be updated and refined as the project proceeds. The realisation of the benefits of research projects requires active management throughout the project lifecycle and clear allocation of responsibilities.

Communicating research

Defined target groups

The aim of research dissemination in SKEP member organisations is usually to ensure that research results are used to support better environmental policy making and decision taking. The audiences therefore needs to be clearly identified and will generally include those directly responsible for policy making and decision taking, together with a wider group of interested actors including the relevant science community, regulated organisations, municipalities, non-governmental organisations (NGO's) and the broad public. Audiences may change during the project or programme, so dissemination plans need to be flexible.

Tailored communications

There is not one best way of communicating research, and the approach needs to be tailored to the audience and the circumstances. It needs to be well thought through and planned in advance, and a view developed on the intended impact of the communication. However, the context for communication can change quickly: it is important to anticipate changes where possible and to respond flexibly.

Wherever possible, good relationships and understanding between research and user communities should be developed as a helpful precursor to research dissemination. Where appropriate, approaches to communication should facilitate feedback from, and active interaction with, users on interim and final results.

The preferred channels and forms of communication with the target audiences should be identified in advance, and an appropriate combination chosen recognising resource constraints. Table 3 lists potential channels and forms of communication, and summarises their pros and cons.

Responsibilities and incentives

Incentives need to be in place for researchers to communicate their work, and funding arrangements should ensure that researchers are available to support implementation of research results after the research project has been completed. Attention should be given to ensuring that researchers have the necessary communication skills and/or communication support. A specific responsibility for communication may be allocated to an individual within the research team. The steering group should oversee and support the communication plan.

The effectiveness of communicating the results of research programmes can be enhanced by provision of support to individual projects. Mechanisms to consider include:

- the creation of a support service to identify and develop links with the broader set of users and stakeholders, and to support dissemination activities;
- the use of professional science writers to edit reports to ensure they are more readily understandable by the target audiences;
- the facilitation of links between projects to enable the synthesis of research results across the programme; and

- the creation of user-friendly databases of research outputs.

Interpreters and intermediaries

Arrangements and skills

Interpreters and intermediaries may be needed to bridge the gap between the research and user communities and the public at large, and to ensure that results are available to users in a form which is helpful. Their role is facilitate interactions between the research and user communities, and to put research results into context and in proportion, using language that can readily be understood by policy makers and other stakeholders. They should work with projects and programmes from the initial planning stage to enable the timely transfer of new knowledge.

Adequate arrangements for interpretation should be in place which may involve:

- in-house science advisers, potentially embedded in policy teams but maintaining contacts with the research community;
- dedicated agencies and research institutes: close contact and sustained interaction over time enables these bodies to have a good understanding of the policy process and issues;
- advisory committees whose independence can be helpful when decisions and environmental standards are challenged;
- consultants who can play an important intermediary role with regulated industries and local authorities; and
- professional, industrial and commercial bodies and associations.

Interpreters need distinctive skills and capacities as listed in section 5. Appropriate training and development mechanisms should be in place to ensure that these skills are developed. Career paths should be enabled which provide for people to spend time in both the research and user communities.

Synthesis of knowledge

Consideration should be given to the preparation of a synthesis of the current state of knowledge, presenting a balanced overview of what is known and of uncertainties and disagreements between experts. Similarly, interpreters or intermediaries may be commissioned to develop a consensus document in conjunction with the research community. The synthesis also needs to cover the situation where there are unresolved disagreements and should explain the consequences of the uncertainties for the issues being addressed.

Engagement with stakeholders

Aims of engagement

Engagement with stakeholders on research programmes and results should respond to societal expectations about the openness of science, and should support the increasing need for environmental improvements to come from changes in public

behaviour. Two-way communication processes can be particularly valuable, enabling research, and the explanation of research results, to respond to stakeholders' framings and concerns.

The aims of engagement should be clearly established in advance and may include:

- enabling stakeholders to develop better informed views leading to a more robust debate and consequently an improved policy-making process;
- increasing awareness of environmental problems and enabling organisations and citizens to act in the best interests of the environment;
- enabling an understanding of stakeholder views as an important precursor to addressing environmental management issues;
- avoiding polarisation of views (making it easier to communicate science); and
- meeting legislative requirements for freedom of information, for example the Aarhus Convention.

Responsive and coordinated communications

Consideration should be given to how the issue is framed by the stakeholders: what is their level of interest; what do they already know; what are their concerns; what values are associated with the issue; what do they expect from science? In explaining the science behind a decision, it is important to be clear on the information and your confidence in it, taking particular care to explain the uncertainties in a balanced way.

Ministries should coordinate public engagement activities with their agencies and research institutes, and should aim to develop consistent messages while recognising the need for independence in the presentation of research results and their significance by the agencies and institutes.

The media

A constructive relationship should be developed with the media who play an important intermediary role in communicating research to broader audiences. Websites to provide source material for journalists, and opportunities for journalists and researchers to develop a better understanding of each others' work environment, can play a useful role in developing such relationships.

In working with the media it is necessary to make complex things more understandable, to be good at visualising the message, and to find particular issues that will ignite interest. The message needs to be focused and it is important to provide an angle (which the media will otherwise do for themselves).

Evaluation

Evaluation of research dissemination, uptake and impact can potentially provide valuable lessons to enable improvement of processes of research programme planning and management and to establish the value derived from research

investment. However, to be useful, the evaluation process must move beyond counting things that can readily be measured.

The evaluation process should promote honest reporting and address the following methodological challenges:

- tracing the uptake of research in policy-making and regulation given that the science will be just one of the considerations taking into account in the decision and that the science that matters may be derived from several research projects and pre-existing knowledge;
- it can be some time after the completion of a research project before the impact is realised; and
- the value of the research may be through building conceptual understanding which is more difficult to measure than instrumental use.

Clearly established programme and project objectives and measurable outcomes provide an important starting point for the evaluation process.

9. CONCLUDING COMMENTS

Given the different types of organisations represented in SKEP, and the different aims and operational settings of their research programmes, it is not surprising that there are some differences in approach to research dissemination and implementation between them. And there are initiatives in particular countries which may be of interest elsewhere. Nevertheless, the study has revealed that the represented organisations also have a lot in common: in terms of their approaches, experiences of what works and what doesn't, and in recognising remaining challenges that need to be addressed to improve the effectiveness of their research dissemination and implementation processes.

The findings from the interviews are broadly consistent with the messages derived from the literature review. Similarly, they generally reinforce the findings and recommendations of previous work in the SKEP programme. There is a shared interest in improving performance in research dissemination and implementation.

Table 1: SKEP members

Organisation	Country
ADEME: Agency of the Environment and Energy Control	France
AMCS: Autoritatea Nationala pentru Cercetare Stiintifica	Romania
BELSPO: Federal Public Planning Service Science Policy	Belgium
BMLFUW: Federal Ministry for Land and Forestry, Environment and Water Management	Austria
EA: Environment Agency for England and Wales	England & Wales
FG-ENED: Flemish Government – Environment, Nature and Energy Department	Flanders, Belgium
FiMoE: Finnish Ministry of the Environment	Finland
IEP: The Institute of Environmental Protection	Poland
IEPA: Irish Environmental Protection Agency	Ireland
IMELS: Ministry of the Environment and Protection of the Territory	Italy
MEDAD: Ministry of Ecology and Sustainable Development	France
MSHE: Polish Ministry of Science and Higher Education	Poland
RCN: Research Council of Norway	Norway
SwEPA: Swedish Environmental Protection Agency	Sweden
SYKE: Finnish Environment Institute	Finland
UBA: Umweltbundesamt	Germany
VROM: Ministry for Housing, Spatial Planning and Environment	Netherlands

Table 2: Questions addressed by the study

- The **planning and management** of research projects and programmes:
 - *When are the users of the research identified?*
 - *How are they involved in research planning, project specification, project selection, project/programme management, and the research itself?*
 - *How is it ensured that the research meets the users' needs?*
 - *Are resources and responsibilities for dissemination built into the projects and programmes?*
- The **communication of results** - the routes and mechanisms for bringing the research results to the attention of users and enabling their use:
 - *What are the aims of communicating the results of research to different users?*
 - *How are results made available to different users?*
 - *What are the benefits of different mechanisms for information transfer, for example research reports, summaries, syntheses, web sites, face-to-face meetings and workshops?*
 - *What mechanisms are used to promote and support the use of the results?*
- The roles of **interpreters and intermediaries** in making results available to users in a form which is useful:
 - *To what extent are interpreters and intermediary bodies involved in the transfer and translation of information between research results and the inputs that the end-users (policy makers, regulatory decision makers etc) actually need?*
 - *What is involved in these processes of interpretation and how do they contribute to the successful utilisation of the research?*
 - *What skills, capacities, inter-relationships and organisational arrangements are necessary to ensure that research results are successfully transferred to, and interpreted for, the users?*
- Engagement with **stakeholders**:
 - *What are the aims of engaging with stakeholders on research results?*
 - *What are their knowledge needs and how are they met?*
 - *How is it ensured that the processes of research dissemination and utilisation are transparent, build trust and meet Aarhus requirements?*
- The **evaluation** of processes of dissemination and utilisation:
 - *What constitutes "success" in research dissemination and utilisation?*
 - *How is it evaluated for projects and programmes?*

Table 3: Potential communication channels

Communication channel	Pros and cons
Technical reports	Present the research in the context of policy and can be an effective mechanism for knowledge transfer if the information to be conveyed is essentially factual. May be effective in ensuring the longevity of the research record but there are concerns about retrievability. Can be resource intensive and have a limited audience.
Non-technical summary	Written for a non-technical audience and explains the policy relevance of the research. Condenses the results into a form which is consistent with the time pressures on users and can be assimilated by them.
Peer reviewed publications	Are an appropriate channel of communication with the science community and are important in respect of the quality assurance of the work and to build confidence in using the results. The long timescales involved in peer review are an impediment in this latter regard. Their preparation needs to be adequately funded.
Professional journals	Are an effective channel of communication with practitioners, particularly engineers and environmental managers. However they count for less than peer reviewed publications in evaluation of academic performance.
The Internet	Is a key mechanism for providing access to technical reports and summaries but reports may be difficult to find unless the website is well designed. Websites can work well if people are actively looking for information but are not particularly good for getting information to a more passive audience.
Newsletters	Useful for keeping an extended user and research community up to date with developments in a programme. Can be difficult to get copy from busy project and programme managers.
Face-to-face communication	Enables a proper understanding of the confidence of the conclusions and remaining uncertainties to be established. Often the preferred channel of communication but can be resource intensive. Needs to focus on key audiences.
Workshops and seminars	Work well when they focus on a particular issue and with a targeted audience. Need to give time in the workshop for discussion and to create an atmosphere that enables an open and frank discussion. An important benefit is the contacts and relationships developed. Can be difficult to get users to attend: it needs to be seen as relevant to their current needs.
Transfer of researchers	Researchers taking up positions in the user community bring their innate knowledge of research and help to build mutual understanding.
Networks and forums	Enable periodic exchange of information between the research and user communities. Help to build relationships and mutual understanding.
Training courses	Over time, transfer the latest body of knowledge to younger scientists and engineers who may take up careers in the user community.
Dissemination of protocols	Embodiment research results in a practical form and may use the consulting profession as the intermediaries in bringing the knowledge to the end-user community.
Visits to laboratories and field sites	Bring the research to life and provide a good opportunity for researchers and users to get to know each other.

Annex 1: Literature review

Introduction

A short literature review was carried out at the start of the project to inform the development of the questions for the interviews and their subsequent interpretation. The literature review has been supplemented during the course of the study as additional relevant papers and reports came to light. The aim has been to ensure that the study is informed by the results of previous studies and thinking in this area.

As in the rest of the report, the review is presented under the five headings:

- planning and management
- communication of results
- interpreters and intermediaries
- engagement with stakeholders
- evaluation

The bibliography of reports and papers referred to is given at the end of the annex. It includes links to websites where reports are freely available for download.

Planning and management

Carden and Neilson 2002 consider the experience of staff working to ensure research uptake in public policy-making in an international development context and point to the importance of interaction between researchers and policy makers during the design of the research, dissemination, and the research process itself, and of building relationships between researchers and decision makers that last beyond the research project.

Eckley 2001 reports on a workshop held by the European Environment Agency and the Global Environment Assessment research programme of Harvard University (and therefore drawing on the work of Clark discussed elsewhere in this review) on the design of effective environmental assessments. The workshop concluded that participation of users in the planning stages (the “first 5 metres” using the analogy of a 100m race), and through iterative communication with the researchers throughout the assessment process, will improve the likelihood that the assessment will produce results which are salient to them, and hence enhance its salience (see Clark for attributes of salience, credibility and legitimacy). Participation should be “substantive”, not “sitting and listening”. However, participation of users who have clearly defined interests in the assessment’s outcome can risk harming its credibility.

Furman, Kivimaa et al 2006 recommends that different stakeholders should be involved in scoping a research programme at an early stage, for example, through stakeholder seminars or consultations. The involvement of industry is important in

programmes that generate industry-relevant or policy-relevant results. NGOs could also be included. The involvement of different stakeholders adds transparency.

Nutley, Davies et al 2002 draws lessons from a review of experience of using social science in policy making across UK Government departments. In respect of issues associated with planning and management they conclude that better, ongoing interaction is needed between researchers and practitioners throughout the process of research, from the definition of the problem to the application of the findings. This is not cheap or organisationally straightforward and issues of independence and impartiality need to be addressed. They also conclude that “pushing” evidence out is not enough: there is also a need to develop the “pull” for evidence from potential users.

Quevauviller 2005 focuses on science-policy integration in respect of implementing the Water Framework Directive and points to clustering of projects in the key action “Sustainable management and quality of water” in FP5 in order to promote integration and synthesis of results for policy needs, and to create platforms for active dissemination to users.

Scott 2000 reviews previous work on research results dissemination, and in particular work by Huberman, and points to the advantages of an interactive style of working where researchers and practitioners jointly define and elaborate research strategies, and where there is “sustained interactivity”.

Scott, Holmes et al 2005 summarise the findings of a survey of 100 people working at the science-policy interface in environmental ministries across Europe and in the European Commission. The survey points to the need for researchers to interact with users and stakeholders to identify the right questions to address and to enhance communication. An important outcome of the dialogue between researchers and users is the development of trust. Close linkages, long-standing relationships and trust are vital components if science is to be recognised and utilised by policy makers. However, care must be taken not to undermine the independence of the research. Also, it was recognised that policy makers can find it difficult to articulate their research needs over the medium (2-5 years) and long term.

Scott, Holmes et al 2005b report on the Science Meets Policy workshop held in London in November 2005, which emphasised the need for constant interaction between researchers and users from the start of the research process, including the identification of research questions. Such interaction should be a requirement of funders in the design of research projects, who should provide funding and time for engagement. Where research is intended to inform policy, project selection criteria should include criteria relating to policy relevance, timeliness and usefulness, reflecting a broader notion of quality than scientific excellence.

Wren 2002 reports on an action research project for the Canadian Government to consider how to achieve a stronger integration of the science and policy functions. The starting point for the project was a recognition that scientists and policy makers frequently misunderstand each others' processes, arising in part from the fact that they traditionally connect around end-products (scientific information or finalised policies), and not during the process of setting questions and setting priorities. He concludes that to achieve stronger integration means moving on from the metaphor of a "relay race" – a scientist completes a piece of work and then passes it off to a policy person to run the next leg of the race – to that of a rugby team – scientists and policy analysts run the field together, supporting each other as they go, and achieving goals as a united team.

Communication of results

Ballantine 2005 takes stock of the use of science in decision making in the European Union and draws conclusions on how it could be improved. He points to the limited scientific literacy of many policy makers, the cultural and capability gap between scientific advisors and policy makers, and the lack of public confidence in the use and utility of scientific evidence. He recommends that the European Commission draws up mandatory detailed guidelines for the presentation of scientific advice to policy makers which emphasise that advice should be understandable to policy makers and of publishable quality. The guidelines should require:

- each population addressed by any estimate of risk and each risk assessment end-point to be identified, along with the expected and (appropriate) upper and lower bound estimates of human health or environmental risk;
- peer review studies that are relevant to the subject should be highlighted;
- facts, judgements, opinions and studies that have not been peer reviewed to be distinguished;
- methodologies used to reconcile inconsistencies in scientific data to be explained;
- assumptions and analytical methods to be described;
- significant uncertainties to be identified and explained;
- new evidence that might alter conclusions to be highlighted; and
- value judgements to be avoided and comments restricted to science and scientific advice.

Bradshaw and Borchers 2000 point to the science-policy gap as arising from differences in confidence in a given scientific finding between the scientific community and policy makers / society. The way in which uncertainty is treated is key to closing this gap, and requires more efforts to be directed to communication to policy makers and the public. Also, uncertainty needs to be treated in the policy arena as it is in scientific circles: as information for hypothesis building, experimentation and decision making.

Brown 1992 identifies three conditions for useful interactions between researchers and policy makers:

- clear presentation of research material;
- a sense of ownership among policy makers of the results of the research;
and
- the need for a suitable forum for communication.

DTI 2004 reviews the impact of the EU Framework Programmes in the UK and concludes that the Commission should give greater weight to dissemination and exploitation of research results and to the synthesis of programme results to assist policy makers.

Eckley 2001 continues the analogy of the 100m race, and concludes that participation of users in the last 5 metres can be critical to saliency too. This may include participation in simulation exercises, in querying database systems, or using models. For reports, it may mean making authors available for making presentations and answering questions.

European Commission 2003 examines exploitation and dissemination of research results from 34 Framework Programme 4 and Framework Programme 5 projects and concludes:

- That while dissemination is promised in project proposals it is mostly passive and not pro-active. Researchers often have limited interest in dissemination outside of the academic world.
- Initiatives are needed to link research projects more directly to potential clients in the Commission and national ministries.
- Dissemination starts with availability and better electronic, web-based databases of project reports are needed.
- A European Research Paper series is needed which reduces the time-span to publication, is inexpensive to access, and provides a platform for a first publication of research results.
- Increased exploitation would result from dissemination being organised as part of the research projects themselves.

Faulkner 1995 concludes that to improve knowledge flows from public sector research, the number of communication channels should be increased rather than the number of formal linkages. This is because knowledge use tends to be “bitty” and through coalescence, and hence cannot be planned at the micro level – instead one has to set up suitable structures and cultures. The model is one of “dating agencies” rather than “marriage brokers”.

Furman, Kivimaa et al 2006 consider that indispensable features related to dissemination include a communications or dissemination plan for the programme

and/or projects, information in popular and professional language in addition to scientific reporting, the reporting obligations of the management team to be continued after the programme, and a budget allocated for stakeholder communication on project and programme levels. These elements can be facilitated by allocating time for identifying relevant stakeholders, ensuring the presence of high-level officials in workshops and seminars, having stakeholders present on programme boards or steering groups, and marketing the research programme and its projects in different stakeholder events and forums. It can also be useful to assign specific people to translate research results for general use.

Hornbeek 2000 develops a typology of “environmental information efforts”, identifying two categories of drivers for information development (programme support and benchmarking) and two categories for information communication (motivational and dissemination). Programme support information has a targeted audience and includes technical and policy analyses, implementation guidance, site information for permitting, enforcement and remedial strategies, and information to support compliance. In contrast, the audience for benchmarking information (which concerns the trends of the environment or environmentally related activities) is broad.

For information communication, “motivational” information efforts relate to message and content, and seek to promote particular decisions or behaviours in targeted audiences. They include programme support communications such as guidelines, social marketing (brochures, advertising), and public relations incentive programmes such as product labelling. “Dissemination” activities relate to processes rather than content, and are concerned with making available information, once developed, to target audiences. Mechanisms include information hotlines and clearing houses, web sites, and newsletters.

The paper compares the approaches to information development and communication in the US Environmental Protection Agency and the European Environment Agency, and relates their practices to their institutional setting and organisational structures.

Lievrouw 1992 proposes four characteristics of scientific fields that practice effective communication:

- they have a clear statement of goals;
- their members communicate frequently and across institutional boundaries;
- their main “problem” relates clearly to other more familiar issues that are of interest to key audiences; and
- their members popularise their principle messages and findings.

Nutley, Davies et al 2002 in drawing lessons from a review of experience of using social science in policy making across UK Government departments conclude that promulgation of individual research findings may be less appropriate than distilling

and sharing pre-digested research summaries. Multiple channels of communication – horizontal as well as vertical networks – may need to be developed in parallel. Recommendations for research commissioners for improving dissemination are identified as:

- time research to deliver solutions at the right time to specific questions facing practitioners and policy-makers;
- ensure relevance to current policy agenda;
- allocate dedicated dissemination and development resources within research funding;
- include a clear dissemination strategy at the outset;
- involve professional researchers in the commissioning process;
- involve service users in the research process; and
- commission research reviews to synthesise and evaluate research.

Quevauviller 2005 points to current problems in relation to research to support implementation of the Water Framework Directive as a lack of transfer mechanisms to policy makers and stakeholders – relevant information therefore stays in the specialised technical community – and communication difficulties linked to the different jargon in different communities.

Scott 2000 reviews previous work on research dissemination and identifies training, networks and person-embodied knowledge (often tacit or uncodified) as important, in addition to transmission through documents. The mass dissemination of information is costly and ineffective in transferring knowledge that can actually help improve policies. Policy makers do not generally actively seek knowledge – research knowledge “must be expressed, communicated, channelled, explained or otherwise distributed to policy-makers if it is to affect policy decisions”.

He concludes that the user community is not uniform – many different sorts of users seek to use research in different ways and for different purposes - and users are not passive targets, they will weigh new information against the constructs and experiences they have built up throughout their lives.

He also describes the experience of research dissemination by the UK Global Environmental Change Programme (a programme funded by the Economic and Social Research Council) which drew the following conclusions on good research dissemination:

- look at the subject from the audience’s perspective, not the researchers;
- assume that most readers are not specialists in the area;
- identify the key messages, concentrate on them and don’t be afraid to repeat them;
- keep documents short for rapid reading and repetition;
- ensure the use of clear language;
- make the most of each product;
- be opportunistic, particularly with the media; and

- emphasise appropriate messages for different audiences.

Scott, Holmes et al 2005 conclude that while dissemination is sometimes criticised as being based on an unrealistic notion of knowledge creation, diffusion and uptake, there is still an important role for dissemination. The accessibility of knowledge can be enhanced through various kinds of meetings and publications/websites, and the careful use of the mass media. These activities take time and resources and need to be built into research plans (for example the UK's Government Department for International Development requires research projects to allocate 10% of the funding to communication with non-academic partners).

Scott, Holmes et al 2005b report on the Science Meets Policy workshop held in London in November 2005, which concluded that research should not just be published in the form of academic papers. New forms of communication for research need to include: policy briefs from policy-relevant research projects, the use of science cafes, and work with media specialists. Better databases, which are easily searchable and written in plain English, are needed to ensure that scientific knowledge is more readily available to policy makers.

Woolgar 2004 considers the uptake of knowledge from social science research, and reviews three models for the process whereby new ideas are adopted:

- The best ideas will in the end be adopted and there is no need for marketing.
- While the intrinsic properties of the ideas are important they may need some promotion or “assisted passage” to ensure their adoption. The process of dissemination concerns an unchanging idea which needs to be presented to a stable and identifiable audience in terms that they can relate to.
- The ideas themselves are constituted through the processes of their origin, genesis, take up, interpretation and use. The nature and perceived value of the ideas emerges through processes of interaction between producers and users.

He argues that this last model is the more accurate description of the complex and messy processes of “real-life” dissemination and uptake.

Interpreters and intermediaries

Clark, Mitchell et al. 2002 consider how institutions mediate the impacts of scientific assessments on global environmental affairs and concludes that the most influential assessments are those that are perceived by a broad range of actors as having three attributes:

- **Saliency:** whether an actor perceives the assessment to be addressing questions relevant to their policy or behavioural choices;
- **Credibility:** whether an actor perceives the assessment's arguments to meet standards of scientific plausibility and technical adequacy; and

- **Legitimacy:** whether an actor perceives the assessment as unbiased and meeting standards of political fairness.

There are trade-offs between these attributes: efforts to bolster one may be at the expense of another. Also, their relative importance changes as an issue develops. Institutions shape the influence of assessments by shaping the trade-offs between the attributes. Three institutional features are important in determining an assessment's potential influence:

- **Embeddedness:** the degree to which an assessment is carried out within, or under the control of, the organisation that will use it to inform policy decisions. Assessments which are too strongly embedded risk being dismissed as self-serving; those too weakly embedded risk being ignored by decision makers as irrelevant.
- **Boundary spanning** arrangements: bridge the gap between the experts and the decision makers. If too weak, experts and decision makers will not hear each other's concerns or insights, leading to low influence through lack of saliency. If too strong in coupling producers and users of assessments, suspicions may arise that decision makers are not only asking the questions but determining the answers, reducing the credibility of the assessment.
- Provisions for **learning:** are important in balancing the benefits of continuity and cumulative experience in the assessment with the need to track the changing needs of decision makers and the changing state of scientific knowledge.

Haas 2004 considers that science is seldom converted directly to policy, and that the path from "truth to power" is a circuitous route at best. In order to be useable in a policy context, knowledge must be seen to be accurate and accessible, contribute to the achievement of collective goals, represent consensus, and be provided through a medium which is politically palatable. He considers that scientific consensus is often poorly represented to decision-makers, and that there is a need for eloquent and articulate specialists from within scientific disciplines who are able to communicate across technical and cultural divides to policy analysts and politicians.

Holmes 2005 reports on a survey in the UK of 70 people working at the science-policy interface to identify barriers to the better use of science in environmental policy making and regulation. The survey points to the translation role from research to policy inputs as key, but under-resourced, and where the necessary skills are in short supply. It also identifies the communication of uncertainty in a way which is useful to policy makers but true to science as an important challenge, and where there is a need for an enlightened view shared between policy makers and scientists of the provisional nature of scientific knowledge.

Perkin and Court 2005 review the literature on the role of networks in providing links between research, policy and practice, defining networks as “formal or informal structures that link actors (individuals or organisations) who share a common interest on a specific issue or who share a general set of values”. They have the capacity to foster communication, creativity and consensus, and can perform the following functions:

- **Filters** which “decide” what information is worth paying attention to, and organise unmanageable amounts of information;
- **Amplifiers** for little known ideas and make them more widely understood;
- **Convenors** bringing together people with an interest in the issue;
- **Facilitators** helping members carry out their activities more effectively;
- **Community builder** promoting the values and standards of the members; and
- **Investor/provider** of the resources members need to carry out their activities.

The paper draws from the literature six characteristics that make networks successful in influencing policy:

- **a unifying purpose;**
- **interactive communications** ensuring information is freely accessible and there is good feedback between actors;
- **autonomous actors** resulting in fluid structures and the presence of “entrepreneurs”;
- the capacity for **simultaneous action** from multiple nodes;
- **a dynamic culture** fostering creativity and risk-taking and enhancing collective action; and
- **shared interests or values** providing cohesion.

Quevauviller 2005 points to current problems in respect of the Water Framework Directive that policy makers do not have the time or capacity to translate research results into policy, or even access to technical journals – they are not defining their role as “client” sufficiently well – and there is insufficient effort to present results in a form that policy makers can easily use, for example “science-digested” policy briefs. He describes the initiative taken by the HarmoniCA concerted action – a web-based portal - to enable communication between researchers and research users, and which takes a multi-level approach.

Rayner, Lach et al. 2005 consider the experience of the uptake of research information (climate forecasts) by water resource managers in the USA and concludes that if new information indicates a departure from past experience and established procedures then the users (the water resource managers) tend to formulate negative perceptions of information reliability that hinder its acceptance. Externally

generated information is unlikely to be influential in an organisation's decision making unless it is incorporated in internal reporting in a fashion that renders its origins almost invisible to its ultimate users. Integration of new information into the decision making process is a challenge of articulating the information within an organisation's frameworks of meanings and collective action, not merely a problem of removing exogenous barriers to information. Translators, whether in-house or employed as external consultants, play a key role in getting information into organisational decision processes.

Scott 2000 reflecting on experience with the UK Global Environmental Change Programme, concludes that practitioners are often more interested in contact with researchers than in particular pieces of research. They want understanding as well as facts, and they need knowledgeable people with whom they can interact.

Scott, Holmes et al. 2005 summarise the findings of a survey of 100 people working at the science-policy interface in environmental ministries across Europe and in the European Commission. The translation of scientific knowledge into policy was considered to be a key issue by many interviewees and the assimilation and synthesis of science into user-friendly forms was recognised as a considerable challenge. A new race of "translators" is required who are familiar with both the scientific and policy worlds and who are more "horizontal" than "vertical". They require analytical, synthesis and communication skills to assimilate large amounts of information, identify the essence and communicate this for non-specialists. Researchers often do not have the skills to undertake effective translation and dissemination.

Scott, Holmes et al. 2005 report on the Science Meets Policy workshop held in London in November 2005, which concluded that there is a need for more effort on processes aimed at translating research results into inputs that could be useful to policy makers. While scientists themselves should be encouraged to interact more closely with policy makers, there is great potential for various types of intermediaries and translators to do this work.

Wren 2002 points to the inherent difficulties of relaying technical information to the policy community in a form that will convey the important knowledge without oversimplifying the science. A particular challenge is conveying scientific uncertainty. Scientists are frequently not adept in this translation role and may need assistance in communicating their knowledge (as may policy makers in interpreting it).

Engagement with stakeholders

European Commission 2001 points to the increasing challenges to scientific expertise, and indicates that lack of transparency in the way expertise is selected, used and diffused undermines the legitimacy of the policy process. It concludes that much more needs to be done to improve the interactions between expertise,

policy making and public debate and focuses on the concept of “democratising expertise” which concerns ensuring “due process” in the way in which expertise is developed, used and communicated. It is about extending the traditional approaches for assessing quality.

The report points to the need to translate information into suitable forms (e.g. synthesis documents) for democratic institutions and the general public to ensure that they have access to relevant and useable knowledge, while avoiding information overload. Also, the role of the mass media is important, and improved communication is needed between the media, experts and policy makers.

It concludes that a proactive communication strategy, taking account of the diversity of target audiences, should be implemented, aimed at informing stakeholders of what is accessible and how. Simplistic “black and white” messages should not be provided. Rather, the strategy should ensure that uncertainties and controversies are made explicit. A balance needs to be struck in respect of making available information that has not yet been quality assured, and information made available setting out the “track record” explaining how evidence was produced and used.

Intermediary platforms or organisations are considered to be useful in facilitating interactions between experts, policy makers and the public. They may be “intermediary institutions” (e.g. the Danish Board of Technology or the Rathenau Institute in the Netherlands) or can be virtual platforms such as networks, workshops or journals.

European Commission 2002 recognises the controversy frequently associated with the use of science in policy making, and the need to ensure that stakeholders and the public at large are convinced that decisions are sound. It points to the need to ensure that the process followed is sound, not just the policy outcome, and establishes guidelines on the use of expertise in the Commission (with a view that they should, over time, form the basis of a common approach for all institutions and member states).

It describes three general principles of quality, openness and effectiveness. With regard to openness, transparency is considered a key precondition for more accountability for all involved. It requires a strategy for proactive communication, in which the scientific advice is made understandable to non-specialists. Scientific advice and underpinning documents should be made available to the public as quickly as possible. Nonetheless, the level of openness should be tailored in proportion to the task in hand.

Experts should clearly highlight the evidence upon which they base their advice, as well as any persisting uncertainty and divergent views. The status of documents should be made clear, and it may be appropriate to publish for comment advice in provisional form. On sensitive issues, informed and structured debate should be facilitated between policy makers, experts and stakeholders.

European Science Foundation 2003 identifies science communication as an important part of the project initiated by the Lisbon and Barcelona decisions. They

recommend that 1% of research money should be spent on communication and educational activities, and that science communication should be part of the application and evaluation procedure for research funding. Science communication is recognised as being, to a high degree, dependent on national relevance, culture, history and development. Scientists need to be more aware of the importance of communicating science to the broader public.

Fondazione Eni Enrico Mattei 2002, through consideration of case studies of the science-into-policy process in EU member states, identifies two extremes of processes for the governance of science (recognising a wide spectrum of different approaches in-between):

- **Open Process:** the public is involved, stakeholders and pressure groups are invited in, and scientific evidence is treated just as another stakeholder community. Both dissemination of information and public participation are widely sought.
- **Closed Process:** it is assumed that government knows best, and central staff from the government are entitled to decide how science has to enter the policy-making process. No consultation with society is sought during the different phases of policy-making, and the procedure is kept internal.

It recommends that the processes by which scientific input is included in policy-making are made more transparent (which is not the same as openness) and concludes: “The boost on transparency does not mean that all information should be evenly disclosed to the public whatever their content. Transparency means that the public is to be informed in a proficient and intelligent way, and not be overloaded with unnecessary flows of information. Sometimes, information is disclosed in a way that makes the policy-making process obscure rather than more understandable. Attention should be paid to the way non-definitive, controversial and alternative scientific visions are disseminated to the society, particularly when they are likely to foster confusion or social fears.”

Green 2006 indicates that, despite many initiatives over recent years, Europe's performance in disseminating its research results through the mass media is poor and the European media are largely dominated by North American research news. He considers that the role of media liaison staff - the press officers and information officers who day by day ensure that the work of the organisation gets accurate and appropriate coverage in the media - is not given sufficient priority. Consistent, planned and professional media relations are not a common characteristic of the European Research Area.

Grove-White, Macnaghton et al (2000) conclude that present methods of one-way information provision are inadequate in relation to new technologies, and that the patterns for interactive understanding of the potential social implications of new technologies need to be developed. The different “social constitutions” of

particular technologies - that is, the distinctive values and social assumptions embedded in their development - are of fundamental importance for understanding public responses. The lack of official recognition of the humanly significant dimensions of uncertainty or ignorance act to foment, rather than to alleviate, public scepticism and mistrust.

Koolstra, Bos et al (2006) compare the merits of television and the Internet for communicating science to the general public. Based on empirical studies conducted in Europe they argue that television should still be regarded as the more important medium for science communication, because:

- people use television more frequently than the Internet;
- television is more effective in transferring messages to the public than the Internet; and
- people have more trust in television and in the internet as a reliable information source.

People who intentionally search for scientific information use the Internet frequently and the medium offers many possibilities to find a broad scope of background scientific information. A big advantage of the Internet is that looking for information can be done at any time of the day. But a disadvantage, also recognised by Internet users, is that much of the information on the Internet is of dubious quality and reliability.

Television is an important medium to initiate and stimulate interest in science, because it may expose people to scientific information in an unintentional way. Once television gets people interested in science, they may explore other means of information exchange such as the Internet.

Pinholster and O'Malley (2006) report on an online survey of over a thousand reporters and public information officers conducted in 2006 by EurekAlert!, the science-news Web service of the American Association for the Advancement of Science. The survey revealed that reporters' concerns are to learn about breaking science-news stories before the information reaches either competitors or the public. Beyond these usual news-reporting concerns, however, finding researchers capable of explaining science in an understandable fashion was the task most frequently cited by reporters as challenging. Obtaining photographs or other multimedia materials to help convey complex scientific content, and judging the trustworthiness of research or researchers, followed as the reporters' biggest challenges.

The reporters indicated that the top issues affecting public trust in science are:

- research findings being “hyped” or overstated by press officers, reporters, funders or researchers;
- ambiguous findings or scientific uncertainty; and
- the intersection of science with values, morality or politics.

The reporters indicated that their top peeve is press officers or researchers who respond too slowly to media queries. Press officers indicated that researchers should “talk up the research” but avoid hyping results.

Royal Society (2006) reports on a survey of nearly 1500 research scientists in higher education institutes and concludes that better training in public engagement, and better rewards and recognition are needed if the rather modest current levels of engagement are to be improved.

Evaluation

ESRC 2003 provides a communications toolkit to enable researchers to maximise the impact of their work. Its “10 top tips” in putting together a communications strategy include, “Build in some simple evaluation measures at the start so that you'll know if and how you've succeeded in meeting your communication objectives.”

Furman, Kivimaa et al 2006 conclude that ex-post evaluations often used include both self-evaluation and external evaluation of research programmes. A self-evaluation of the research programme and projects can yield important information on how to improve research programmes in the future due to the hands-on experience of the participants. External evaluations should be used to generate a wider picture of both the outputs and the functionality of the programme as a whole.

Attention should be paid to the timing of the final evaluation as dissemination processes and the use of the results in policy may take time. Sufficient money and time should be allocated to programme evaluation activities. A specific evaluation protocol that defines the contents of the evaluation is useful in targeting and carrying out the evaluation as planned. Evaluation should also look at the research programmes impacts on society as well as the elements defined in the programme objectives.

Scott, Holmes et al. 2005 summarises the findings of a survey of 100 people working at the science-policy interface in environmental ministries across Europe and in the European Commission and indicates that while it was recognised as important to evaluate the success of science-policy interactions, few interviewees were able to report mechanisms at the national level.

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Annex 2: Austria

Introduction

This annex for Austria concerns the approaches to research dissemination and utilisation of two ministries:

- BMLFUW: The Federal Ministry of Agriculture, Forestry, Environment and Water Management
- BMBWK: The Federal Ministry of Education, Science and Culture

and the Federal Environment Agency: UBA

Contributors

The following people were interviewed during a visit to the BMLFUW offices on 31 October 2006:

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Background

BMBWK is responsible for basic and general scientific research in universities and research institutions, for coordination of international affairs in the research area, and for human resources in R&D. Each Ministry, including BMLFUW, is responsible for research issues within its particular areas of responsibility. A Council for Research and Technology Development advises the Government on research issues and prepares a long-term strategy for research and technology development for Austria.

The UBA monitors the state of the environment and provides advice to BMLFUW. It is a limited liability company. Its research programme is funded from a variety of sources, particularly European Framework Programmes.

Findings

The approaches to, and experience of, research dissemination of BMLFUW, BMBWK and UBA are summarised below under the five areas of investigation.

The Federal Ministry of Agriculture, Forestry, Environment and Water Management: BMLFUW

Introduction

The Ministry (in its current configuration) was set up in 2000 by merging the previously individual ministries of environment and agriculture. In that year the first research programme PFEIL 05 was developed which ran until 2005. A second research programme (PFEIL 10) has now commenced which will be carried out between 2006 and 2010. The programme has a budget of €30 million a year, 80% of which funds research institutes directly linked to the Ministry. The remaining 20% is available to fund proposals for research projects received in response to periodic cut-off dates for proposals. Two calls for proposals were made during the course of the first research programme. The Research and Development Unit coordinates research for the whole Ministry.

Planning and management

The programme PFEIL 10 is compiled in a document which describes the topics for research. It was developed in collaboration with the users of the research through a process involving commenting on drafts and workshops on particular topics. The prime users are the policy makers and technical units in the Ministry. Other users include the regional administrations, small and medium sized enterprises (SMEs) and the science community.

Researchers in universities and research institutes submit project proposals in response to the periodic cut-off dates. The proposals are peer reviewed by the scientific community for their scientific excellence and are reviewed by the appropriate policy and technical units in the Ministry to ask whether they are in line with their needs. The decision on which projects to fund rests with a steering committee within the Ministry comprising representatives from across the Ministry's departments.

As the programme and topics are described rather broadly, the individual project specifications are effectively drawn up by the researchers. For some projects users may be involved in a meeting with the researchers to refine the project proposal. Policy makers tend not to think about the longer term research needs. This, together with the fact that the initiative for project proposals lies with the researchers, means that a sufficiently close match with user needs is not always achieved.

Communication of results

Reports are useful but policymakers do not have time to read a hundred pages. They need a user-friendly summary which interprets the research for policy and sets out the options. With regard to uncertainties, researchers should give their best view while setting out the premises behind the results. It is not helpful to emphasise the difficulties and conclude that more research is needed.

Workshops are helpful, but it can be difficult to get the real policymakers to attend. A workshop needs to create an environment in which people feel they can contribute without being an expert on something. This can be easier for discussions around policy than around basic science.

For a more effective communication of results it would be helpful to have a subscription system for relevant topics which draws attention to potentially useful research projects on the basis of a previously defined profile.

It can be worthwhile to look for completely different ways of communicating things. For example, in a scenarios exercise at a workshop in Copenhagen, storytellers were appointed to develop stories which were simple enough for everyone to understand for each of the five scenarios.

Interpreters and intermediaries

The desk officers in the Ministry are science trained and are the interpreters. It is their job to read as much as possible of the scientific reports and to have contact with the science community and contractors so that they can summarise and distil the research for the policy makers. The Ministry's research institutes and the Federal Environment Agency also give scientific advice to the policy process.

It is helpful if interpreters and intermediaries work with projects and programmes from the initial planning stage, and observe developments throughout their lifetime. The ideas generated throughout such processes can be picked up and used to facilitate dissemination.

Evaluation

There is no defined process to evaluate the uptake and impact of research results in the Ministry. A mid-term evaluation is carried out for the research programmes to consider whether an adaptation of priorities is necessary.

Federal Ministry for Education, Science and Culture: BMBWK

Introduction

This section reflects the experience of two programmes sponsored by BMBWK:

- a 10-year programme on the Austrian landscape carried out between 1995 and 2004; and
- a current programme which commenced in 2004 concerned with the interactions between climate change, spatial development and the quality of life.

The current programme is part of the strategy for research on sustainable development developed by BMBWK, BMLFUW and the Ministry of Transport, Innovation and Technology. There are 11 core projects addressing two leading questions and a number of accompanying projects commissioned to support the core projects including establishing institutional partnerships. There has been one call for proposals and the second is currently being prepared. Both programmes have emphasised trans-disciplinary work.

Planning and management

A strong effort has been made at the start of both programmes to identify and involve potential users of the research. Users include people at the federal, provincial and regional levels of government, from municipalities, NGOs, regional development agencies and the education sector. The first programme had contact with 1200 partners.

For the current programme they initially held three workshops with groups of experts and non-scientists to develop a first concept paper setting out principles, aims and leading questions. The relevant ministries were also invited to contribute to the development of this paper. It was then sent out to 6000 people to comment and to identify their research needs. Subsequently a workshop was held for 600 people to discuss the programme. A programme paper setting out seven leading questions was then prepared on the basis of these contributions and discussions. The research questions were quite broad: an inevitable consequence of such broad participation.

Project proposals are requested from the research community in response to calls for proposals. Proposals are required to describe the outputs and outcomes and to include expressions of interest from potential users. Evaluators assess whether the proposed involvement of users would be effective. The projects are obliged to collaborate with users during the whole research process, involving them in the work itself and securing a financial input where possible. This close involvement is considered to be important to secure the use of the research and to be a more effective approach than the use of steering committees (which are only convened for some projects).

Projects are required to allocate resources for trans-disciplinary work and dissemination activities. These may be around 30% of the overall project costs. For the projects, early contact with the users is considered to be important. If it is left to dissemination stage at the end of the project the researchers may find they do not have answers to the practitioners' questions.

The programme is accompanied by a scientific advisory board comprising scientists and two members from non-scientific fields. This helps to ensure the relevance of the programme.

Communication of results

The overall aim is that the research results should be used to support better political decision-making. This includes all those involved in the decision-making process, for example industry, NGOs etc. They also try to ensure that the research is used in the decision-making process of other ministries but this can be difficult.

They have commissioned a project to work on public relations for the whole programme, informing the broad public about the programme and its results. This project also provides support to the individual projects on communication activities, providing coaching and support for organising events, communication between projects etc.

There is not one best way for communication: it is important to try different ways. Reports are useful in recording the research process and results, but are resource intensive and have a limited audience. Summaries are prepared and describe the political relevance of the research results, making recommendations for policy in many cases. Each project is required to publish its results in the media used by the practitioners, for example the relevant professional journals. Workshops are held during and at the end of projects and provide room for discussion which helps to overcome misunderstandings and explore different interests. A scheme to enable researchers to move to positions in the Ministry has had some success.

Interpreters and intermediaries

Scientists need a better understanding of how policy and the political process works: they cannot be left alone to transfer results and need to be supported by intermediaries. At the federal level, the Ministry's activities are part of the translator role. The PR project in the programme helped to transform and transfer the research results to the users.

With regard to skills, researchers need communication skills and a feeling for the decision-making process and the situation faced by users. Conversely the users need to understand how research works and what research can offer.

Engagement with stakeholders

They endeavour to inform the general public and special audiences but this costs a lot of money. They co-operate with the press and the media and particularly with the government broadcasting organisation which has a cultural radio channel carrying programmes about science.

For the first programme, a collaboration between researchers and a film producer resulted in a 45 minute film dealing with Austrian landscapes which received several awards and was invited to more than 40 international festivals. It brings the research to people who would not be interested in a research report.

A key concern for dissemination is to make research more useful at the level of schools and youth organisations, and each project is required to include cooperative activities with them. The aim is to ensure that young people get a better understanding of the research process - and what research can and cannot provide - which should improve the political decision-making process over time.

Evaluation

They evaluate outputs, for example the number of partners, how many publications, radio contributions etc. rather than effects: the latter are not so easy to measure. They would like to evaluate effects in the future but associating outcomes with particular projects is difficult as there are many influences.

Umweltbundesamt - Environment Agency Austria: UBA

Introduction

Although not a research institution, the Agency participates in several international research projects, some of which it coordinates. It also conducts a limited amount of its own research. These research activities are supplementary to the governmental tasks of the Agency. Typically, in research projects, the Agency either has a coordinating role, in that it links various stakeholders, or a role complementary to the participating research institutions, e.g., in that it provides advice to the latter on environment related legislation and political decision making processes. The most important source for external research funding is the Framework Programme of the Commission (currently some 15 projects), but a few current projects are also funded by other research programmes.

The Agency produces its most significant state of the environment report every three years. This is an important report for the national decision-making process. Moreover, the Agency publishes various kinds of reports for different purposes. It regularly holds science events with the Austrian broadcasting services. It also publishes in journals. The Agency's web pages are for different target groups (the public, schools, public authorities, science and companies). Nevertheless, specialist information, such as reports, can be downloaded by anyone interested.

Communication of results

How you communicate the results of research projects depends on whom you want to address: it is important to differentiate between different situations and different target groups. For example if you want to communicate high quality scientific work then you should use the top journals or conferences. But if you want to communicate to a broader audience then you should use other instruments. An intermediate way is the popular science journals. At the top end of such journals are Nature and Science which are read by journalists who are looking for articles for their own newspapers and journals.

Currently, owing to the vast amount of information that is around, distributing information is not the key issue for successful dissemination, but getting the addressee's attention. The best (if not only) means to assure this is face-to-face communication. Thus, if you want to get to the political decision level you need to incorporate these people into the project. Then a good indicator of the success of the dissemination practices is how much time they put into the project.

There is also a problem about how scientists are measured for their career. A published paper and a talk to the Mayor (who should later use the research results) both take time and you have to find the right balance, but likely only the former will be advantageous as to career development. Before you do anything you need to think about whom you want to address and how you motivate scientists to do that communication.

The Internet is the best medium to distribute information to those people who want to get it from you (pull approach), but is not good if you want to approach someone (push approach). The quality of Internet sites is very variable and therefore if you do a search you can get information of variable quality.

The above approach is illustrated by an example, this procedure is applied in several projects:

A current project for Framework Programme 6 – GMES Network Users: GNU - includes a work package called discourses, emphasising that communication is two-way. The project is just beginning and each consortium member is currently identifying appropriate stakeholders in their countries. These stakeholders are invited to an initial workshop at which the project is explained and which includes discussion about what information the stakeholders need and what they can contribute in return. This enables the deliverables from the project to be specified in a way they best meet the stakeholders' needs.

The project has 22 partners and they have established several sets of stakeholders. For each, there will be two workshops over the three year project which will enable the users to influence the project. A website will be established to enable ongoing exchanges during the project. There is a genuine desire to meet user needs and to be responsive. Resources for dissemination have been identified because they had to have a costed plan for the proposal. Moreover, each of the other work packages has its own dissemination elements.

Interpreters and intermediaries

UBA has to present information honestly but with sensitivity to the political context. Interpretation is integral to all such communication. To be effective you need experience and honesty, but the relevant skills are developed by informal means rather than through formal training.

Engagement with stakeholders

There are regular contacts with different media and journalists. UBA works through the media, for example placing newspaper articles. The communications and marketing department maintains contact with the media and edits articles. There is also collaboration with the Austrian Broadcasting services with whom programmes are produced on a regular basis.

Evaluation

In 2006 UBA initiated a quantitative and qualitative evaluation of their work with the press.

Annex 3: Belgium

Introduction

This annex is concerned with the approaches to research dissemination and utilisation of the Belgian Federal Science Policy Office (BELSPO) and of the Environment, Nature and Energy Department (the former Environment, Nature, Land and Water Administration of the Government of Flanders, AMINAL) of Flanders and associated bodies:

- The Flemish Public Waste Agency – OVAM
- The Flemish Environmental Agency – VMM
- The Research Institute for Nature and Forest – INBO
- The Flemish Institute for Technological Research – VITO

Contributors

The following staff were interviewed during a visit to the Environment, Nature and Energy Department (former AMINAL) offices on 19 September 2006:

Philippe Van Haver (Dr)	Departement LNE
Jeroen Cockx (eng)	Departement LNE
Bob Nieuwejaers (eng)	Departement LNE
Griet Van Gestel (Dr)	OVAM
Sofie Van den Bulck (eng)	OVAM
Marleen Van Steertegem (eng)	VMM
Beatrijs Van der Aa (Dr)	INBO
Dominique Aerts (eng)	INBO
Prof Rudi Verheyen	Flemish expert on policy relevant environmental research

The following staff from the Research Programmes Department of BELSPO (Science for Sustainable Development) were interviewed during a visit to their offices on 28 November 2006:

Nicole Henry (Head of Department)
Georges Jamart
Hilde Van Dongen
Marc Van Heuckelom
Martine Vanderstraeten

Background

Belgium is a federal authority comprising three Regions (Flemish, Brussels-Capital and Walloon) and three communities (Flemish, French and German-speaking). The Communities are in charge of culture and education as well as person-related issues. The Regions are responsible for a range of issues including the

environment, energy policy and transport. The Federal Authority deals with domains such as national defence, justice and finance.

With regard to research, the Communities are responsible for general support of research carried out in higher education institutions. The Regions provide the general support of industrial and technological research and innovation. The Federal Authority, besides supporting research required for the fulfilment of its own assignments, also finances the Federal scientific institutions, space research conducted in an international context, data transfer networks between scientific institutions as well as several other activities requiring uniform implementation at national or international level.

The Belgian Federal Public Planning Service Science Policy (BELSPO) has two key missions:

- operational: through research programmes offering scientific support to policy-making, the funding of networks of excellence in fundamental research, space research, Federal scientific institutions and the telematic research network: and
- coordination: with respect to the Federal research efforts as a whole as well as to the strategies for bringing into effect the European Research Area.

In the Flanders region, the environment is the concern of the Environment, Nature and Energy Department (ENED) ENED is part of the Flemish government and reports to the Minister for Environment of the Government of Flanders. The Minister is also supported by a number of agencies including the Flemish Environmental Agency (VMM), the Flemish Public Waste Agency (OVAM) and the Flemish Land Agency (VLM), and by several research institutes including the Research Institute for Nature and Forest (INBO).

The annual research budget for the Department and agencies is €10 million. It is divided between the agencies and the divisions within the Department. The research coordinator of ENED prepares an integrated programme each year for the agencies and the Department divisions: the Applied Scientific Research into the Environment programme – TWOL.

More generally in Flanders, science is funded by two Departments: the Department of Education and Training (which finances universities and institutes of higher education) and the Department of Economy, Science and Innovation which finances two intermediary organisations:

- the Institute for the Promotion of Innovation by Science and Technology in Flanders (IWT) which focuses on applied research; and
- the Fund for Scientific Research – Flanders (FWO) which concentrates on basic, groundbreaking research in universities and research institutes.

Four research institutes: IMEC, VIB, VITO, and IBBT focus an important part of their research on the environment.

Findings

The approaches to, and experiences of, research dissemination and utilisation are summarised in the following pages for each of the following bodies:

- BELSPO
- Departement LNE (ENE Department)
- VMM
- OVAM
- INBO
- INBO – NARA team
- VITO

In addition, a case study from BELSPO is presented: the Assessment and Integration report on global change research.

The Belgian Federal Science Policy Office: BELSPO

Introduction

The mission of the Research Programmes Department of BELSPO is mainly the implementation of multi-annual research programmes, actions and networks on Belgian or international levels. They are responsible for identifying research issues and making calls for proposals. They evaluate the peer reviews and are responsible for contracts for research, and for research dissemination, in effect the complete research cycle. They work in collaboration with the regions and communities, particularly where responsibilities are not clear-cut or where a uniform approach is needed.

Universities, research institutes and non-profit consultants can apply for funding from BELSPO. It is also possible for scientists from other countries to be funded as part of consortia projects. Programmes are typically for four to five years, individual projects for two to four years.

Planning and management

They develop targeted – thematic - programmes identifying particular research topics, albeit broadly. A programme committee is established, composed of representatives of the Federal, regional and community administrations. BELSPO staff develop a draft of the programme which is discussed with the programme committee. It is the Council of Ministers that approves the budget and the headlines of the programmes. Topics for calls for proposals are identified in cooperation with the programme committee. It is for the researchers to identify the specific research questions and how they will address them.

Taking the example of the ongoing programme “Science for Sustainable Development”, at the level of each project there is a user committee. In the call for proposals they ask proposers to say who should be on the user committee. The programme committee, peer reviewers and BELSPO can ask for people to be added to a project’s user committee. They endeavour to involve all kinds of users: in some projects other researchers are important users as the next link in the chain. Reviews of project proposals evaluate whether the user committee for a project is adequate and whether the project will contribute to sustainable development policy.

The user committee can shape the project to some extent but the contract for the research is established before the user committee is put in place. They can only influence the project within the frame of the contract: a decision to change the contract must be made by BELSPO. Projects must have freedom to develop as scientific projects: they are not solely determined by the needs of users. However, the user committee may be able to contribute knowledge that the scientists do not have.

Project proposals are required to include proposals for dissemination. These are then taken up in the contract. It may be foreseen at the start what dissemination will be done, but in other projects it is decided during the execution of the project.

The project administrators follow-up the projects (scientifically and administratively) and also look for possible ways to disseminate the project's outcomes.

Communication of results

On completion of projects, a summary report for the general reader of around 10 pages and a final technical report of around 100 pages are produced: these integrate the work of all the partners in the project. BELSPO has issued guidelines on the content of these reports. They are put on the website and printed, and are distributed both by the researchers and by BELSPO. More detail may be provided in annexes which are put on the website but not necessarily printed. Sometimes they have a brochure to translate the results for a broader public.

The researchers present a first draft of the final report before the last meeting of the user committee. There is then a procedure of redrafting to take up the advice of the user committee particularly with regard to the use that can be made of results in the policy context. This should lead to an output agreed with the user committee. The reports are important as published papers only cover the scientific aspects, whereas the reports present the results in the context of sustainable development and the policy agenda.

The advantage of the user committee is that they are involved from the beginning. There would otherwise be the problem of getting research results presented at the end which people do not understand. This problem is solved because people are following the research from the beginning. They get familiar with the particular approach being used.

A recent initiative has been to provide extra money to enable clustering of ongoing or not yet finalised projects (BELSPO projects and other) in order to foster cooperation between researchers, to explore synergies, and to compare and harmonise disciplinary approaches, methodologies, and hypotheses. Results that are useful do not always come from one particular project - they may need:

- comparison and integration between projects
- an assessment of the project's outcomes to enhance their span/reach;
- to make scientific information better accessible to the users (other scientists, decision makers, stakeholders and the public at large); and
- to stimulate dialogue between the different actors.

So they have specific calls within the programme where the projects can propose clustering activities. Such activities might be a workshop where different projects are presented or could be more conceptual, for example comparing methodologies between different projects working on the same issue, 'translating' project outcomes etc.

It is an important process as it gives added value to the projects. The clustering may enable the scientists to see how they can translate the research themselves. Normally, BELSPO tells the researchers to produce a report, or to talk at a particular event, to take part in assessment and integration exercises (such as the Millennium Ecosystem Assessment, the IPCC assessments, the aerosol related

EMEP assessment etc.), to take part in expert meetings in support of decision making etc. But with this clustering initiative it is an active process and it is for researchers to think what they can do with their research. Some of the clusters are very stakeholder and user oriented. Some are educational and involve translation activities (from scientific outcomes to information for the public at large). Others are more for researchers. It depends on the type of projects.

The cluster-experience will be evaluated within the coming weeks and adjusted. Examples of Clusters are given at:

http://www.belspo.be/belspo/BePoles/index_en.stm,

At the end of 2006 they will get the first series of final reports from the clusters. Then they can evaluate the success of the initiative. The outcome of the cluster may be a website, a book or a workshop etc.

A further example of actions taken to disseminate research results relates to the issue of ozone. BELSPO organised a workshop and invited policymakers and researchers. They asked the researchers to present results specifically on tropospheric ozone. The presentations were put together in a book (available at http://www.belspo.be/belspo/home/publ/pub_ostc/CG/ozon_2.pdf). The workshop was for a day: for half the day the policymakers had the opportunity to talk and the rest of the day scientists explained the research to them. As a result, the policymakers know which scientists are doing what. So if they have a particular problem they can contact the scientists and may give them a small contract.

Interpreters and intermediaries

A biodiversity platform has been created as an intermediary involved in the transfer and translation of research knowledge to stakeholders. It involves the Walloon and Flanders Regions and the Federal Government. The platform has developed several different interface mechanisms:

- a reference metadata base on Belgian biodiversity resources;
- coordination of the SCAR-Marbin metadata base on Antarctic marine biodiversity results;
- several thematic forums covering scientists and policy makers; and
- thematic workshops (e.g. Climate and biodiversity).

Different outputs are generated by the platform:

- recommendations to policy makers;
- expert reports on demand; and
- assessments of the Belgian current knowledge on different topics in support of the European platform for research strategy.

The platform works as a two-way process but mainly from science to policy. As such, the platform through its forums acts as a catalyst for the integration of science into biodiversity conservation and policy, and as a focal point for R&D

projects and initiatives on specific problems related to the management and conservation of biodiversity.

They plan also to create platforms for climate change impacts and for transport and mobility. However, the costs of running a platform are around €250,000 a year which is a significant sum.

Engagement with stakeholders

They have a journal - “Science Connection” - which comes out five times a year which is aimed at a broader audience. Everyone can have it: it goes to schools, libraries and all the scientists from the programmes get it (available at http://www.belspo.be/belspo/scienceconnection/index_en.stm).

They engage with schools through for example a competition for children to write or present a slideshow about sustainable development. In 2006, the “Pole Position” contest on Antarctica involved 55 schools (children from 14-16 years old) and was a big success. They have also prepared brochures for schools on sustainable development and a handbook for teachers (available at http://www.belspo.be/belspo/home/publ/pub_ostc/hefboom/Inf_fr.pdf, and http://www.belspo.be/belspo/home/publ/pub_ostc/hefboom/Sup_fr.pdf).

At the end of the 1990s they had a big exhibition in the museum for natural sciences about sustainable development. All the work they funded was shown to people and a book was published. Some of the researchers were involved in preparing the exhibition.

They also take part in stakeholder meetings or policy preparation meetings (such as CCIM: the co-ordination committee for international environmental policy).

Evaluation

They have had some ex-post evaluations of programmes but these are broad evaluations of the scientific quality of the projects and the procedures of programme management. They are less about dissemination and uptake.

There will be a mid-term evaluation of ongoing projects but this is mainly a scientific evaluation to get external input to the science of the projects. They use foreign peer reviewers.

ENE Department

Introduction

This case study is concerned with the research programme of the ENE Department and with the overall coordination of the research of the ENED divisions and of the agencies through the TWOL programme. The findings are summarised under the five areas of investigation of the work package four study.

Planning and management

The research budget is divided between around 15 divisions and agencies. Proposals from individual divisions and agencies are brought together annually as a proposal to the Minister of Environment for the TWOL programme. The programme proposal (which typically has two pages on each of around 100 projects) is reviewed by the Cabinet which advises the Minister. The programme is revised in light of comments received and is finally approved by the Minister. The budgets are, as mentioned in the first sentence, allocated to the various divisions and agencies, prior to the selection and approval of the research projects. The co-ordinating process is effective at avoiding overlaps between these individual projects, but has so far been unable to facilitate transfers of budgets between divisions and agencies. A steering committee oversees the TWOL programme.

Since the end of VLINA (Flemish impulse programme on nature development) in 2002, no interdisciplinary research programmes spread over more than 4 years and concerning the environment or nature were developed (e.g. climate change, halt to the loss of biodiversity etc).

Individual research projects typically have a budget of around €100,000 and a duration of 12 months. The research is very applied, meeting immediate needs of policy development and implementation, and is carried out by consultants as well as by universities and research institutes. The users of the research write tight specifications for the projects and the impetus for what is done lies with the users rather than the researchers. The users are typically policy advisers and implementers with a science or engineering background and are intelligent customers for the research.

The proposals made in response to a call for proposals are reviewed by four or five people/experts. Evaluation criteria relate to both usefulness and scientific quality but the emphasis is on the former. The research is driven strongly by user needs and hence can usually be used immediately in policy development and implementation.

The divisions and agencies have different approaches to letting and managing contracts. However, they all use steering committees for projects which ensure strong direction and control of the research, and which play a key role in ensuring that the research meets user needs. A steering committee will typically meet two or three times over the course of a 12 month project, and comprise 8 to 12 policy advisers and implementers from the divisions and agencies with an interest in the research project. If there are well-defined stakeholders, for example from the regulated industry, they too will be represented on the steering committee. The aim

is to involve them from the beginning (in reviewing the terms of reference of the project) to the end. These steering committees do not normally include external experts as they may well have applied to do the research.

Sometimes stakeholders have different interests and try to pull the study in a particular direction. The steering committee plays a key role in enabling constructive discussions and to ensure that the arguments of the stakeholders are taken into account in developing the recommendations of the study. In most cases there is agreement eventually, which gives a more solid base to agree on consequent measures. This may take additional time but a research project is part of a trajectory which should help participants come closer together on their views.

Communication of results

Typically the users sit on the steering committee and have been closely involved with the research. There is therefore no need for a specific dissemination plan. But sometimes it is important to get the results to particular stakeholders who are not directly represented on the steering committee (as may be the case if there are a large number of relevant municipalities or companies in a particular sector). It is often the aim that such stakeholders should take actions based on the research results. Results are disseminated in the context of the consequent regulatory measures and what stakeholders could do as a contribution to meeting environmental objectives.

In such cases a workshop may be held. Workshops work best if they are limited to around 30 people, include panel discussions which allow questioning by the workshop participants, and enable learning.

A specific example relates to air pollution from traffic. The aim was that local citizens and communities should take measures on air pollution caused by traffic. A number of research projects were carried out including the development of a model which can be used by local communities to judge the pollution situation in their city. ENED organised an information day for cities and local communities at which they presented the results of the study and also gave information on the context of the policies and on the measures they could take.

The results of the projects (400 so far) are put onto the ENED website in the form of a one-page summary. If people want to know more they have to contact the TWOL research coordinator who can send them the complete report, typically as a CD-ROM.

After the end of the project, if they need further support or more information, this has to be the subject of a new research proposal.

Interpreters and intermediaries

Interpretation of the research should be resolved within the steering committee during the project. The steering committee therefore acts as an interpreter, ensuring that the research results can be used for policy making and implementation.

People within the Department need to take a broad view and to translate the research into measures and into products which they communicate to companies and local communities. For example, some years ago they had a research

programme on emissions from waste burning and domestic appliances and gardens. The results from this study were used for a communication campaign involving posters, radio spots etc, where the stakeholders were the broad public.

Sector bodies play a role as interpreters and in disseminating information to their members. Most people in academia are not interested in interpretation: the incentives in science are still excellence in science within single disciplines. To be an effective interpreter you need to be expert in a particular area but also to have a global view. Interpreters need to have contact with the Department and be able to understand research.

ENED funds a knowledge centre on best available technologies in air pollution at VITO (a research institute of the Flemish government). The centre organises information sessions for companies in the sector where they give presentations on the main conclusions of studies. They write brochures which they disseminate to particular sectors.

Engagement with stakeholders

The website is the main mechanism for communication with broader stakeholders. For each project the one-page summary and the name of the division of the Department or Agency are given. The research summaries are intended for everyone that has an interest in the research project. It is not intended to advise the policymakers. They are intended to be technical but usable, but are not easily understood by the general public. The TWOL research coordinator does a quality check on the summaries before they go onto the Web (<http://www.mina.be/twol-databank.html>) but they do not always arrive from the research groups who write them in the same format.

Evaluation

Evaluation happens informally through the steering committee process but there is no formal evaluation process at the project level for the uptake and usefulness of research results (but this will be the case in the future).

VMM

Introduction

VMM is the Flemish Environmental Agency and includes a team of around 10 people responsible for environmental reporting. This team produces the Flanders environment reports (MIRA) which provide:

- a description, analysis and evaluation of the current state of the environment;
- an evaluation of the environmental policy conducted at that point in time; and
- a description of the expected development of the environment by unchanged policy and by changed policy according to a number of scenarios considered relevant.

The annual MIRA-T reports present the state of the environment, underlying causes and how the environmental situation can be improved, and are aimed at policy makers and citizens.

Planning and management

They want the environment reports to be independent of the policy makers and it is for the MIRA team to decide what indicators to use. However, they also want the reports to be relevant and hence there is a tension. The environmental indicators presented in the report are those used by policy makers together with some additional indicators.

They do not do research as such, rather they collect what information is available. They have an annual budget of €0.5 million for data processing and presentation. They try to use all available information on the state of the environment but not all research results can feed into the reports. They explain to the researchers what is needed and bring them together to discuss if there are disagreements.

Interpreters and intermediaries

The MIRA team sits between the research community and the Administration: it is not easy to communicate with both. There is a degree of mistrust between the research and policy communities. The research community does not get much credit for its involvement with this kind of policy relevant environmental reporting.

The process of bringing people together to develop an agreed description of the state of the environment is as important as the eventual outputs. The MIRA team needs to be independent to facilitate effectively such interactions. It is helpful that there is a law requiring organisations to provide them with data.

They make sure that they only put into the reports what is needed: scientific knowledge is put into background reports. Scientists are involved in editing text and authors have to give their permission to the final text. They employ a professional firm to make language corrections. Scientists tend to want to be correct rather than to be clear and simple, and so there has to be an iteration.

Engagement with stakeholders

The website and a small summary report are the main mechanisms for communicating information on the state of the environment. The website is more for the general public. Different kinds of information are prepared for different audiences. Graphical presentation of information is used wherever possible, but it may still be difficult for members of the general public to understand. They present an indicator of the week on the website.

When they release their annual report they hold a big meeting which the Minister of Environment attends. They also hold similar events with members of the Flemish parliament. They are regarded by the media as the preferred supplier of information on the state of the environment.

The communication of uncertainty is a big challenge: researchers do not always do this well. This issue has been discussed at their steering committee where concerns have been expressed that the communication of uncertainty can dilute the message. In communicating to the public it is necessary to simplify and to make things clear: scientists can react against this.

Evaluation

For reports they send an evaluation form to the scientists and the reviewers: the scientists often say they need more money, and the reviewers that they need more time. They seek feedback from key customers on what they think of the report.

OVAM

Introduction

OVAM is an agency of the Flemish government responsible for the implementation of legislation on waste and soil. With regard to soil, Flemish legislation states that if soil is suspected of being contaminated, an investigation has to take place. Soil experts carry out these investigations. If they indicate that remediation is required, the site owner has to appoint a contractor to do the remediation work. OVAM is responsible for the technical and scientific input to support the development of legislation and the whole process of soil investigation and remediation.

OVAM has an annual research budget of €600,000 divided between new technologies for remediation, measurement techniques, risk assessments and setting of soil standards. The users of the research are OVAM staff, remediation contractors and soil experts. The results from the research projects are incorporated in codes of practice which, while not legally binding, are strongly recommended for use by those involved in the evaluation of soil contamination and its remediation.

Planning and management

There is a rather limited number of users and hence their identification for a particular project is straightforward. In asking for research proposals they specify the work quite closely and are very definite about what needs to be done. However, they may interact with the research community to establish what is possible and may talk to the association of soil experts about potential research projects. They have criteria for project selection which include the quality of the science, but the most important criterion is that they need the results, i.e. the project proposal meets their needs.

Steering committees are established for projects and typically meet three times a year. Steering committees evaluate project proposals, bring in further data and experience from the field, and focus on practicability issues. This focus is important to the eventual usefulness of the results as things may work in the laboratory but not in the field.

The SNOWMAN project is an example of a collaborative project carried out with partners in other European countries. They are currently planning the next call for proposals for SNOWMAN and have established parameters for project selection. One of the criteria is the dissemination of results and it is intended that the quality of the dissemination plan will be a significant factor in the selection of project proposals.

Communication of results

The project reports and a summary (including a summary in English) are published on the website. Given that the focus is the Flemish government, the language of reporting is Dutch.

They organise two or three workshops each year for the soil experts and other stakeholders (there are around 100 such consultants) to get the results of the research programme to them. The workshops include interactive sessions, for

example to discuss a draft protocol or to get ideas from the soil experts. The workshops provide an important forum for the experts to give their opinions.

Protocols are the best way of disseminating research outcomes to the user community. As OVAM strongly recommends their use, the user community has to look at them. The consultants and contractors adopt the protocols themselves.

The Association of Soil Experts and OVAM have developed a training course for junior experts and for younger staff at OVAM. The course comprises 10 sessions each of three hours covering all aspects of soil contamination and presented by soil experts, lawyers, university staff etc. The course forms part of the professional development of OVAM staff.

In their field there is a Journal in Dutch aimed at soil engineers but it is not used much. They have their own electronic newsletter which is a useful way of disseminating information to soil experts and others with an interest. Dissemination of knowledge between different parts of the Administration is increasingly important given the need for effective working across government. Engagement with the research community internationally is helpful to ensure the two-way flow of information.

Interpreters and intermediaries

Interpretation is the job of staff in OVAM, for example to advise the Cabinet on how to change the law on soil contamination. They also have to translate problems in the field to people working in the laboratory and vice versa: you must listen to people on both sides. A common problem is the feasibility in practice of techniques developed in the laboratory.

To be effective, it is important to be open and accessible to experts who should feel that they can talk to you about problems. You need to know who to ask and therefore a network of contacts is key.

Evaluation

They do not explicitly evaluate the dissemination and uptake of their research. However, their main goal is that experts use their research and they evaluate this by the way the experts make use of their reports. Soil investigation reports are sent to OVAM for review and so they can see if the experts are keeping up-to-date with their research. Because it is a well-defined and rather small community it is easier to tell whether research is being taken up.

INBO

Introduction

The Research Institute for Nature and Forest is a new institute which was formed at the beginning of 2006. It is a research institute of the Flemish government, most of its budget coming from the government and some coming from contract work. It employs 250 people.

As a government research institute they have a special role in the research landscape. Their position facilitates direct contact with the users: policy makers and field workers in nature, forest and water management. The nature of their institute makes contact with such people easier.

Planning and management

For the research carried out for the Flemish Government, staff interact with people in the Administration to establish their needs for research to support policy-making. Also they consider what research would be useful to policy makers given research developments in Flanders and internationally. INBO then develop a programme proposal to the Minister of Environment which is reviewed by sectoral advice boards. It is generally the researchers who have the ideas and make the proposals: very often, ideas for projects come from good contacts that INBO staff have with field workers and policy makers. These are typically informal and individual contacts.

The people who work in the institute have a genuine desire for interaction with users. A lot of the time of their staff goes into advising the Minister of the Environment and other groups on specific subjects. They have a good interaction with them and therefore a good understanding of the needs of the Minister, the divisions and the agencies. All of this gets built into the way the research is defined.

For the government sponsored programme, steering committees are currently only used for the bigger projects. For these steering committees INBO identifies relevant researchers from universities and other research institutes; the Administration identifies representatives from divisions and agencies. If a steering committee is not created, user interests are identified through the planning cycle. Steering committees are always used for the institute contract work, in which case the client chooses the steering committee members.

The institute has a NARA team (described later) which works closely with the MIRA team in VMM. Whereas the MIRA team produces the Flanders environmental reports, the NARA team produces the Flanders nature reports. Through the integration of available datasets, NARA describes the current state of species, habitats and ecosystems, as well as the treats and sustainable use. NARA also provides an evaluation of the policy measures towards nature and integrates a lot of the institute's and external data. Their work is overseen by a steering committee which was previously constituted primarily with researchers, but the balance has now been shifted such that it comprises the main users. This has been a real benefit: the users are better able to signal what kind of research is needed.

Communication of results

In their Institute there used to be just one approach to communication: it was the same for policy makers, stakeholders, farmers etc. They now recognise that they need people with communication skills who can use different approaches depending on whether they are talking to people who need to be convinced, who need management advice, who need numbers to improve their policies etc.

Written reports are for the scientists: other groups, even policymakers, do not read them. Policy makers need short summaries with recommendations. For contract research and most of the work for the government programme, they are obliged to give reports every six months or every year. The users can comment on these progress reports, enabling them to influence the further direction of the research. The final report of a project includes a summary with recommendations to policy makers and management.

Quite a lot of their research is published through publications of NGOs, aimed at professional and other audiences. This is a very different group of people from the academic audience. However, they do also publish papers in academic publications as this is important as a quality control. They have to do this, not because it is their main aim, but to ensure that their research is scientifically sound.

Communication through direct contact gives the best results in their organisation. Workshops, demonstrations and excursions work best. They organise an annual workshop for policymakers and nature and forest managers where they present the results on particular topics.

Excursions are a very good way of communicating the science. They take the users - usually a small group - to see the site where the research is done. They are given an explanation of what they will see in the lecture theatre at the beginning and then they go outside to see the research site and to have explained to them what is in the report. This makes the report visible: the users can ask questions and have a good interaction with the scientists. This generates new ideas and identifies particular issues that users have which the scientists can then address. It gives scientists a better idea about what their research is worth.

On the whole, institute staff are too busy being researchers and do not generally have good communication skills. Initiatives are in place to address this, including courses on science communication and also collaborating with organisations specialising in science communication.

Interpreters and intermediaries

Being an interpreter is an important part of their role: one unit in INBO specialises in interpretation and the provision of advice, getting its information from the other scientists in the institute. However, the interactions between the institute's scientists and users more generally also constitute interpretation. These interactions are not structured and depend on who the scientists know: some are better at networking than others. A current initiative is seeking to strengthen the institute's capacity in this respect.

They have not had a good experience with working with other organisations as interpreters. They had to put in a lot of time themselves. Their experience was that either people understood what the research was about but their communication skills were not so good, or that they had good communication skills but it took a lot of time to explain to them what research was about. They are very unlikely to go down this route again.

With regard to skills, interpreters have to know the field and to understand the interests of the people they are trying to reach. They need to be enthusiastic and to use the right images to get to people. They need to be able to make contact with their audience and to be able to put themselves in the place of the people they are trying to reach. It is important to have a good balance between knowing your subject and having communication skills.

Engagement with stakeholders

They have a newsletter with a broad circulation (around 3000 people) and whose articles provide links to their website where further information is available.

Through NGOs they publish information aimed at a broader public.

They are active in annual events such as an annual science week which is an initiative of the Flemish government science department.

Evaluation

Evaluation does not currently happen routinely and systematically, but they are developing a process which will build evaluation into the project cycle. Proposers will have to specify from the beginning who the users are for the research and how the research project should be evaluated. It's important to think about these issues at project inception.

Case study: INBO – NARA team

Introduction

INBO includes a team of around 8 people responsible for nature reporting. This team produces the Flanders nature reports (NARA) which provide:

- a description, analysis and evaluation of the current state of nature;
- an evaluation of the nature policy conducted at that point in time; and
- a description of the expected development of nature by unchanged policy and by changed policy according to a number of scenarios considered relevant.

The nature reports describe and evaluate the state of nature, underlying causes of change and efforts towards improvement, and are aimed at policy makers and citizens.

Planning and management

They want the nature reports to be independent of the policy makers and it is for the NARA team to decide – after consultation – what indicators to use. However, they also want the reports to be relevant and hence there is a tension. The biodiversity indicators presented in the report are those used by policy makers together with some additional indicators.

They do not do research as such, rather they collect what information is available. They try to use all available information on the state of nature but not all research results can feed into the reports. They explain to the researchers what is needed and bring them together to discuss if there are disagreements.

Interpreters and intermediaries

The process of bringing people together to develop an agreed description and evaluation of the state of the nature is as important as the outputs. The NARA team needs to be independent to facilitate effectively such interactions. It is helpful that there is a law requiring organisations to provide them with data.

They make sure that they only put into the reports what is needed. Scientists are involved in editing text and authors have to give their permission to the final text. They employ a professional firm to make language corrections. Scientists tend to want to be correct rather than to be clear and simple, and so there has to be an iteration.

Engagement with stakeholders

Press releases, articles, presentations, the website and a summary report are the main mechanisms for communicating information on the state of nature. The summary report is aimed at the general public. Different kinds of information are prepared for different audiences. Graphical presentation of information is used wherever possible, but it may still be difficult for members of the general public to understand.

When they release their bi-annual report they hold a big meeting which the Minister of Environment, members of the Flemish parliament and the press attend.

The communication of uncertainty is a big challenge: researchers do not always do this well. This issue has been discussed at their steering committee where concerns have been expressed that the communication of uncertainty can dilute the message. In communicating to the public it is necessary to simplify and to make things clear: scientists can react against this.

Evaluation

Every report is evaluated through questionnaires (included in the report and mailing to the users) and discussion with the steering committee. The evaluation is the starting basis for the next report.

VITO

Introduction

The Flemish Institute for Technological Research is one of the four large strategic research centres of the Flemish community, specialising in environmental studies, energy, materials and remote sensing. It employs close to 500 scientists, engineers and technicians as well as some 30 PhD students and 5 post-docs. VITO as a government research institute is part of the Ministry of Economy, Science and Innovation while a large part of its research is intended for the Ministry of the Environment and Energy and its agencies.

Planning and management

VITO performs two different types of research, so-called strategic research and contract research. Contract research is performed for and on behalf of the Ministry of Environment and Energy or its agencies. This means that the customer determines the objectives and planning of the research. These are typically small research contracts with a limited budget and within a fixed timeframe extending from a few weeks to a few months. Strategic research is performed mainly on the VITO-budget. Its content is determined by the VITO researchers itself and a research project typically extends up to 4 years. Strategic research can be either policy-research aimed at gathering or extending policy know-how, or technological research aimed at establishing new technological know-how or procedures which can be patented or licensed to interested industry. The so-called reference tasks of which the BAT (Best Available Techniques) is an example, are included in the contract research projects.

All strategic research projects are approved by the board of directors on a yearly basis as part of the yearly budgeting cycle. Contract research projects are executed and accepted by VITO on a sequential basis, as opportunity arises. Next to paid contract research VITO staff often advise the Minister of the Environment and other groups on specific subjects or act on behalf of the Flemish Government in international forums.

For the reference tasks, steering committees are usually installed which determine the yearly work programme. In these committees both the relevant government agencies and VITO staff are present and sometimes also representatives of industry. They determine the yearly programme and follow the proceedings during the year. Most of the reference tasks are communicated through the VITO website or specialised websites such as the EMIS-website concerned with dissemination of information relevant to the Environment (legislation, available research, etc.).

Although VITO is situated in the Ministry of Economy, Science and Innovation there is a close interaction with the Ministry of Environment and Energy and its agencies.

Communication of results

The results of most of the reference tasks are publicly disseminated through dedicated websites or official publications e.g. the BAT-publications for sectors. In contract research the study results are transferred to the government agencies. It is left up their discretion if and where they want to disseminate the results. A large part of this type of contract research is intended to support or prepare future government policies. As such the reports are not immediately communicated to a large audience but used in establishing future policies.

The results of the strategic policy research are communicated through dedicated workshops, articles published in (peer-reviewed) journals or publications, or on the VITO-website. The results of the strategic technological research is converted to patents and later on published in journals or communicated in conferences, workshops, etc. All research work supported by EU-grants is communicated to a large audience.

VITO organises on a yearly basis several international conferences and some thirty national workshops, while contributing to several international conferences and workshops organised by others, both in Belgium and abroad. VITO has a dedicated group of people, specialised in communication and marketing, supporting the scientific and commercial communications of VITO and organising the conferences and workshops.

Interpreters and intermediaries

VITO's specialists are often required to represent Flanders or Belgium on international fora. They are also requested to work for two to three years in European joint research centres contributing their own expertise and the typical Flemish approach to the European policy level.

Engagement with stakeholders

There is a rather strong interaction between VITO's researchers and governmental stakeholders. There is relatively little interaction with the public. VITO's website will be completely revised with equal emphasis on broad public dissemination of research results and dedicated commercial information. As part of the new management contract with the Flemish Government dissemination of scientific and technological research results to a broad audience, also aimed at attracting interest in technology and its implications for daily and future life, will form a significant obligation for at least the period 2007-2011.

All of VITO's strategic research is published yearly in a scientific yearbook but also summarised together with the main research results of VIB, IMEC and others in the "Speurgids" (Information guide) of the Flemish Government, also published in English.

Evaluation

Evaluation of the strategic research is performed every three years through the SAC, the Strategic Advisory Counsel. This is an advisory body to the Board of Directors which evaluates on a three year basis all strategic research performed at

VITO. The SAC consists of a permanent core of 5 Belgian eminent scientists and is complemented by three or four foreign international experts on each of the areas under investigation.

For reference tasks the steering committees gives guidance and evaluates the work performed by VITO.

BELSPO Assessment and Integration Report on Global Change

BELSPO published in mid-2005 an Assessment and Integration Report that presents the state-of-the-art in public-policy-relevant knowledge on Global Change research funded by the Belgian Federal Science Policy (BSP) since 1990 (it also includes some related research as far back as 1985). In this report, “policy support” refers to the provision of tools (e.g. methods, models, instruments), data, knowledge, and expertise to public administrations at the national and international levels in order to contribute to policy development, implementation, and monitoring and awareness building. The policy domains span sustainable development, natural resource management (conservation and use), and sectoral policy areas such as the environment, agriculture, energy, forestry, water, air, and fisheries.

This A&I Report is just one of the initiatives taken towards improved integration of research results into information relevant to policymaking. It focuses in particular on:

- questions and answers regarding Global Change topics related to research projects funded by the BSP within the natural sciences;
- contextual information to help policymakers understand the complex nature of Global Change topics in a proportionate way;
- the significance of scientific results for decision-making, detailing scientific outputs in layman’s language;
- highlights of acquired expertise in Belgium;
- current uncertainties and knowledge gaps and their implications for policymaking at the local, regional, national, European, and global levels;
- policy-supporting products and services;
- emerging issues and ‘sounding the alarm’ topics that anticipate upcoming questions and problems; and
- transfer mechanisms operating between science and policy on Global Change related topics.

The A&I Report is the result of a process of analysing and structuring information. This process encompassed:

- collecting, classifying, and integrating scientific results;
- analysing scientific knowledge and creating an inventory of expertise;
- translating results into stakeholders’ language; and
- enhancing the accessibility of scientific information to (non-)scientists.

The preparation of this A&I report, required the active involvement of all Global Change scientists and policy actors who have been or remain active in BELSPO research programmes. Four teams of science editors from the Belgian Global Change science community - with broad experience in their domain and in assessment and policy support - were invited to supervise the scientific inputs. They were

guided by a consultant and the BELSPO staff. A questionnaire on science-policy mechanisms, policy support, and Belgian contributions to outstanding scientific findings was sent out to all BELSPO -funded Global Change Research teams. The information collected was analysed and integrated.

The above approach was chosen because of:

- the complexity of ‘Global Change’ issues (interwovenness);
- the diversity of scientific disciplines involved;
- the interaction of different spatial and temporal scales (‘glocality’);
- the necessity to promote multi-disciplinarity, networking, and dialogue between scientists and policymakers;
- the need to interpret the policy relevance of research results as presented in the final BSP project reports; and
- the opportunity to integrate individual research results into a broader scientific and policy context.

A Residential Workshop in Oostend with a large group of scientists resulted in structuring the report, formulating clear, striking, and recognisable questions to which answers could be produced (on the basis of BELSPO-funded projects), and selecting illustrations. After external specialists had reviewed the full report, the science editors finalised the drafting in the beginning of 2004. The reviewers also recommended the drafting of an additional summary which was carried out between January and May 2004 by a science journalist in cooperation with a consultant and the BELSPO programme administrators.

Annex 4: Finland

Introduction

This annex focuses on the approaches to research dissemination of the two SKEP members in Finland: the Finnish Environment Ministry and the Finnish Environment Institute: SYKE.

Contributors

The following SYKE staff were interviewed during a visit to the SYKE offices in Helsinki from 16th to 18th August 2006:

Dr Saara Back
Prof Mikael Hilden
Dr Leena Huttunen
Prof Juha Kamari
Dr Markku Kukkamaki
Mr Jari Lyytimaki
Dr Heikki Makinen
Dr Mika Marttunen
Dr Seppo Rekolainen
Dr Marja Ruohonen-Lehto

On a second visit to Helsinki on 28 September interviews were conducted with Mr Jukka Noponen at SITRA and the following staff at the Finnish Environment Ministry:

Dr Pekka Harju-Autti
Ms Pirkko Heikinheimo
Mr Pasi Iivonen
Mr Pekka Jalkanen
Ms Paivi Sihvola

Background

The Ministry of the Environment formulates the Finnish Government's environmental and housing policies. These policies include environmental protection, pollution prevention, land use, nature conservation, construction and housing. The Ministry is also responsible for strategic planning and management in these fields, the drafting of new legislation, and international cooperation on environmental issues. It has two departments concerned with environmental issues: the environmental protection department and the land use department. It funds investigations of environmental issues and its own research programmes such as the environmental cluster.

SYKE is Finland's national centre for environmental research and development and is part of the environmental administration of the government, reporting to the Ministry of the Environment. It sits alongside several other bodies reporting to the Ministry including: Finland's 13 regional environment centres, three environmental permit authorities, and the Housing Fund of Finland.

SYKE was established to work at the interface of science and decision-making and its mission is to support environmental decision-making. Its closest and most important customers are the Ministry of the Environment and the Ministry of Agriculture and Forestry. Other ministries also use their information and it is hoped that they will do so more in future.

SYKE has a direct budget from government which is not passed through the Ministry of Environment or of Agriculture and Forestry. But these two ministries supervise the spending of the budget. Each year SYKE negotiates with them for the next year. This results in a formal agreement on what they will do for them. 60% of their annual budget (which was €42 million in 2005) is a direct allocation from government, the other 40% is gained from outside sources or awarded for specific projects. SYKE wants to maintain this ratio which is sustainable. In research it is 50-50.

There are four divisions in SYKE (totalling 600 staff):

- research, which is to create new information and understanding;
- expert services to provide services to customers, particularly to the ministries;
- data: in particular environmental monitoring; and
- laboratory functions.

The research division comprises 200 people. They do in-house research but nearly all of it in collaboration with other research institutes and universities. The expert services division also comprises around 200 people. The Ministry of the Environment does not have its own scientists and uses SYKE as its scientific arm, developing the scientific knowledge needed to support policy-making, providing scientific advice to the policy-making process, and supporting the Ministry in international negotiations.

Other funding bodies in Finland are the Science Council (the Finnish Academy), responsible for more basic research at universities, and the Technical Research Centre, TEKES, which funds technically oriented research for business and applications in the private sector. SITRA funds innovation initiatives in Finnish industry. The SYKE gets some funding for projects from the Science Council: always for work in partnership with a university and in which SYKE provides the applied part.

For collaborative projects SYKE forms consortia to enable the participation of the range of expertise needed. Part of SYKE's role for government is to enable government decision-making to access the broader range of expertise in academia and other research institutes both in Finland and other countries.

SYKE's overall research programme is divided into a number of individual programmes on: global change, production and consumption, contaminants and risks, integrated river basin management, protection of the Baltic Sea, biodiversity, and environmental policy.

There is a regionalisation process in Finland. SYKE is expanding its offices to other cities. This is partly because these other cities have universities: a local office means that SYKE can mobilise this expertise better. A ministry in Helsinki cannot do this.

Findings

The views of the interviewees on the approaches and experiences of the Environment Ministry and SYKE are summarised in the following pages under the five areas of investigation of work package 4. Five case studies are also presented illustrating particular issues of research dissemination and utilisation:

- projects carried out by SYKE concerning the regulation of water courses;
- a learning package developed by SYKE for schools on the reporting of climate change in the media;
- the development of a new waste management plan for Finland;
- the Finnish government's programme on mitigation of climate change; and
- the work of SITRA in supporting innovation in the environmental technologies sector in Finland.

The Environment Ministry

Planning and management

The Ministry must make clear arguments in support of its policies and decisions. These arguments need to be based on reliable knowledge and data: hence the need for research and scientific support. The science behind environmental issues is becoming more complicated in respect of both the natural scientific processes (for example climate change) and due to the need to integrate socio-economic considerations.

Establishing the research questions requires an interaction between staff in the Ministry and the researchers: to know the problem they need information and research data, and to solve it they have to tell the researchers what information they need. The answers can tell the policy makers what kind of problems there are and what is going on, but not what to do. Policy people in the Ministry are well educated (typically natural scientists, engineers, lawyers etc), and some may have done some research themselves before coming to the Ministry. They can therefore have a good dialogue with the scientists about their needs.

The Ministry's cluster research programmes are carried out over a three year period and typically a first step is to hold seminars with the research committee to discuss the issues and problems. Relevant stakeholders are identified and involved in planning the research programme: they may include other ministries, consultants, companies, communities, universities etc. They do not therefore formulate the problems and programmes alone.

Their approach to steering the projects depends on the scale. If it is a small-scale investigation there is a supervisor from the Ministry who is in close contact with the people doing the research. His job is to ensure that the information being prepared is focused on what is needed. For the larger projects, for example the cluster programmes, a group of stakeholders guides and steers the research.

SYKE often ask the Ministry to define the area of their scientific work. It is a challenge for the Ministry to predict their needs in three or more years - they are more able to describe their immediate needs. However, staff in the research institutes are aware of the political context of their science, and can make a valuable input to defining longer term research needs through dialogue with the Ministry.

Consideration is being given to having a more formal requirement to embed a communication module when a research project or programme is agreed. In the first instance, the module within the agreement could be a fairly general statement about the intentions for communication: it is inappropriate to fix on the instrument for communication before you do the research. When you have started the research you know better who is most likely to be affected, what communication channels are already in place, and what instruments would work best. Typically at present, an allowance for communication is included in research projects but it is usually for a research report or brochure, a project workshop/seminar, or www-pages of the project.

Communication of results

The reports from research projects are all made available on the Web, but it is recognised that it is not always easy to find a particular report. Paper copies are also produced and are distributed to around 100 libraries. The public can buy paper copies of the reports. Also, a short summary is prepared: the policymakers will read this first. However, reports can be expensive to produce and many end up collecting dust on the shelves. Sometimes it may be best to forget the report and put the resources into a seminar or creating a really good set of PowerPoint slides.

The value of peer reviewed publications is recognised, but research institutes need to achieve a balance between publication to develop their scientific profile, and providing useful inputs to the policy-making process. Such inputs may often be based on second level investigations and involve scientists who act as intermediaries between the researchers and the policymakers.

Face-to-face communication of research is best (the term communication is preferred to dissemination as it suggests a two-way, rather than one-way, process). With their focus on particular policy problems, it helps that the scientists talk face-to-face with the policy people. This means that if the policy people have not understood something they can ask the researchers to explain. For example, for research on eutrophication of the Baltic Sea the relevant group of scientists from SYKE communicated directly with policy makers and had continuous interaction with them through the project.

In some research programmes they hold seminars where the researchers present the results and the participants communicate with the people who have done the research. Then it is possible to have effective discussions and interactions between the users and researchers. Opinion leaders should be involved in such seminars.

Interpreters and intermediaries

Policy makers do not have the time to read all the research reports or to find the particular information they need in the research literature. It is therefore important to be able to have face-to-face discussions with the researchers. In these meetings the researchers are encouraged to interpret their research in relation to the policy issues and to discuss their views on what action should be taken. This helps to bridge the gap between research results and policy-making which would otherwise be too big. However, responsibility for the policy decision remains with the policymaker.

Some scientists are reluctant to make such interpretations as they are concerned that the reliability of the results will be distorted. Scientists and policymakers need to learn to communicate with each other: personal relationships are important which take time to develop. Such relationships are particularly effective with people working in the research institutes who have the experience of interacting with the policy world.

Where issues are sensitive, for example where people's health is concerned, it can be difficult to communicate science. This is a big responsibility for the scientist to take but it is important that they do this kind of interpretation: putting the information into context and in proportion. For example, recently problems

were identified with TBT sediments in the sea. There is a chain through living organisms into fish which people eat. Scientists hesitated to interpret this research in the context of other health aspects.

Engagement with Stakeholders

Through the Ministry's communication of science it wants:

- stakeholders to be well informed about the issues relating to the Ministry's mandate;
- to help citizens to participate in debates; and
- citizens to be able to act in the best interests of the environment.

Generally, the Finns are big believers in science and have a high level of trust in the Ministry and its institutes. However, they are not particularly inclined to debate: the word has some negative connotations.

The aim should be to avoid polarisation of views in the first place: this makes it easier to communicate the science. If there has been no systematic dialogue and research is dropped into this environment it may be explosive: people do not know how to interpret it. It may well be interpreted by those who will give it a meaning from the point of view their cause.

The policy-making process in Finland is open. A good example is the biodiversity programme in southern Finland which has been based on dialogue and has involved a lot of research projects. It followed on from a bad experience of implementation of biodiversity projects where landowners felt that they have not been sufficiently involved. Dialogue has therefore been taken very seriously and has enabled the trust of the landowners and the forestry industry to be gained.

There can be a tension between the Ministry and its research institutes arising from the need to present a consistent message on the one hand, but allowing the institutes their independence and own profile on the other. Journalists want the information in one package so the most effective way generally is a joint press release which makes clear who is saying what, and is clear about who has done the research and who has funded it. At the very least, the Minister should not be taken by surprise as a result of the release of new research findings.

With regard to uncertainties, you have to give the arguments about why you are making the decision and be honest about the uncertainties: honesty is a surprisingly effective strategy in communication. There is a balance to be struck between the precautionary principle and inspiring panic: you have to decide where on the spectrum you want to be. For example, decisions about advice on whether to eat fish due to pollutants have to be taken in the context of the overall benefits of eating fish and the impact on other sectors of the economy, for example fishermen. It is for the Ministry to give guidance but they have to be clear on what are the facts that underlie the guidance so that if people disagree they can be well-informed to make an educated decision for themselves.

The media are an essential part of their communications to build bridges to the man on the street (public campaigns are very expensive and so you can not usually

reach the man on the street directly). In working with the media it is necessary to make complex things more understandable, to be good at visualising your message, and to find “grabbers” to ignite interest. The Ministry should give the media an angle otherwise they will find it for themselves. The message needs to be focused: the media will take a maximum of three points - you have to leave the rest. For a big research project it is best to feed it out piece by piece, that way you can find more grabbers and develop more media interest.

Evaluation

In the environmental cluster research programmes they always do evaluation of the impacts of projects and their dissemination. They were just completing it for the fourth round. The project leader and the supervisor in the Ministry each score the project on a set of criteria:

- the organisation of the project
- budget issues
- timetable issues
- how easy it was to agree things
- how well the project met its objectives
- the research methods
- networking aspects
- its affect on stakeholders
- dissemination: the Internet, seminars, other researchers, how well publications succeeded
- cooperation with other projects and stakeholders

The project leader and the Ministry supervisor score independently – having two independent scores makes the evaluations more trustworthy. There have been several cluster programmes and this evaluation process has become standard – allowing good comparability between one programme and another. It is important for the cluster programmes to develop their own methods, since they have a direct influence on the quality of the projects.

It has been observed that there is quite a good match between the scores of the supervisor and the project leaders. The scores are generally better than they were three years ago, indicating that the programme has been organised better than before. Where things are most striking, i.e. the lowest and highest, the project leader is interviewed: you can learn most from the most extreme cases.

The Finnish Environment Institute: SYKE

Planning and management

At the overall programme level, planning in SYKE starts from an annual negotiation with the ministries and goes down to internal negotiations on what to do next year in different departments. The focus of these negotiations is what to do to service the needs of users in the best way.

SYKE has developed a strategy which identifies the key issues on which they will work. Strategic goals have been identified for the period 2006 to 2010 and indicators describe how the fulfilment of these goals will be evaluated. These indicators include publications, the level of multidisciplinary research, and evaluations from customers.

The strategy has then been translated to what it means at the level of the research department and what its strategic measures should be. In turn this leads to the identification of activities at a project level setting out what they need to do in the following year.

A key challenge is how to increase the impact of their science on society, and the strategy process outlined above is their initiative to attempt to meet this challenge. The strategy is set out on two pages: everything can be traced back to the strategic indicators. They will be able to say whether things are getting better or worse year on year.

Interactions with the Ministry of the Environment sit above this in-house strategy development. A 5-year plan is updated and negotiated each year, identifying the key issues for the next five years. An annual plan is also agreed with the Ministry. Groups led by SYKE's Director-General are responsible for negotiating these plans. These groups meet regularly, review progress and discuss the priorities for the next year. In the Ministry there is one director and a number of staff who are responsible for the interactions with SYKE. There are also thematic groups comprising people from both the Ministry and SYKE. Each has a theme leader. The groups contain the relevant policy people, meet three times a year, and feed up to the top level.

At the project level, the starting point should be the identification of the customers for the research and an exploration with them of their needs. Most projects will have steering committees which, depending on circumstances, may include representatives of the Ministry of the Environment, other ministries, industry bodies, local authorities, agricultural organisations, trade associations, NGOs, and collaborating research organisations.

If the project is clearly serving the decision-making process in a ministry, for example the implementation of the Water Framework Directive, then a person from the ministry may sit on the project steering committee. However, the ministry does not have many people, so if the linkage is less direct they may give the task of sitting on the steering committee to someone else, typically from the Regional Environment Centres who have the task of implementing policy regionally.

For policy development it is seldom clear what the key questions are that researchers can address. It is part of SYKE's role to take policy problems and tease out the research questions. It is generally difficult to get the ministries to prioritise their needs.

Working groups and committees play an important role in identifying and elaborating the research questions. SYKE uses a range of structured dialogue processes including group work techniques and the use of decision support systems. A starting point may be the general policy aim. Measures to achieve that aim may then be considered and the research questions associated with the measures explored.

Within the dialogue processes it is useful to have time for both personal reflection and group discussion. For example, in considering the future of Finnish agriculture, researchers were given a 10 minute slot to present basic results and ideas. Administrators and researchers were then given time to think personally about what is relevant. It was then opened up for group discussions and finally a plenary discussion on the key issues.

The research process and the eventual uptake of research tend to work well when users are involved from the initial planning stages and through the project itself. Users should come to meetings, hear intermediate results and have the opportunity to comment. A persistent problem is that users do not have sufficient time: this is particularly acute in the ministries.

A dissemination plan is a requirement of EU projects but not always so for those funded by the Finnish government. There are no guidelines within SYKE on what should be built into project proposals for dissemination. As a result, planned dissemination for smaller projects often does not go beyond the preparation of the project report.

Communication of results

It is an important part of SYKE's mandate to ensure that the best available scientific information is available to policy making and public debate. A range of routes are used to communicate research results, including reports, articles and published papers, workshops, the media and the internet.

Historically, SYKE produced a lot of reports but their readership was limited. While projects still produce reports, which retain a role to ensure the longevity of the record of the research, less emphasis is now placed on them than previously. Instead, more emphasis is being placed on preparing timely articles for professional journals. Journals are targeted which are read by key audiences in the ministries and other organisations. Articles are prepared to explain the science in the context of decision-making.

Peer reviewed published papers remain an important demonstration of the quality of the science and the aim is that each project should result in one or two papers. The 200 people in the research department produced around 100 papers each year. This is a lower publication rate than a university department, but given SYKE's remit, is as much as they can do. It is sufficient to ensure their scientific

credibility but not enough for SYKE to be recognised in academic circles as a centre of excellence.

Workshops and targeted seminars are important mechanisms for enabling discussion of research results with users. Targeted seminars focus on people who SYKE consider should be aware of the research results and are designed to enable the research to be presented and discussed in an open and informal setting. The initiative for such seminars usually comes from SYKE rather than the Ministry.

If research results are of particular interest to an individual policymaker, then a written brief may be prepared in advance of a face-to-face meeting. More generally, SYKE staff communicate research results through their day-to-day support of the Ministry in its policy making activities. The relationship with the Ministry is sufficiently close that requests for support are usually made through informal contact between staff in the Ministry and SYKE. SYKE staff may also be called on to give evidence in debates in Parliament.

The Internet plays an important role in dissemination - research reports are made available on SYKE's website - but increasingly the problem with sending information and reports via e-mail is that people's in-boxes are overwhelmed.

Projects may be carried out in collaboration with other organisations and research institutes which themselves have a good network of contacts with end-users. In these cases it makes sense to make use of these established channels. Similarly, models or tools are often developed in collaboration with other bodies, for example the Regional Environment Centres, who may support a pilot study of the model or tool prior to its dissemination more widely.

A problem with a project based structure is that follow-up subsequent to the project completion may be difficult to resource.

Interpreters and intermediaries

Finland has a participatory approach to policy development, and a working group or committee of stakeholders is normally established to support the policy making process. These working groups and committees frequently call on SYKE for expert representatives and to carry out syntheses. When an issue is on the policy agenda the different research groups and perspectives "shout" as in a market square. To discriminate between these different perspectives requires the synthesis of research to evaluate the potential consequences of policies in the ex-ante context, and the systematic evaluation of the effectiveness of programmes of measures in the ex-post context.

Synthesis is an extremely important part of SYKE's role and is likely to be more so in the future. It requires SYKE to look beyond its own research and to carry out systematic and holistic environmental assessments. For example, in anticipation of a need of the new government to be elected next year to put in place new programmes of environmental measures, SYKE has taken the initiative to carry out an assessment of the status of the Baltic Sea and the measures needed to enhance it.

Acting as interpreters and intermediaries is a key role for SYKE's expert services division. To act as an effective bridge between the research community and end-users, requires clear links between groups in expert services and the research division. To fulfil this role you need to understand the research results and their key implications, and be able to bring this information to the people who need it in an appropriate form and in the language of the non-specialist. However, it should be recognised that in each step in the chain, information may be modified or lost.

To most civil servants, even though many are fluent in English, it is an additional barrier to access the scientific literature written in English. This is an impediment to their direct use of the scientific literature. So the role of SYKE is also literally in translation: they occupy the world of science in English. This is changing in the European Union with the need for an international language.

There is an increasing need for people with the skills required to be a good interpreter and SYKE intends to further strengthen its training in this respect. Important skills may be identified as follows:

- being a good mediator, able to produce a well-balanced synthesis;
- having a good sense of different arguments;
- having good social skills;
- able to synthesise information into a structure which is meaningful;
- able to put yourself in the shoes of the policy makers and stakeholders;
- having breadth as well as depth: needing to take a broader view of your research field than is normal and having exposure to the international context; and
- able to see the forest, not the trees and able to say what things mean in practice.

Engagement with stakeholders

The need for stakeholder engagement depends on the project. However, it is important to understand stakeholder views in order to address most environmental management issues. SYKE has a research programme on participatory processes.

Part of the role of SYKE is to ensure that the environmental debate in Finland is well-informed. There is a high level of trust in public authorities in Finland which helps SYKE, but brings pressures to live up to this trust. The head of the Communications Department is a member of the leadership group of SYKE and this has helped raise the profile of communication with stakeholders and the general public.

SYKE publishes a magazine on the environment which has a circulation of 5000 copies and is estimated to reach 15,000 people. It is aimed at people who are being regulated (industry and the private sector), local communities and universities. Its focus is the environment rather than research, but science is prominent in its use to address environmental issues. The editorial staff have a significant degree of freedom to decide on the content of the magazine.

Staff in the Communications Department meet each week to discuss what issues are likely to be hot topics. Timing is important with the media: for example there is little interest in nature topics in the winter. Hot topics in the summer of 2006 have been:

- algal blooms in the Baltic and inland lakes: SYKE has reported each week to the media on how much algae there is and where; and
- particulate air pollution from Russian forest fires where research conducted by SYKE some years ago has been featured in interactions with the media.

It is important when the media contacts a researcher that they are able to talk. In some cases the journalist works through the press office, but sometimes they go directly to the researcher. Researchers keep the press office informed of such interactions, but not necessarily beforehand. There are a small number of topics which are sensitive to the Ministry in which cases SYKE staff maintain a good liaison with the Ministry.

It is important for SYKE to be visible and hence the media play a significant role in its communication strategy. SYKE's Information Department maintains a network of contacts in the media and are able to support the preparation of press releases and articles. Staff are encouraged to communicate their work in these ways and to not have to get agreement from their boss unless it is an obviously sensitive issue.

Some scientists are good at writing text for the wider public but many are not. Researchers will sometimes draft an article which the Communications Department edits, alternatively an article is prepared by Communications Department on the basis of an interview with the researcher. They are currently in the second year of a science communication project in which groups of researchers are receiving "on camera" media training given by TV editor.

Evaluation

Evaluations are carried out at different levels on different timescales. At the top level SYKE is evaluated every 10 years by an international evaluation panel. Every three or four years there is a strategic evaluation. This comprises questions to external customers, interviews with customers in the ministries and also internal self-evaluation. This was done last year and has now led to consideration of how they can better serve their customers.

Evaluation is also done each year through annual reporting which includes an evaluation of the previous year's results and of their impact and effectiveness in supporting customers. The balanced scorecard approach is used, considering impacts and efficiency. It has been a challenge to develop this but it has led to some good thinking on the ways in which the organisation influences policy.

The indicators are not perfect: much of their work is collaborative and it may be difficult to establish SYKE's individual contribution. Sometimes this contribution is clear, but in many cases it is not. Similarly, they cannot claim to be the

sole organisation responsible for policy. But you can trace uptake in some cases: for example, the debate in Parliament on climate strategy was structured according to SYKE work and made direct references to it.

At the individual project level they are trying to establish a process in which each project, when finished, undertakes a self-evaluation. There is a form providing a structure to the evaluation. In it, the principal investigator needs to look back: were the goals for the project fulfilled? What was the impact of the project? What was the impact on decision-making? By what means were the results made available? It is important to recognise that there is a multitude channels.

There is an emphasis that each project has a customer orientation: customers are identified and express their views on the project. However this is not so in every case: for example for more basic research it is more difficult to identify the users and establish clear linkages with them. It is important to get staff to think about measuring effectiveness. The thinking helps, even if problems of measurement remain, and it gets staff away from the mentality that your job is done when you hand over the report.

Case study: SYKE projects concerning the regulation of water courses

Some of the lakes and water courses in Finland are regulated for hydropower, flood prevention and recreation. Over the last 15 years SYKE has been involved in around 20 projects to update the regulatory approach used in individual water-courses to reflect current uses and pressures, and scientific knowledge of ecological impacts. The projects have been carried out in collaboration with the stakeholders and usefully illustrate issues of research dissemination and utilisation in a strongly collaborative context. The projects typically take four or five years and many inherit a history of conflict.

An important starting point for the project is the establishment of a steering committee which sits at the heart of the project. A key factor in the eventual success of the projects is to ensure that the stakeholders are appropriately represented on the steering committee: this should include the main critics. In most cases the steering committees have comprised 15 to 20 people: this is a good number as they can sit round one table making the participants feel that they are part of one group.

The steering committee will typically meet 15 times over the four or five years of the project. Meetings last the whole day and are more like seminars, providing enough time to discuss results of research work carried out. The projects have several stages and the steering committee has a central role at each stage. Discussions in the steering committee guide the work: they try to be open and flexible on how the work is done. The project is tailored to meet the needs of the steering committee. For large projects, working groups may be established under the steering committee to focus on a particular geographical area or on particular issues: this makes time for discussion.

A lot of emphasis has been put on learning about people's views and values, and how important different outcomes are to them. This has been done through questionnaires and interviews. One aim has been to seek agreement on the objectives that should be taken into account in arriving at the eventual regulatory approach.

All projects have made use of workshops which are open to local people, but which also include representatives of stakeholder groups and authorities. It has proved to be quite difficult to get people to come to workshops, particularly younger and middle-aged people.

The media has an important role but can confuse and include irrelevant material. An important objective has been to get the messages through the media in a way which is not biased. SYKE staff have played a key role as interpreters of research: in many cases, researchers from academia are so deep in their own subject that they have problems in simplifying or generalising results in a way that is meaningful for stakeholders.

Experience of the 20 projects points to the following factors as important to the effective use of science and successful project outcomes:

- it should be a learning process leading to improved understanding of stakeholders;
- stakeholder knowledge should be incorporated along with formal research: people notice if they have really had an impact and it increases their commitment;
- an adequate information base is necessary and usually is to be developed during the course of the project;
- issues should be framed broadly to provide space for compromise; and
- the process needs to build the trust and commitment of stakeholders.

Case study: a learning package for schools on the reporting of climate change in the media

This case study focuses on the dissemination of science to schools. It concerns an educational package developed by SYKE for secondary school children on the ways in which climate change is reported in the media. It is intended to enable pupils to learn how newspapers and the media deal with environmental issues. It is based on a previous study and report in SYKE. The initiative was funded by the Ministry of Trade and Commerce.

A steering committee was established for the project which proved to be very helpful. Four schools were used as testing places for preliminary material and project workers spent 1 – 2 hours in classrooms in each school discussing the material with pupils and teachers. The material was also tested in a summer camp organised by a Finnish NGO. These interactions were important and led to a change in understanding of the level of material that would be appropriate.

The package comprises a booklet for the pupils and PowerPoint presentation for the teachers. The booklet is very visual, containing cartoons produced by professional cartoonist. They set out to make a product that would be interesting for teachers and pupils. The booklet and PowerPoint presentation can be downloaded from the SYKE website but they have not relied on this dissemination route. The aim has been to provide ready-made teaching materials: the teachers do not have too use time to search for materials.

The package is intended to be part of the pupils' coursework. There is a requirement from government for more focus on media literacy in schools, and pressure from civil society and concerned researchers. A problem has been that there is no exact place in the curriculum for it, but it is intended to be used in other subjects such as biology and geography.

The booklets were printed in the summer of 2006 and have been delivered to schools ready for the start of the new school year. They had a very helpful collaboration with the Teachers Association, which was interested in having the booklets and which forwarded them to their members. This meant that they had ready-made channels: it would have been very difficult for SYKE to get the materials to the right people without this. It is also better that it should come from their own association rather than SYKE whose status may not be apparent.

The project at SYKE has now ended, so while teachers may contact them if there is a problem, there is no guarantee that they will be able to provide further support. This is a generic problem with a project-based approach.

Case study: the development of a new waste management plan for Finland

In response to the EU Waste Directive Finland is preparing a waste management plan for the period 2006 to 2016. SYKE is carrying out the preparatory project for the plan and this project is the basis of this case study. It illustrates issues of research dissemination and utilisation in a country-wide project which has taken a participatory approach to involving a wide range of stakeholders. The project has been running for 18 months and should result in a draft of the plan by the end of 2006.

A small working group within SYKE runs the project and it is overseen by a steering committee comprised of representatives of the relevant ministries, local authorities, Regional Environment Centres, NGOs, the waste industry represented by its trade association, business and researchers: 20 people in all. The chair of the steering committee is from the Ministry; a SYKE staff member is the co-chair. The steering committee meets monthly.

As an initial step, questionnaires were placed on the project's website to get public views on the relevant issues, but only a hundred responses were received. Workshops have also been held which are open to all: 130 people attended the last one. They are being held through the course of the project to present initial results and to get feedback. Minutes of the workshops are taken and are published on the website. This has proved to be a more effective way of interacting with stakeholders than the Web-based questionnaires.

They have made many presentations across Finland: around one each week. These may be open meetings or by invitation to certain interest groups, but are always to seek feedback. Results have also been communicated through newspapers and magazines. An important part of SYKE's role is to help to resolve different views, for example between the technical options for waste incineration.

The draft plan arising from the project will be sent to the Ministry at the end of 2006 and there will then be a political process to get it accepted. This will include debates in Parliament and could take a year. There will be a continuing need for SYKE staff to support this process, including briefing ministers.

The final report from the project will be in two parts: the main text of 60 to 80 pages then many pages of annexes. There will also be a short executive summary and an English version. They will prepare leaflets for the general public, but the detail of this has not yet been decided upon. All the material will be placed on the website. There will be an open seminar when the report is published.

Case Study: The Finnish Climate Adaptation Research Programme

The roots of the climate adaptation research programme lie in the Finnish national adaptation strategy prepared in 2004. Research needs were evaluated through two routes:

- An exercise carried out by the National Meteorological Institute and SYKE which drew on the identification of research needs contained in the national adaptation strategy, and through engagement with the research community and stakeholders, including seminars in which stakeholders were heavily involved.
- The identification of research needs provided by an earlier programme – Finnadapt - an environmental cluster programme.

The climate adaptation research programme contains seven projects to be carried out over the period 2006 to 2009. The programme is linked to an initiative by the Ministry of Agriculture and Forestry which has the role to coordinate adaptation initiatives across Finnish government. The programme's limited budget means that it is important to work with others, particularly the Forestry and Agricultural Research Institutes. Networking and personal contacts are therefore key.

Projects have steering committees which have a strong representation of stakeholders. There is also a steering committee of the ministries for the programme as a whole. The benefit of Finland being a small country is that the people represented on the steering committees are networked into other consortia and initiatives enabling information to be transferred effectively.

The aim is to have sectors integrate adaptation into their long-term planning: some sectors, for example energy and forestry, are already alert to this need. It is important to allow time and meeting opportunities for discussion and to enable the issues to sink in. Seminars are held during the projects to get inputs to guide the research.

The basic nature of the research programme is to be interpreters and they recognise the need for more multidisciplinary interpreters. The research institutes do not always recognise this need as they are competing for resources. The interpreter role refers to institutions as well as to individuals, and research institutions need to allow some people not to be specialised and take on broader tasks. As an interpreter it is important to be able to admit publicly that you do not know things: experts may not be prepared to comment outside of their specialist area. A further skill is the ability to promote networking.

Case study: the SITRA Environmental Programme

SITRA is the Finnish National Fund for Research and Development: it is an independent public foundation under the supervision of the Finnish Parliament. The aim of its environmental programme is to upgrade the business activities and competitiveness of the Finnish environmental sector in global markets. It is therefore concerned with the innovation process - the translation of R&D into sound business opportunities. The programme has concentrated on four principal themes:

- providing publicity for the sector and its companies;
- improving the monitoring of market data;
- providing tools for anticipating trends and trend information; and
- improving the sector's prospects for venture-capital investment.

There was a six-month preparation phase of the environmental programme in which they identified partners, developed goals and identified needs. They identified users and tried to build commitment from them before the programme started, working closely with both state and private sector organisations to develop a network.

An important aspect of the programme is the demonstration of new technologies in their home market. It has been difficult to find partners, for example municipalities, to host demonstration plants. These are now coming forward but it is apparent that it takes time for new ideas to be adopted. Wherever possible they try to get organisations involved as partners: this gets their commitment.

An open approach to information dissemination from the projects has been adopted and accepted by industry. Networking is an important part of the programme and includes the facilitation of building links and relationships between the companies concerned. Building networks internationally is also important and they are developing and disseminating models of effective practice.

A private consultant has been hired from the beginning to evaluate the programme. The consultant interviews partners, for example the companies and municipalities, and reports to the SITRA board. This has proved to be an effective approach and has enabled them to adjust the direction of the programme as it has proceeded. Different programmes are brought together to benchmark the results of evaluation.

Annex 5: France

Introduction

This annex for France focuses on the research programme of the French Environment Ministry: Ministère de l'Ecologie et du Développement Durable (MEDD).

Contributors

The following MEDD staff were interviewed during a visit to the MEDD offices in Paris on 29th and 30th August 2006:

Dr Sylvie Charron
Dr Laurence Colinet
Dr Mathieu Jahnich
Dr Sebastien Treyer
Dr Eric Vindimian

Background

MEDD is the ministry responsible for environmental policy in France. Its key areas of concern include: the fight against global warming; protection of natural heritage and biodiversity; risk prevention; antipollution measures; water policy; and sustainable development. It is supported by a number of public institutions and agencies, including ADEME.

Its research programme is managed by the Research Department which sits within the Directorate of Economic Studies and Environmental Evaluation. That directorate sits alongside operational directorates and an administrative directorate.

The aim of MEDD's research programme is to provide the scientific knowledge needed for environmental policy-making. It is not concerned with research to support the implementation of policy (this is the role of the agencies, e.g. ADEME), and it addresses more generic questions, developing strategic knowledge platforms, as distinct from answering specific questions arising from particular, short term policy-making needs. The latter would be for the operational directorates to commission directly with the research or consulting communities, or with MEDD's supporting agencies. Conversely, looking upstream, more basic research is supported by the National Research Agency established two years ago.

MEDD's research programme has an annual budget of €7 million. It comprises around 20 research programmes each containing, typically, 20-30 projects (whose average value is around €100,000 and which last three years). Each research programme lasts around five years during which time there will usually be two or three calls for project proposals. The research groups carrying out the projects are generally located in universities or research institutes, but may occasionally be in consultancies. MEDD only funds part of the costs of the projects, up to 80%, and the balance must be met by the host institution's own funds.

There are around 20 people in the research department which is divided into three units. The units for “Ecology and Risks” and “Social Sciences and Future Studies” manage the research programmes: each programme has a member of the department staff as its programme manager. A separate administrative unit manages the financial and contractual issues, including negotiating and administering the research budgets for ADEME and IRSN (Institute National de Radioprotection et de Sûreté Nucléaire - the National Institution for Nuclear Safety).

The budget for the MEDD research programme comes from the inter-ministerial budget for research administered by the Ministry of Research. This is important as it means they must publish the results and has helped to ensure that they can promote an open debate.

Findings

The views of the interviewees on MEDD’s approach to, and experience of, research dissemination and utilisation are summarised below under the five areas of investigation. The Environmental Economics research programme is presented as a case study at the end to illustrate some of the issues associated with research dissemination and utilisation.

The French Environment Ministry: MEDD

Planning and management

The procedure for research programme management is defined in an official document of MEDD. This establishes a transparent and fairly formalised approach which has helped in defending the research budget in recent spending reviews (other ministries with less well defined procedures have fared less well). MEDD's approach to research programme management has been adopted by the new National Research Agency. While fairly formalised, the approach provides sufficient flexibility to respond to the range of user needs and scientific disciplines covered by the programme.

Each programme has a steering committee (or orientation committee) comprising potential users of the research. The steering committee chooses the president of a science committee, who in turn selects the members of the committee when the main axes of the research programme have been established. The steering committee is responsible for the relevance of the research for public policies, and the science committee for its scientific quality.

Starting from a broad theme for the research programme established by the research department, the main axes of the research are developed iteratively between the steering committee and the president of the science committee. Once agreed, the science committee is appointed (typically comprising 7 to 20 members) and drafts the call for proposals. The call is developed iteratively with the steering committee to ensure its relevance to users and so that the research questions are formulated in a way that the science community can respond to and at an appropriate level of generality (i.e. they are not focused too narrowly on short-term needs).

The science committee's role is to ensure that the research builds on the existing knowledge base. However, a study may be carried out prior to developing the call for proposals in order to establish the current state of knowledge in respect of the programme's theme or to identify and elaborate the problems needing to be addressed. Also, a seminar may be organised for 20 to 30 users and scientists to inform the development of the call for proposals. The call for proposals is typically around 10 pages: two pages summarising the policy context, three setting out the axes for the research (indicating the kind of questions that need to be addressed and potentially suggesting, but not prescribing, methodologies), and five describing administrative aspects.

In response to the call, the project proposals are first evaluated by the science committee for their scientific quality. Each proposal is evaluated by a member of the science committee and by an external expert and is graded A to C: projects graded B- or C would not normally be considered further. The science committee should not consider the relevance of the projects, but may indicate that a project proposal falls outwith the axes of the call.

The steering committee then chooses amongst the projects judged to be of sufficient quality on the basis of their policy relevance. Given that, on average, only one in three proposals is funded they are usually able to select between grade

A projects. However they may opt for a grade B project if it is judged to be particularly relevant or to fill a gap. If the axes of the call are not fully covered there can be a further call for proposals. The final decision rests with the Research Department but the recommendations of the steering committee are normally followed.

The membership of the steering committees is primarily from other directorates in MEDD and other ministries, and from the regional and district level authorities. They try to involve other stakeholders, for example NGO's, but this does not happen often. The steering committee meets once or twice a year during the programme but due to members' time pressures it can be difficult to get them together.

They are trying to get the steering committees more involved in the science, so they have experimented with appointing members of the steering committee as the godfather or godmother for projects. The role of the godfather or godmother is to ensure that the project meets the needs of at least one group of users. Many of the policy makers in French governmental ministries have technical backgrounds. Taken together with the highly selective process for recruitment to the civil service, this means that many members of the steering committees have a good grounding in science and are able to engage effectively with the research programme and scientific community. Nonetheless, an effective dialogue between the steering committee and science committee is essential to formulating research questions at the right level: if asked in isolation, policy makers tend to define their needs too narrowly.

The president of the science committee selects its membership according to guidelines established by the research department. They aim to ensure that all relevant schools of thought are represented (this is particularly important in the social sciences). They also look to include scientists from other countries - typically French-speaking given the practical need for dialogue in French. There are also guidelines on the appropriate level of representation of women scientists. The science committee has an annual meeting with all the research projects to review progress and to facilitate dialogue and collaboration between projects.

The effectiveness of the president of the science committee is an important determinant of a successful outcome for the programme. He or she needs to be a good scientist in the eyes of the science committee, but also needs to understand the policy world. Typically, presidents are chosen as well-known and mid-career scientists for whom heading a MEDD research programme committee is good of their CV. They are not paid for their work on the committee (nor of the committee members) as it is considered part of their duties as a government scientist.

A key role of the programme manager is to ensure good connections between the two committees. The programme manager acts as secretary to the two committees. The level of input that the programme manager needs to make in ensuring good dialogue between the committees depends on the role adopted by the president of the science committee. If he or she limits their role in just considering the scientific quality of the projects rather than actively steering the direction of the research programme, then the programme manager will need to be more strongly engaged. Differences of view can arise between the steering committee and

science committee. The presence of the president of the science committee on the steering committee can help to resolve such differences, but a joint meeting between the committees is occasionally needed to resolve entrenched positions.

In practice, there are usually two or three people within the science committee who are really engaged. Similarly within the steering committee there are typically two or three people - often those with the stronger scientific backgrounds - who are really interested in the science. The effective interaction of these two subsets of the committees lies at the heart of successful programmes.

An important component of each research programme is an animation contract to identify and develop links with the broader set of users and stakeholders, and to support the dissemination and communication of the research results. The animation contractor helps to organise conferences and publications, and acts as an intermediary between the science and steering committees. These contracts are typically awarded to someone from a university, research institute or consultancy that specialises in science communication and dissemination.

The animation contractor augments the resources of the Research Department and brings in additional competencies and experience. In practice, the animation contractors have been of variable quality. The budgeting for dissemination in research programme planning is primarily through the animation contract.

Communication of results

Activities to communicate the results from the research programme aim to bring the results to the attention of potential users and a broader range of interested stakeholders in a form that they can assimilate. Several routes are used:

- reports, books, published papers and articles
- the specific research programme website (in some cases)
- the department website (part of the Ministry's website)
- the department newsletter
- the media
- workshops and seminars
- informal mechanisms

The department has a science communication manager who works with the programme managers to publicise the results for research and who is responsible for the newsletter and website. For the individual research programmes, the animation contractor supports the dissemination of research results, generating syntheses, abstracts and articles, and supporting dissemination events such as workshops and seminars.

Since around one year ago all projects are required to generate a summary report of 10 to 20 pages aimed at policy makers and which should be understandable to the non-specialist. For the projects where a godfather or godmother has been appointed, their role is to interact with the research group to identify particular issues that they should endeavour to shed light on in their summary report. The summary is made available to policy makers via the website. Experience

indicates that these summary reports are of variable quality. If the summary is good and the potential users have been identified, it may be sent directly to them.

Additionally, a more detailed project report is required, written according to the relevant scientific standards. A compilation of peer reviewed papers generated by the project may be accepted in lieu of the project report. Peer reviewed papers are regarded as a useful indicator of the scientific quality of the research but are not specifically encouraged: the scientists will do it anyway.

Sometimes a book will be prepared on a project or programme. This is good for the visibility of the research programme in MEDD but may be of limited use in getting the research results to the people who need them. Emphasis is increasingly being put on articles in journals that will be read by the relevant professional community. For example, an article on a project on oil spills was published in the Journal of the French National Oceanographic Institute. The programme manager and animation contractor may also prepare syntheses of results at the programme level.

The newsletter is prepared monthly and is four pages long. It is sent to 1600 people electronically: scientists, students, decision makers and the general public. A few paper copies are generated for distribution within the Ministry and at relevant events. The science is communicated at a simple level, at about the same level as Le Monde. For each article there is an introductory paragraph which is understandable by everyone. Pictures are an important complement to the text. Time pressures on programme managers make it difficult to get articles from them. More often, the science communication manager drafts the articles and gives them to the programme managers to edit.

The website is contained within the ministry's web site: the research programme pages are accessed via a well-placed link on the homepage. The web pages include a news section, a section on calls for proposals, a general presentation on the research programme, the mission of the Research Department, a description of how the programmes function and a presentation on each programme saying what the projects are and what can be done with the research. Different levels of information are presented and are designed to minimise the number of clicks required to access the higher level information of interest to the public and policy makers. There is a separate space for the science community but which is open to all. Links are provided to the web sites of individual programmes and /or projects but these are of variable quality.

Where appropriate, the media are informed of the outputs from the research projects and programmes using the science communication manager and MEDD's press office as intermediaries.

A workshop is held at the end of the research programmes involving the researchers and users, and generally lasting two days. The researchers are asked to present their findings in a format suitable for the non-specialist user community. The workshops include round tables looking across the projects to consider what light has been thrown on the key issues addressed by the programme. Previously, proceedings of these workshops were generated and published but they are moving

away from this now. Their preference is to select the best presentations and generate articles for the relevant professional journals.

In a less formal way, researchers also do their own dissemination, for example by teaching at the University or training future engineers. The extent of dissemination through such routes depends on the institutional setting of the researcher and his or her personal motivations. A mechanism that should not be underestimated is the contacts and relationships made between policy makers and researchers, which often have far-reaching benefits beyond the duration of the research programmes.

There is no specific mechanism for the involvement of the research groups in follow-up activities once their project has been completed. However, generally when you ask researchers to come back and provide an explanation of their work or support its uptake they will happily do so. Researchers are very often interested to have an ongoing dialogue with policy makers and consequently will participate in workshops etc in their own time.

Interpreters and intermediaries

The research programme managers have a key role as interpreters and intermediaries and must forge links with potential users in other directorates. Through discussion, they are able to point policy makers to relevant results arising from the research projects. Frequently there is a group within the Ministry that has a particular interest in a programme who are natural partners, closely involved in setting up and running the programme.

A synthesis of the results from a programme may be prepared after the final workshop. This is usually the job of the research programme manager with support from the animation contractor. The workshops usually involve a discussant from another area who is there to draw out research questions and to explore the relevance to policy-making.

The steering committee should also play an important role in getting the results across. It is part of the duty of the steering committee members to get back to their constituencies. However, given the pressures on the time, they may need to be convinced to do that.

In order to be effective as an interpreter you have to be familiar with the world of research and also aware of policy issues. You therefore sit between these two communities, regularly interfacing with both. However, there can be a perception by the policy makers that research department staff are closer to the research community than themselves.

Engagement with stakeholders

In general, a sharp distinction is not drawn between the material aimed at policy-makers and that the broader range of stakeholders. In both cases it must be written to be understood by the non-specialist. The website is an important means of communication with stakeholders.

Evaluation

The science committee evaluates the quality of the science before, during and at the end of programmes. The final report from each project is evaluated by two members of the science committee who rate it A to C. This review is communicated to the research teams but is not published. The satisfaction of attendees at the end of programme workshops is also evaluated: a recent innovation has been to ask them to identify what they will do, or take up, as a result of attending the workshop.

They are currently launching a new form of evaluation, initially on three programmes. These evaluations will be completed in June 2007. They have set up a committee to assist with defining the evaluation questions. These evaluations respond to a broader initiative in French government requiring more formal evaluation of the impacts of budgetary expenditure.

It is not straightforward to evaluate dissemination and impact. They will hire people to interview policymakers asking them whether they know about the research programme, whether they were involved, whether they were happy with their involvement including workshops etc. They will consider all the events and mechanisms connected to the programme in order to evaluate whether their research is getting to its intended targets. A quantitative mark will be reported to Parliament, but the qualitative information arising from these evaluations will be more useful in refining their approach to the management of the research programme.

After this initial trial, the intention is that around five programmes will be evaluated each year, meaning that all programmes will be evaluated over a four-year period.

Preparation for these programme evaluations has identified a number of methodological difficulties:

- Commonly used measures such as citations or patents are inappropriate for this kind of policy relevant research.
- It is difficult to trace the uptake of research in policy-making. The research result will be just one of the considerations taken into account by the policymaker who, in France, is not required to explain the evidence base for the policy decision. Attribution is therefore very difficult.
- A lot of their research is aimed at building conceptual understanding rather than at instrumental use, which is generally easier to evaluate. This also exacerbates the usual problem of time delays to uptake.
- The relevance of a programme may be reviewed against its starting conditions or the context pertaining when it is completed.
- Programme objectives tend not be precisely defined, making achievement of objectives difficult to evaluate.
- It is difficult to identify appropriate benchmarks to evaluate the efficiency of programme management.

Case study: The Environmental Economics Research Programme

The environmental economics research programme contains a number of projects which usefully illustrate some of the research dissemination and utilisation issues associated with MEDD's programme. The projects can have different kinds of intended outcome, bringing different challenges as illustrated in the following examples:

- A project intended to explore the key issues associated with a current debate considered differences in rates between private and public sector suppliers of water services. This responded to a concern that privatised service providers were taking profits and therefore charging higher prices. The research project used innovative statistical methods to test this proposition. It showed that it is not true that privatisation is the direct cause of price increases. Rather, it is because it is the tough situations that are privatised so they are inherently more expensive. But the researchers then asked more questions regarding the potential for regional monopolies to influence prices through the way the market functions. Another research team working on the same issue proposed a new policy instrument: changing the way contracts are made. This was regarded by policy makers as idealistic and impractical. But the fact that the research team proposed it may mean that policy makers do think differently. It may establish new directions of thought, so while the results are not directly used it may have conceptual impact. In this case the researchers' contribution is to establish a new way of thinking about the problem.
- Projects have developed innovative approaches for economic evaluation. For example, the Department for Economic Studies needed a new methodology for assigning an economic value to landscapes. Stakeholders can use the derived values as arguments in debates. But some of these stakeholders, for example environmental NGOs, are opposed to the idea of giving values to landscapes in this way. It is hard to have a dialogue between researchers and these kinds of stakeholders. In this case it is a role for the Research Department to help people to understand how such research can legitimately be used. These NGOs are members of the steering committee of the project on landscapes.
- Projects have assessed the economic efficiency of public policies. For example, projects have been undertaken on agriculture relating to how CAP is being implemented and on the efficiency of agri-environmental measures. Such projects are useful for policymakers and also for other stakeholders to enable them to have a critical point of view. It is therefore part of the aim of the programmes to ensure that the results are available to everyone so that there can be a better debate. As these questions might

be at the centre of tensions between MEDD and the Ministry of Agriculture, who is represented on the steering committee, MEDD is interested in having the researchers keep their critical point of view, whatever their institutional or contractual relationships with the agricultural sector might be, and in having an open dissemination of their results. If ever the proposal of not publicising the result might be raised within the steering committee, MEDD is able to appeal to the legitimacy that it is public research funding and that everything therefore has to be transparently disseminated.

Experience in the environmental economics programme pointed to the importance of engagement with potential users of the research from the start of the programme. The animation contract was not put in place until part way through the programme which made it difficult to disseminate to people who had not been involved from the beginning. They noticed a big difference in the effectiveness of dissemination for projects on:

- water services where the results were produced without interaction, and
- agricultural economics where interactions through the project with the users in the administrations seem to ensure that the usefulness of the project will be much better.

Annex 6: Ireland

Introduction

This annex for Ireland focuses on the research programme of the Irish Environmental Protection Agency. In addition, relevant experience is summarised from the Sustainable Energy Ireland research programme and the RELAY initiative to disseminate the results of research relating to the Irish food industry.

Contributors

The following people were interviewed during a visit to Dublin on the 25th and 26th July 2006:

Dr Jim Bowman	Environmental Protection Agency
Dr Brian Donlon	Environmental Protection Agency
Dr Shane Colgan	Environmental Protection Agency
Dr David Moore	Department of the Environment, Heritage and Local Government
Dr Patrick Gilheaney	Department of the Environment, Heritage and Local Government
Dr Morgan Bazilian	Sustainable Energy Ireland
Dr Dermot Cunningham	Clean Technology Centre, Cork Institute of Technology
Dr Derbhile Timon	RELAY
Dr Martina Prendergast	Environmental Change Institute, National University of Ireland, Galway
Dr Frank O'Mara	University College, Dublin
Prof Frank Convery	University College, Dublin
Dr Louise Dunn	University College, Dublin
Dr Michael Bruen	University College, Dublin
Dr William Magette	University College, Dublin
Prof David Taylor	Trinity College, Dublin
Dr Anna Davies	Trinity College Dublin

Interviewees represented the management of the Environmental Protection Agency (EPA) research programme, a key customer – Department of Environment, Heritage and Local Government (DoEHLG), and providers of research. Interviewees from Sustainable Energy Ireland and RELAY are not so directly associated with the EPA research programme, but were able to provide useful and complementary perspectives on research dissemination and utilisation in Ireland.

Background

Government funding for research in Ireland has increased substantially over the last 10 years. Science, technology and innovation are increasingly seen as a key

component of the National Development Plan (the current plan is for the period 2000 to 2006). Funding for the development of infrastructure and capacity in environmental research is provided through the research councils. Related thematic research programmes are funded in a number of areas including sustainable energy, marine science and agriculture.

Looking ahead, Ireland's new science strategy (for the period 2006 to 2013) sets out ambitious targets for the further expansion of research in Ireland as the basis for building a knowledge-based economy. Implementation of the EU's Environmental Technologies Action Plan is considered an important component of the future strategy, linking economic development with environmental protection.

Findings

The views of the interviewees on the approach and experiences of the Irish EPA's research programme are summarised under the five areas of investigation. In addition, two case studies are described:

- Sustainable Energy Ireland
- The RELAY dissemination service for publicly funded food research.

The Irish Environmental Protection Agency

Introduction

The act which established the EPA in 1992 empowers them to support and to conduct research, and to coordinate environmental research across Ireland. The EPA is an independent public body. The DoEHLG is its sponsor department and provides funding for the research programme: the Environmental Research, Technological Development and Innovation (ERTDI) programme.

The current programme is the second and is due to be completed this year. Its funding over the period 2000 to 2006 has been €32 million, and research funding currently runs at around €7 million per year. This is substantially higher than the first programme, carried out over the period 1994 to 1999, which had a total funding of €3.2 million. Funding for the programme was originally provided from the National Development Plan, but is now provided from the environment fund (whose revenues derive from the landfill levy and plastic bag tax).

The aims of the programme are to develop the scientific knowledge needed to support EPA activities and DoEHLG policy-making. A further important aim is to support the development of environmental research capacity in Ireland.

The programme comprises:

- targeted or open calls for proposals for research projects;
- PhD and masters scholarships, primarily aimed at capacity building; and
- research fellowships (at the post-doctoral level) to carry out research and to provide day-to-day support to the EPA. Each of the research fellows has an academic home but is a staff member of EPA's newly formed Environmental Research Centre.

The DoEHLG is a key customer for the programme and DoEHLG interviewees were very positive about its usefulness and effectiveness. DoEHLG does not separately sponsor research to support policy development.

The approach to dissemination and utilisation taken by EPA, and the views of EPA and DoEHLG staff, and researchers engaged on the programme, are summarised below.

Planning and management

For the current research programme, EPA sat down at an early stage with end-users to identify their needs. For the next programme a series of thematic workshops is currently being held involving the research community and end-users (DoEHLG, local authorities, industry etc). Each workshop generates a document of around 10 pages setting out a shared view on research priorities. An advisory group was set up for the current programme but was not well supported and has been disbanded.

At the project level, EPA frequently carry-out a scoping exercise, interacting with the research and user communities to frame the research questions. This early engagement of users is considered important by the EPA. Generally, the

researchers interviewed felt that this works well, the EPA are prepared to listen, and that they are able to influence the project specifications.

Usually a steering committee is established for the research project, involving users and independent experts, to provide guidance to the researchers over the duration of the project. Interviewees recorded variable experience of these steering committees depending on the level of engagement of their membership. They can work well. Typically they meet four or five times over a three year project. In certain areas DoEHLG is a very active customer: evaluating research proposals, sitting on steering committees and being keen for research results to come through on time.

EPA encourages researchers to engage with users during the project through workshops etc. Their intention is to ensure that the researchers have the customers firmly in their sights during the project. EPA provide support by making available facilities, speakers etc. For larger projects there will be a mid-term project evaluation which may involve a workshop involving users to ensure that the project will meet their needs.

The grant applications require the researcher to indicate how they will do dissemination. The experience of a least one interviewee was that there was little guidance or interaction with EPA over this. EPA requires the preparation of a research report and, where appropriate, a synthesis report. In practice, they do not generally fund the preparation of peer reviewed published papers, despite attaching a high value to such publications.

Several interviewees in the research community expressed a concern over an inherent problem with the funding cycle. Once a project is completed and the report signed off there is no further funding for dissemination and publication activities. It is in the period after submission of the final research report that such activities are most likely to occur. By then, budget realities mean that the research group has moved on to their next project. There was a general sense that this is a missed opportunity for the research community to support the uptake of research, and that the level of support for dissemination is too low.

Communication of results

All projects require the preparation of a research report setting out in detail the aims, methods and results of the project and aimed at a technical audience. These reports are made available on the EPA web site, and are sent to libraries and to potential users.

Where appropriate, a synthesis report is prepared by the researchers which is non-technical and is aimed at users and policy makers. These reports are professionally copy-edited. Feedback from users to help with the preparation of the synthesis report usually comes from the steering committee or review of drafts rather than by direct interaction with the intended audience. If the significance of a piece of work or the breadth of its audience points to the value of a “glossy” report it will be prepared and disseminated by EPA’s corporate communications group. In future it is intended that a member of staff from EPA's communications group will work part-time to prepare one or two page summaries of key research projects.

The EPA recognises the value of making available the underpinning data and has set up a data management centre within its Environmental Research Centre to make available the data behind the reports.

Reports are typically reviewed by three or four reviewers at the draft stage. Reviewers may be external experts or end-users. When the report has been signed off a workshop may be held with an invited audience to enable dissemination and discussion of these results.

EPA encourage the publication of results in peer reviewed journals and conference proceedings. They consider this important in respect of the quality assurance of the work and to build confidence in using the results. However, some concerns were expressed by academic interviewees that the publication process can take a long time: review comments may well not be received on a timescale that enables them to support the quality assurance of the project. Publications are key drivers for academics and the view was expressed that they are important in ensuring the longevity and accessibility of findings.

Views were expressed on the relative merits of different mechanisms for research dissemination as follows:

- Face-to-face meetings were favoured by several interviewees as enabling a more in-depth discussion of research findings and to ensure that a proper understanding is conveyed of the confidence of the conclusions and remaining uncertainties.
- The transfer of researchers themselves to positions in the user community can be an important mechanism for knowledge transfer. They take with them their innate knowledge of the research, which cannot always be captured in a written report, and their transfer helps to build mutual understanding between the research and user communities. This has worked well for the EPA in that some of their research fellows have taken up positions within the operational management of the organisation.
- The power of electronic media to make available reports to a wide audience was recognised, but it was also suggested that paper copies continue to have an important role to play.
- Conferences are good for networking but not usually very effective in supporting a good level of discussion with potential end-users. You tend to be talking to technical people and other researchers, and as yours is one of several papers in a day, the attention span on your work may be rather limited. Focused workshops are a better mechanism for dissemination to user communities. In such workshops the value of generating excitement about the research results should not be underestimated.
- There is a gap in the market for a journal aimed at practitioners and the user community which provides articles which are technical but not aimed at experts. There used to be such a Journal in Ireland (Irish Environment) which was positioned midway between an academic journal and a magazine.

- Reports can be an effective mechanism for knowledge transfer if the knowledge is essentially factual. Face-to-face interactions are better if there is a need to explore meanings and understandings, and to support the effective interpretation of results.
- Web sites can work well if people are actively looking for information but even then the right report can be difficult to find. They are not particularly good for getting to a more passive audience.

One interviewee pointed to the need to professionalise dissemination: it is a serious professional job and does not just happen. Running effective workshops, developing relationships with the media, and setting up a user-friendly website require relevant experience. Many academics are not good at this. Some interviewees questioned whether dissemination is a good use of academics' time.

Development of good relationships and understanding between the research and user communities is important to enable knowledge transfer.

Interpreters and intermediaries

The EPA indicated that an enhanced interpretation capacity would help to realise more value from their research programme. They considered the RELAY initiative as a good model if interpretation and dissemination were to be outsourced. They regard the synthesis reports as a serious attempt to get results across to the general reader.

Within the DoEHLG the in-house technical advisory group fulfils the role of interpreter in respect of policy making. Researchers are brought in to talk directly to the policy makers if there is a need to develop an enhanced understanding and further interpretation of the research results. Also researchers are sponsored to be involved on behalf of the government, for example in preparing the fourth climate change assessment report. However, some academic interviewees considered that the policy making process is rather closed and difficult to get into.

With regard to the necessary skills and experience for interpreters, DoEHLG indicated that their in-house advisers have spent time in the “real world” - industry or state bodies - and that this is important if they are to act as a bridge between academic research and policy-making.

Interviewees raised a number of issues around interpretation and the role of intermediaries as follows:

- Operational managers and engineers, for example in the local authorities, can be an effective route to getting research adopted, which may ultimately influence policy. The example was given of groundwater protection plans, adopted at a local level and subsequently taken up at national level. The researcher may usefully tap into existing networks to access these middle-level managers.
- There is a lack of credit to academics for engagement with the policy-making process. The pressure for peer reviewed publication acts as a disincentive to devoting time to interpretation roles.

- There can be a problem of the level of conceptualisation, for example between academics concerned with the bigger picture and operational people, as users of research, requiring a “quick fix”.
- A useful analogy was considered to be the shift in tertiary education away from imparting information to a more interactive approach intended to develop an inquiring mind in the student. A similar model might usefully be adopted for the mode of interaction between researchers and policy makers.
- Whereas an academic can exert a high degree of control in writing peer reviewed papers, there was a concern about the lack of control in engaging with broader dissemination efforts, for example through the media. Nuanced accounts and carefully framed uncertainties can easily be lost. Some academic interviewees had had bad experiences with the media.
- There was a concern about being asked to make recommendations beyond what the research project could robustly support. The view was expressed that any recommendations should arise from a good dialogue between the researchers and policy makers and be developed within the particular policy context.
- The value of researchers sitting down with policy makers and being able to have an open discussion was stressed.

Engagement with stakeholders

The EPA considers it important that all stakeholders should have access to the information arising from research programmes. This enables all those with an interest in a particular issue to develop more well-informed views and leads to a more robust debate. Ultimately this benefits the policy-making process.

There has been a very strong legislative requirement for freedom of information in Ireland for some time and stakeholder engagement is seen as increasingly important.

A concern was expressed that if consultation is very broad in framing research questions the research project may lose focus. The EPA had encountered problems in this respect with a research project on acidification.

Concerns were expressed about the accessibility of earlier research reports: grey literature. The poor accessibility of this work leads to an increased requirement for preliminary work in current projects. Also, the development of baseline information is not generally well funded.

Evaluation

The EPA uses the number of published papers as a measure, but there is no systematic evaluation of uptake and impact on regulatory decision taking and policy-making. They are looking to enhance the approach taken in future.

It is relatively easy to develop measurement parameters where you can quantify things, for example number of reports published, or if the output of research is a “number” which is adopted in the policy or decision, for example an emission factor or environmental quality standard. Impact is more difficult to measure

otherwise. You need to ask the policy makers where they get their information from. It may be that it is a coalescence of outputs from several projects which has the influence and allows the step forward in decision-making rather than the output of an individual project.

There is an issue also of the timing of evaluation in that it can be some time after the completion of the research project before the impact is realised. For academics, papers in good journals and citations are the thing that counts.

Case Study: Sustainable Energy Ireland

Sustainable Energy Ireland (SEI) was set up by the Irish government in 2002 as the national energy agency. Its mission is to promote, and assist the development of, sustainable energy. Its research, development and demonstration programme supports a wide range of projects and end-users. This diversity of projects and end-users represents a significant challenge to the effective dissemination and utilisation of research. The approach taken needs to match the nature of the research project and the particular needs of the end-users (which may be industry, academia, energy professionals etc).

SEI requires that resources for dissemination are built into project proposals and that research results are published (subject to considerations of protecting intellectual property). Key dissemination mechanisms include:

- the SEI website (www.sei.ie) providing summaries of research outcomes and research reports;
- e-mail communications with targeted end-users;
- the publication of research reports; and
- dissemination events (for example workshops) around significant pieces of work.

The input of research results to policy-making tends to be by a more circuitous route. SEI brings researchers in for guided meetings with policy makers. A key role for SEI is managing this process and the interpretation of research results to provide policy advice. The promotion and marketing of research results to the broad set of users is also a key role. Training for their staff includes media interactions and working with the government policy-making process. Staff members include marketing and events coordination professionals. Networks, either already existing or created by SEI (for example of energy users and of energy professionals), are important mechanisms for dissemination.

Case Study: RELAY

RELAY is the national dissemination service charged with communicating the results of publicly funded food research to the Irish food industry. It represents a model for dissemination which is of interest to the EPA. It employs three research disseminators, each with a scientific background, whose role is to ensure that research is made available to those who can use it, and to act as interpreters so that information is presented in a form that can be assimilated.

RELAY staff engage with research projects from the point when funding is granted. When the research project starts, a one-page summary is developed which is sent out to those companies and contacts whose profile indicates that they be interested. Three or four updates are then sent out over the course of the project.

Four methods are used for dissemination:

- the website (www.relayresearch.ie) providing updates on research projects; researchers' details including their expertise, projects and publications; a diary of upcoming events; and research reports;
- workshops, typically 10 to 12 per year, focusing on the outcomes of significant pieces of work;
- visits to companies to talk to about the research projects that may be of interest and enabling links to be made with the researchers; and
- updates and alerts by e-mail.

For RELAY to be a success they must know the target audience and interpret research in a way that they can understand and is useful. They need to get to the right people using a multifaceted approach, and to be appropriately branded.

Written information, for example a two-page summary, gets attention but you need to have face-to-face contact to develop in-depth understanding. Getting the researcher to talk to the industrialist for 30 minutes is much better than a written report. Workshops are very useful to gain feedback and are vital for the researchers.

Annex 7: Italy

Introduction

This annex considers the approach to the dissemination and utilisation of environmental research in Italy. It focuses on three organisations:

- MATT: The Ministry for the Environment and Territory
- APAT: The National Agency for Environmental Protection and Technical Services
- ENEA: The Italian National Agency for New Technologies, Energy and the Environment.

Contributors

Discussions were held with the following staff during a meeting at the MATT offices in Rome on 4 December 2006:

Dr Giuliana Gasparrini	MATT
Dr Claudio Rapicetta	MATT
Dr Viviana Bianco	MATT
Dr Alessio Di Virgilio	MATT
Dr Gaetano Battistella	APAT
Dr Alessia Alessandro	APAT
Dr Giuseppe Ferrari	ENEA
Dr Gaetana Giuffrida	ENEA

Background

MATT funds research to support the execution of its responsibilities for the development of environmental legislation and policy. Individual departments within MATT sponsor research to support their particular needs. The Department for Environmental Research and Development also has a coordinating role and responsibility for interfaces with international initiatives, for example SKEP.

APAT and ENEA play key roles in carrying out environmental research for the Ministry. But research projects may also be sponsored at universities and at research institutes and agencies reporting to other ministries.

APAT carries out scientific and technical activities in the national interest to protect the environment, water resources and the soil. It is technically, scientifically and financially autonomous and is subject to the guidelines and oversight of MATT. It operates on the basis of a three-year programme agreed with MATT and annually updated, which sets objectives, priorities and resources. APAT has links to the 21 regional agencies for the environment (ARPA's) to promote co-ordinated development of the national system of environmental control. The ARPA's also carry out research projects to meet their own needs.

ENEA is the Italian National Agency for New Technologies, Energy and the Environment. It has direct links with both MATT and the Ministry of Economic Development. It carries out basic and applied research, disseminates and transfers technologies, and provides high-tech services, studies, tests and evaluations.

More generally, the major part of public funding for research in Italy is organised through the Ministry for Universities and Research. The National Research Programme – PNR - is the main tool for planning public research: it is a framework document generally relating to a three year period. It covers the full span of research, including the environment. The National Research Programme is prepared on the basis of indications from the Government, with the contribution of the Experts for Policy of Research Committee (CEPR) and the Science and Technology Council (AST). It is approved by the inter-Ministry committee for economic planning: CIPE.

The PNR sits within Italy's "National Reform Programme" which sets ambitious targets to increase investment in research to 2.5% of GDP by 2010 consistent with the Lisbon strategy. A distinctive characteristic of the Italian economy is the large contribution of small and medium-size enterprises (SME's). Encouraging the flow of information and knowledge from universities and research institutes towards the SME's is an important concern of the National Reform Programme.

Findings

The Italian approach to, and experience of, research dissemination and utilisation are summarised below under the five areas of investigation.

Planning and management

The planning of the PNR is managed by several working groups established by the Ministry of Universities and Research. All the users (public and private organisations and industries working in the scientific area) take part in this process which results in a draft of the PNR. During the discussion and the further definition of the PNR, institutional bodies (other ministries, regions, public and private scientific organisations, and stakeholders) take part as users.

The PNR is rather general, and once it has been agreed the definition of projects is carried out by the ministries that enact the PNR. Public and private research organisations and industry are also involved in this phase. Following calls for proposals, project selection is made by public bodies. While MATT is directly involved in the preparation of the PNR, it can sometimes be difficult to track and influence relevant projects funded within the programme.

The planning and management of the Ministry's own research programme is more straightforward. It may make an agreement with a research institute, for example ENEA, for a multi-annual programme containing several projects. It is considered important to involve all the users in the planning of the research programme or project in order to maximise the uptake of the research.

The publication of the results is one of the actions normally scheduled in projects. More general dissemination activities may also be included.

Communication of results

The general aim of communication is the sharing and improvement of scientific and technical knowledge and, in the environmental area, the development of its applications. The diffusion of information encourages the promotion of an environmental culture which contributes to environmental preservation. Generally, projects funded by MATT are aimed at clarifying a particular environmental problem. It is therefore important for the public to know the result.

Results are made available in many ways to reach different users depending on resource availability. Projects produce intermediate and final reports which are published. Seminars, brochures, CD-ROMs and web sites are also important mechanisms for communication. The best approach depends on how many people you want to communicate with and how deeply into the technical content you want to go. It also depends on the type of user:

- Specialised: technical reports, summaries and syntheses are particularly useful;
- General: websites are most frequently used; and
- Scientists: meetings and workshops play an important role.

It may be appropriate to use several tools to guarantee different levels of diffusion of information.

Mechanisms to promote and support the use of research results include:

- an analysis of possible benefits;
- the supply of specific information about technical and scientific content; and
- referral to the sources and the experts.

Networking, e-mail alert systems, mailing lists and web sites may be used.

Interpreters and intermediaries

The transfer and translation of information in a usable form are carried out by different tools. An example is the National Research Council (CNR) whose duty is to carry out, promote, spread, transfer and improve research activities in the main sectors of knowledge growth. CNR has a network of institutes across Italy enabling a wide diffusion of its competencies and facilitating contacts and cooperation with local firms and organisations.

The commercial exploitation of research is an important aspect of its mission and is realised through joint ventures, spin-off companies and patents. So far, 141 companies have been established in several technological areas including energy and environment. These companies are generated from synergy between universities and the private sector with the aim of giving technical and economic support to the start-up companies in order to enable the utilisation of the research.

Another mechanism to facilitate the commercial application of research results in Italy is the creation of technological territorial districts. They support the

development of local skills and innovation with an emphasis on SME's. Districts are chosen as the centres for particular technologies on the basis of the existing aggregation of relevant enterprises. As yet, a district has not been established for environmental technologies.

ENEA is very active in supporting the uptake of research results by SME's and helps the regions' technical planning on issues of the environment and energy.

Engagement with stakeholders

The knowledge needs of stakeholders and the general public are met through communication tools which can reach a wide audience (web sites, search engines, e-learning, multimedia products etc.) and through the consultation of the environmental associations in the development of new legislation.

APAT is engaged at a national and international level in projects and activities to enhance environmental awareness. It surveys citizens' opinions and attitudes on the environment and disseminates environmental protection information. Environmental education is one of the tools aiming to spread knowledge and care for the environment among all citizens.

Evaluation

An evaluation methodology for projects and programmes has not yet been defined. However, a new Italian agency for scientific research is planned: a key role will be the monitoring and evaluation of all public resources used for research.

With regard to the commercialisation of research, the award and use of patents and the establishment of a technology district are important measures of success.

Annex 8: The Netherlands

Introduction

This report on the Netherlands focuses on the research programme of the Dutch Ministry for Housing, Spatial Planning and the Environment (VROM) and the work of its associated research institute, the National Institute for Public Health and the Environment (RIVM).

Contributors

The following people were interviewed during a visit to the VROM offices in The Hague on the 24th November 2006:

Dr Aad Sedee	VROM
Drs Hans Verspoor	VROM
Dr Julia Williams	VROM
Dr Ronald Albers	RIVM

The VROM staff all work in the Directorate General for Environmental Protection.

Background

VROM works to find creative and sustainable solutions for improving the living environment of the Netherlands. The Ministry operates in three major areas: living space, housing and environment. Its Directorate General for Environmental Protection coordinates and oversees national environmental policy and has the responsibility for the enforcement of environmental laws. Certain environmental issues, for example water quality and nature management, are the responsibility of other ministries.

The research programme of the Directorate General for Environmental Protection provides the scientific knowledge and advice necessary to fulfil its responsibilities for policy development, implementation, monitoring, assessment, and exploration. Another part of the Ministry is responsible for the enforcement of environmental laws. The management of the research programme is decentralised and research budgets are delegated to the individual directorates. There is a small central team to coordinate the overall programme, develop cross directorate programmes and support interactions with key research providers and partners. The overall annual budget for research of the Directorate General is around €70 million.

VROM has four key research partners:

- RIVM: carrying out applied research responding to the short-term and specific needs of the Ministry (for example, monitoring data), and providing scientific advice. The research and advisory needs of the individual directorates are compiled to develop a research programme which is

negotiated annually. RIVM also implements parts of environmental legislation, like granting of permits for GMO's.

- TNO: a major research institute concerned with technological and strategic research and providing consultancy services. It addresses the Directorate General's needs for research on technologies and innovation. The Ministry lets individual contracts for research projects with TNO and formulates the research questions of relevant research programmes funded separately by the Dutch government.
- MNP: the Netherlands Environmental Assessment Agency which supports policy makers by carrying out retrospective and prospective analyses of the impacts of social trends and policies on the environment.
- NWO: the Netherlands Organisation for Scientific Research which funds more basic research mainly carried out in universities. The Ministry proposes subjects for research programmes to NWO that they wish to see developed.

TNO is an independent advisory institute. While they are government bodies, the other three organisations are independent of the policymaking parts of VROM.

Findings

VROM's approach to, and experience of, research dissemination and utilisation are summarised below under the five areas of investigation.

Planning and management

In the Directorate General for Environmental Protection the model used for research planning and management is that the policymakers interact directly with the researchers. The Ministry has very few in-house scientists and no directorate for research which manages the projects and programmes on behalf of policy "clients". Research planning is an integral part of their more general annual programme planning process. The specific approach taken varies across the four key research partners identified above.

There are good links between the Ministry and **RIVM** at several levels including a regular meeting between the director of RIVM and the Director-General for Environmental Protection to oversee the programme. The regular and ongoing interactions between staff from the Ministry and RIVM mean that research questions often emerge from the dialogue and benefit from the good mutual understanding that develops. The oversight of projects is usually on a one-to-one basis between the project leader in RIVM and the policy 'client' in the Ministry. For more sensitive projects there may be a steering committee.

For the research at **TNO** funded separately by government, the ministries are now being given a stronger say in what research should be done. This research is not for the day-to-day policy questions as at RIVM, rather it relates to more general policy questions with a timeframe of one to two years. The Ministry also funds individual contracts to address specific questions. There is good collaboration

between TNO and RIVM to ensure that their capabilities are complementary and to avoid overlap between the research activities.

MNP's role's are to assess whether policies have been successful and to evaluate prospectively the potential outcomes from policy options. It is therefore important that they are, and are seen to be, independent of the ministries. They prepare reports each year to assess whether policies have been successful and to forecast whether policies will meet their goals. The Ministry also draws on their knowledge through contracts for expert advice.

NWO funds the development of the more basic knowledge wanted by Dutch society. The Ministry is one of several stakeholders that NWO will talk to when deciding on a research programme relating to environmental issues. The Ministry may co-fund a programme, in which case they have more influence over its contents. Individual programmes are overseen by a steering committee, and working committees make sure that research from the programme responds to the sponsors needs. Individual projects are proposed by scientists in response to calls for proposals and are evaluated by an international committee primarily on the basis of the quality of the science. There may be some limited input from people at the Ministry to the decisions on which projects to fund.

The direct contact between the policymakers and researchers generally works well, ensuring focus on their specific needs. It is important that they keep in close contact through the complete project cycle otherwise the questions and answers may drift apart. But it is difficult for policymakers to devote sufficient time as other activities may result in more visible and more valued outputs. They are absorbed in the issues of the day. Projects which are linked directly and immediately to the success of policy initiatives are more likely to command the attention of the policymakers. A number of ongoing issues are recognised:

- The lack of in-house scientists can make it difficult to act as intelligent customers.
- The day-to-day pressures on policymakers (particularly those involved in 'ankle deep in mud' policy) make it difficult for them to formulate more strategic and longer term research questions. But this depends on the individuals and context.
- Sometimes, an inadequate distinction is made between policy questions and research questions.
- Universities and large research institutes may be less responsive to their needs than consultants. A researcher may not be too interested to get the question clear as they otherwise have more room to do the research they want (and to recommend more!).

Communication of results

The reports generated by research projects are put onto the websites of the Ministry and research institutes. However, sometimes they can be hard to find especially when they are written by smaller research institutes. All have short summaries

intended for the broader public in Dutch and English. An extended summary for the public may be produced for important reports going to Parliament.

For most reports produced by RIVM a draft is sent to the Ministry for comment and the Ministry may ask for a few weeks before the report's publication to prepare a response, particularly if the research addresses sensitive issues. The initiative to ask for this small delay lies in the Ministry. Good interactions through the project should mean there are no surprises. It is important that RIVM answers the questions and publishes even though the results may not be welcome. RIVM is sensitive to the policy context and the Ministry expects that RIVM anticipates the way the politicians will interpret the report, enabling them to ensure that the report is clear. But it depends on the researcher.

Dissemination through reports is recognised to have limitations and face-to-face contacts between researchers and research users may often be better. For work carried out by RIVM it is easy to ask the researchers to come in and give a one-to-one briefing. This is rarely done when a research project is carried out at a university.

A workshop may be held at the end of a project or programme to disseminate the results to the users. It is more difficult to persuade policymakers to attend such workshops when they concern the results of research projects funded by NWO as there can be a significant gap between the research and the interests of the policymakers. It helps if the Director-General attends, then others will.

For the social sciences a workshop is organised each year which brings together the researchers and policy makers. The papers are available before the workshop and researchers make presentations to the policymakers. For each lecture a policymaker is asked to respond leading to discussions about results and future directions for research. The papers are published in a report.

Informal networks, for example with local authorities, can be an effective way of disseminating knowledge. For example, there is a network of people involved in the field of air quality monitoring which comes together every six months. They exchange information about what is going on, the latest results etc.

For research funded by NWO peer reviewed publications are an accepted and important mechanism for communicating the results to the scientific community. Producing peer reviewed publications is less easy for RIVM given their dependence on the Ministry for project funding and the time/money it costs. There are no formal restrictions, but tight budgets leave little room for the additional work required to prepare papers for publication. High-quality research carried out by RIVM may therefore not get the exposure in the scientific community that it merits. However, sometimes the Ministry may ask them to publish e.g. to get a method or model internationally accepted.

Interpreters and intermediaries

There has been a shift in the staff at the Ministry from specialists to generalists and process managers. 10 years ago there were people in the Ministry who had an interfacing role, interpreting research results for policy-making. Much of this role has now been moved to the research institutes, particularly RIVM, which act as the

Ministry's source of scientific expertise and which are bringing in new scientific views. This focus on the short-term and scientific support to policy can be a problem for research institutes if it is at the expense of their involvement in longer term research.

The Ministry can reserve capacity in RIVM for day-to-day advice. There are very good contacts between the two organisations, so if it is just a short question they can ring up or go to see them. Sometimes they want an answer as several pages or a state-of-the-art review which takes a few days. This is a benefit of having RIVM: you do not have to negotiate a contract for each question. Personal contacts between researchers and policymakers make it easy to be in touch by telephone and to discuss the issues.

Such close contact rarely happens with scientists based in universities. However, a Minister may seek advice from a professor who will generally be willing to come over and talk to them for an hour. When professors disagree - ie when there is debate about a scientific issue - RIVM may be asked to give an overview. The aim will often be to get the researchers to comment and to develop a consensus document which is very helpful to the Ministry. Where possible, the role of RIVM is to ensure that the science used by the Ministry does not provoke further discussion in the scientific community.

Important skills for interpreters are to be familiar with the basis of the research on one side and to be sensitive to policy on the other. You need a mix of these two characteristics which is not often found in people. Added to this is the need to clearly express the conclusions and to translate research results into scientifically sound advice to policy, that is understandable for politicians. There is a need to be aware of terms, for example "correction factors", which are uncontroversial in the scientific community but which might be misunderstood by a wider audience. Dealing with scientific uncertainties is difficult for politicians.

Engagement with stakeholders

Their aim in communicating research results to the broader public is to improve their awareness of environmental problems. However, they recognise that they can and should do more. It has to go beyond putting PDFs on the website.

If the Ministry wants to get something into newspapers or a response to a newspaper article they have to do this through the Ministry's communications directorate, iterating on draft text until they are both happy with it. Similarly, if the media asks for an interview this needs to be cleared with their communications directorate. As a Government Ministry they need to ensure that what staff say is not contrary to general policy: it is hard for the Ministry to dissociate itself from views expressed by staff members irrespective of their level of seniority.

Evaluation

Each year, when the research questions are collated, their importance is emphasised by the concerned policymaker who may point to the necessity of their being answered for various reasons. However, during the consequent programme implementation phase projects may be deferred or dropped and there may often be

little or no problems arising as a result of this delay. This prompted the Ministry to commission an external bureau to evaluate the use of research results in its policy-making.

The bureau sent every policymaker who had commissioned research in the year an exhaustive list of questions about what research had been done, how it has been used, the extent of its use etc. The questionnaire was accompanied by a letter from the Director-General indicating that they were obliged to fill in the questionnaire and that afterwards quite a lot of people would be interviewed by the bureau to further explore how the research had been used. They therefore had to prove its use otherwise it would be too simple.

This was done for the research done outside of RIVM, i.e. with other research institutes, universities etc. For more than 90% of the projects the indicated use of the research in policy-making was good or very good. The bureau indicated that this was the opinion of the policy makers and therefore there might be some exaggeration of the benefits. Nonetheless, even allowing for some such bias, the level of use of research was high.

This outcome supports the model the Directorate General for Environmental Protection is using for research: the direct connection of the policymaker to the scientists. If there is a close connection during the project the questions will be rephrased during the year so that the scientific results will meet as fully as possible the needs of the policymaker.

In the following year the bureau was again asked to carry out an audit but this time of all the work carried out by RIVM. They got the same percentages scoring good and very good.

They also asked the bureau to give advice on how to organise research better and to increase the percentages. One of their main recommendations was that in the project plan there should be a specific paragraph requiring the policymaker to think beforehand how they will use the results. They should indicate what outputs they need (e.g. a leaflet; a poster-presentation; an exhaustive report; a simple model). Making the policy maker think what they really need later on for policy gives direction to the scientists about exactly what is needed and how it should be communicated and used afterwards. This paragraph was added in 2003 to the procedure for commissioning research projects.

Annex 9: Norway

Introduction

This annex for Norway focuses on the research programme of the Research Council of Norway.

Contributors

The following members of staff of the Research Council were interviewed during a visit to their offices on the 30th November 2006:

Dr Ingunn Lid
Dr Karin Totland
Dr Karine Hertzberg

Background

The Research Council's mission is to increase the value of society's investment in research activity in Norway. The Research Council covers all science and technology fields and has three key roles:

- advisor to the government on research policy issues;
- research funding: supporting basic research, national thematic priorities, and private R&D; and
- creating arenas for cooperation and knowledge distribution.

The Government White Paper on science – “Commitment to Research” - published in 2004 identified the following cross cutting priorities: the internationalisation of Norwegian research, enhancing the quality of its basic research, and furthering research-based innovation. It identified thematic priorities as energy and environment, oceans, food, and health, and technological priorities as ICT, nanotechnology and biotechnology.

The budget for the Research Council is channelled through the ministries who issue “letters of allocation” defining the budget and identifying their priorities. There are three main research sectors in Norway: higher education (i.e. universities), research institutes and industry. The Research Council provides funding to all three. The major part of funding to the higher education sector is provided to the Ministry of Education and Research. Other ministries mainly fund the research institutes and industry: they provide a block grant to the research institutes and are consequently able to call on them for project work and scientific advice.

The Research Council uses three main funding instruments:

- research programmes;
- basic funding to the research institutes; and
- independent projects.

The Ministry of the Environment is a key source of the budget for the environmental research funded by the Research Council. It has a number of subordinate agencies, for example directorates for nature management and cultural heritage, and the pollution control authority, which have advisory and executive functions.

Findings

The approach to, and experience of, research dissemination of the Research Council are summarised below under the five areas of investigation. The 2015 Environment Programme planning process is also presented as a case study.

Research Council of Norway

Planning and management

For the Energy and Environment thematic priority ‘large-scale programmes’ play a central role. There are three large scale programmes within the Energy and Environment theme: NORKLIMA, the climate research programme, RENERGI, the energy research programme, and PETROMAKS, the petroleum research programme. These are strategic programmes carried out over 10 years to promote innovation, increase value creation and develop the knowledge needed to resolve key challenges facing society. They are funded at a level of around €10-20 million per annum and cover the spectrum of research from basic to applied.

The duration and budget of other research programmes will usually be smaller, but the tendency is towards creating larger and more long-lasting programmes. The two other major environmental research programmes, Environment 2015 and Ocean and Coast, have budgets in the range of € 8-10 million per year and last for approximately 10 years.

The planning and management processes are the same for all kinds of programmes. The Research Council creates a programme development group comprising people from the research community, ministries and business to develop each programme. The Research Council acts as the secretariat, preparing draft thoughts which reflect the interests and inputs from stakeholders received in consultations. These include the requirements for knowledge set out by the sponsoring ministries.

However, the programme development group has a large degree of freedom in developing the programme document. This may be a long process involving several iterations.

When the programme has been agreed a programme board is created (which may include some of the members of the programme development group for continuity) which prepares the annual action plans for the programme and undertakes the consequent prioritisation required to establish calls for proposals. The call text is usually quite broad. The programme board has a lot of control.

A more detailed description of this process for a particular example - the 2015 Environment Programme - is attached.

It is quite usual for the programme board to have representation from government and industry. Most of the time this works well but sometimes the representatives of the user community feel that they are not being heard among the researchers. It depends on how active the individuals are. They have to take on the role as a member of the programme board, not just to promote their own interests. Those who do take on the responsibility of running the programme achieve more.

With regard to the selection of projects, the research project applications are sent to international expert reviewers. They return evaluation forms which are processed by the administration to prepare for decisions taken by the programme boards. There is a cut-off level on the overall quality, usually set at around five indicating very high quality (seven is the highest). Projects with lower overall scores than this are not considered further.

They usually end up with a lot of projects which have good quality: scientific quality ways most heavily amongst the criteria - it says that it should in the guidelines. There are no formal or explicit weighting factors. Among the good projects that go forward for decision by the programme board, relevance to users is a factor that can be quite decisive in the eventual decision.

The programme board will try to have a portfolio of different types of research from basic to applied. Also, if there are strategically important gaps in knowledge they will look for particular projects dealing with the necessary basic research. Alternatively, there may be a strong need from users for particular research which they will endeavour to ensure is met. It depends on the situation. The programme boards include users who can argue what the relevance or use is to society of particular project applications.

At the project level, the application form includes a section to be completed on dissemination. But it is briefly described and it does not count for much in the application evaluation. Proposals also tend to focus on scientific publication.

Projects report on progress once a year in a written report. This includes a popular science summary (but some of these summaries are not very user-friendly). The Research Council can stop the money to a project if it is not going well or if they have not prepared their progress report. Typically they will not have a steering committee for each project. But some big projects do have an advisory board. The programme board review the progress reports. If there are problems with a project the Research Council will have a discussion with the programme board to decide what to do.

Communication of results

With some exceptions, most of the planning of dissemination is done by the Research Council administration and by the programme board. The impetus for dissemination therefore comes more from the Research Council than from the researchers. The Research Council organises conferences and seminars around particular themes or for particular groups of users. They also use their website for the publication of popular articles on the research. Projects are encouraged to have their own websites, and in particular the larger projects often have them.

At the end of each project there is an end of project report which is submitted to the Research Council. It is up to the programme board to decide whether these reports are published. Some programmes may publish the full report on the Web, others may extract some text for articles in newsletters etc. For example, the energy and petroleum programmes publish their own newsletters.

The Research Council is being encouraged by the Ministry of Environment to put more emphasis on dissemination. The Department of Energy and Environment in the Research Council has the lead responsibility for contacts with the Ministry of Environment and arranges small seminars for people from the Ministry three or four times a year. The topics for the seminars are discussed at their regular contact meetings with the Ministry. They may look at environmental technologies, alien species, climate change etc.

When they have agreed with the Ministry what topics should be addressed by the seminars, they find two or three researchers in the field who will give short presentations at the seminar. These are held at the Ministry and researchers and the Research Council staff go there to give the seminar. A lot of people from the Ministry and from their agencies attend the seminars. They usually last for around two hours. They result in good discussions and the people from the Ministry can ask questions.

In some areas it is difficult to see how the research feeds back into policy. But in others, for example research on large carnivores or ungulates, it goes quickly and directly back into nature management. It works when the research relates to issues which are currently high profile in policy-making. Large carnivores are a conflict area for policy. A similar example is polluted sediments where the research feeds directly into policy. The same is true for a lot of marine research. In all of these examples there is a continuing policy debate which requires scientific input to resolve.

A successful example of research dissemination is provided by the Centre for International Climate and Environmental Research – Oslo (CICERO) which has a special responsibility to disseminate climate change research in Norway. They hold a regular forum to enable climate change people from the research community, government and business to exchange information. They also publish a magazine – Cicerone - six times a year which is designed to be useful to people in the ministries as well as a wider audience. The Research Council uses several pages in each issue to write about its projects.

Many of the programmes have their own newsletters and may employ an external journalist to interview project managers and write about projects in a popular way. At the end of programmes they often prepare a popular report of 20 to 30 pages highlighting the main findings. They may get someone from outside to prepare these reports.

A good example of a targeted dissemination was the preparation of a film on wild reindeer. This had footage of the reindeer and a soundtrack which was a text read by an actor talking through the time from the ice age up to the present. It was targeted at the most eager group of reindeer hunters to give them a better understanding of what is involved in ensuring that the population remains. They have shown it to local communities and the wildlife administrations. They have had a very positive response.

Interpreters and intermediaries

Research Council staff go to meetings and conferences with researchers to learn about what they are doing. Consequently, they may write articles for the Web, newsletters etc. Also, a programme may produce a synthesis of a range of projects within a theme which is intended for a broad audience and is published. The programme board decides where a synthesis is required and makes an outline. They then involve researchers in writing it: they are usually very positive about contributing.

If the Ministry wants a brief on the science relating to a particular issue it usually goes to its agencies or research institutes. They tend to contact people (researchers) they know particularly if it is a short-term requirement. They may make contact with the Research Council, but more typically the Research Council is the one that takes the initiative to make research known to policy: i.e. “science push”. Or the Research Council may take the role of organiser to make it possible for others to interact with the Ministry. Sometimes they put people together and step back. Other times they do the telling also.

The people working in the Ministry’s agencies tend to be the interpreters, as do the technical people working in the ministries. But ministries have said they would like to get more results from the Research Council programmes.

Engagement with stakeholders

An important part of the mission of the Research Council is to ensure there is an informed public on science issues. This is especially so for future technologies. They want to make the public part of the discussion about the positive and negative features. The Research Council aims to get open dialogue between the research community and the public.

With regard to the Research Council’s ‘meeting place’ role: most research programmes hold annual conferences for researchers where they present the results to other researchers from the programme together with stakeholders and people from the ministries, the agencies, and from the business community. The goal of these conferences is to bring new research results to people.

There is a national website, www.forskning.no, about research for various target groups which the Research Council was involved in setting up. There is a short presentation about the web site at <http://www.forskning.no/Artikler/2005/november/1130853577.08>. It is unique in Europe and won an international prize, "World Summit Award, category e-Science" two years ago (in 2005). It has members (including the Research Council, universities etc.) who pay a subscription each year and can consequently publish articles on the website. In addition, there is a staff of professional journalists who write like they would for a newspaper. The articles that are coming in from members are identified with them and are organised by topics. There is a multimedia section for children.

They publish several articles per day many of which are picked up from the website by the newspapers. The articles are identified in the newspapers as coming from the website. They get 400,000 unique visits each month.

There is a scheme to enable researchers in some disciplines, for example medicine, to spend a year working with a newspaper. The Research Council has also organised courses for journalists to learn about a particular topic or to visit a research institute etc. A particular example is a two-day course for seven researchers and seven journalists who came together to talk about nanotechnology. The journalists interviewed the researchers to make a story, and the researchers wrote a press release about the topic. This helped them to appreciate each others' challenges. It also provided the participants with contacts and made the journalists

more willing to write about the topic. There were journalists on the course from different media, including for example a family magazine.

This kind of thing has been done for several topics, for example by the clean energy programme. It means that the barrier for the researcher to get in touch with the journalist is lower.

There is a science week each year which is held over 10 days at the end of September and which the Research Council organises in collaboration with universities, research institutes, museums and industry. Also several of the Research Council's programmes actively participate. A lot of events are held across Norway under a national umbrella. All of the larger cities have a 'science in the street' event. In Oslo there were 40 to 60 small tents demonstrating research. A lot of children go to the science week events: if you can explain it to children it is OK for everyone.

Communication is also what everyone does day-to-day. It includes formal things and informal things (for example meeting someone). You should not underestimate the value of the informal things.

Evaluation

There is no systematic approach to evaluating research dissemination and utilisation. It is up to the programme board whether to put weight on this and how to approach it.

The Research Council does summarise in annual reports for each programme how many seminars, articles, TV and radio appearances etc there have been. So they are quite good at counting things. Also, if they are aware of a particular use a piece of research this will be included. But they do not evaluate whether the research has reached a particular audience, and if not why not.

The 2015 Environment Programme planning process

The 2015 Environment Programme brings together five existing programmes on the environment: pollution research, biodiversity, landscape changes, wild salmon, and sustainable development.

The programme development group consisted of a majority of researchers. They had a lot of contact with the Ministry of Environment in the planning process, holding regular meetings with them about strategic planning, budgets etc. There was a strong desire to involve the Ministry of the Environment and others concerned with environmental management in Norway. They were also keen to have a cross-disciplinary programme development group.

The programme development group has been led by a professor of freshwater biology at the University of Oslo. It also included professors in zoology, freshwater ecology, physiology, pollution research, social sciences at the agricultural University and from the cultural heritage research institute. There were also users of research in the planning group: one person who is the chair of the board of the Norwegian Tourist Association, one from a big organisation in agricultural production, and two from the civil service - one from the Ministry of Agriculture and Food and one from the Ministry of the Environment. The ministries, particularly the Ministry of the Environment, identified their priorities and made suggestions for the research programme. Their input was very important in shaping the final proposals.

There was also an expert group of 23 people used in a hearing process in the planning of the programme. This group involved people from the ministries and the directorates, people from the counties, from the pollution control authority, the marine research institute, the cultural heritage authority, several research institutes, universities, WWF, and an organisation from industry. They were complimentary to the programme development group in experience and competence.

At the start of the process they had an open invitation on the web pages for people to give input. They got around 80 responses about research priorities. A lot of these were from the research community, but they also got responses from environmental organisations and from research groups outside of the normal environmental arena.

The programme development group did their work starting in October 2005, and in the spring of 2006 had made a draft suggestion for the new programme. This was sent to the expert group for comment and also to all the relevant ministries and research institutes for comment. This is the normal process for programmes.

The programme development group then revised the draft (which was around 60 pages long) to take on board comments. The draft was then forwarded to the division board of the Research Council making the case that the research programme should be established along the lines set out in the document.

There is a budget chapter in the proposal which says what the necessary budget would be to fulfil all the needs (this is about two times what is available). It gives budget scenarios, high, medium and emergency and provides an analysis of

potential sources of financing. This consists of a list of the ministries who have a relevant interest in the programme and a description of what their interest is. The budget approved is close to the emergency level.

The Research Council gives the planning group a mandate which orients them to the kind of research that is needed. So for the 2015 Environment Programme, the programme development group were told that the research should meet the needs for knowledge in relation to nature and environmental pollution and that the focus should be on targeted and applied research. But it also indicated that the programme should include some basic research. There is deliberately a spectrum of kinds of research (true blue skies research is not included: this is for the Division for Science of the Research Council to support).

The Ministry of the Environment was very active through the process and wanted a lot of strategic influence given their role in providing the budget. However they did not necessarily have the best thought through view of research needs. The representative from the Ministry of the Environment was a senior advisor from the Department of planning and economics. This department has the coordinating function for research in the Ministry. This department is where the Research Council has the most contacts. The department knows the research system quite well but they are not hands-on in respect of making environmental policy in Norway which can cause some difficulties.

The Ministry has an internal discussion group to think about their needs: this comprises research coordinators in individual departments. People from each department were consulted.

As the 2015 programme is very broad, they have a programme board on top and then will have four thematic subgroups: on social sciences, terrestrial ecosystems, freshwater ecology and pollution policy. The Research Council had made proposals for the membership of these subgroups. The majority are researchers, but some are key users from policy and industry. They are appointed by the administration in agreement with the programme board.

They have rules about impartiality and conflicts of interest. The problem with this programme is that it will cover all aspects of the environment in Norway. This means that if there are a lot of Norwegian researchers on the programme board there will be problems of impartiality in judging proposals. So the science representation on the programme board is international, and the user representation is from Norway.

The users were identified from the programmes that are already running and some identified themselves. The Ministry of the Environment and its directorates are the most important. The representative of the Ministry of the Environment on the planning group was very forward in his input and expressed clear views on budget issues etc.

Annex 10: Poland

Introduction

This report on Poland focuses on the approaches to research dissemination of the two SKEP member organisations in Poland – the Institute of Environmental Protection and the Ministry of Science and Higher Education. Also, two case studies are presented – the Information Processing Centre (OPI) and a thematic scientific network concerning the pathways of pollutants in the environment and the mitigation of their impacts on ecosystems.

Contributors

The following people were interviewed during a visit to Warsaw on 25 to 27 September 2006:

Prof. Maciej Sadowski	Institute of Environmental Protection
Dr Bozena Kozera-Sucharda	Institute of Environmental Protection
Dr Jacek Gierlinski	Ministry of Science and Higher Education
Ms Iwona Zukowska	Ministry of Science and Higher Education
Prof. Marzenna Dudzinska	Lublin University of Technology
Tadeusz Pietrzyk	Information Processing Centre (OPI)
Jolanta Szumowska	Information Processing Centre (OPI)

Background

The National Framework Programme, established in 2005, is intended to be the main source of science funding in Poland but, as yet, has only made some calls in the field of health, none in the field of the environment. Its aim is to focus government sponsored R&D on bolstering sustainable economic development for improved quality of life. It is closely linked to Poland's National Development Plan and is the responsibility of the Ministry of Science and Higher Education. The National Framework Programme was created jointly by the Ministry and the Committee on Science and Technology Policy of the Council for Science.

The Council for Science constitutes a formal representation of the research community and plays an advisory role to the Minister of Education and Science. A second committee of the Council for Science - the Committee on Research for the Development of Science - participates in the evaluation of proposals for contracted projects.

Until now there have been two ways of funding scientific research in Poland:

- Financial support to research units depending on their level of scientific excellence, evaluated every four years on the basis of the quantity and quality of their scientific research, international co-operations, publications and citations.

- The award of grants for research. There are several types of grants e.g. for young researchers, basic studies or application grants. Anyone can apply for them all the year, but in each group, usually two times during a year, competitions are closed and proposals are sent to evaluators. Then a special commission accepts them or not.

Research is carried out by institutions belonging to one of three groups:

- the Polish Academy of Science;
- higher education institutions; and
- research and development institutes.

The Institute of Environmental Protection (IEP) was established in 1986 and is an independent R&D unit acting under the Ministry of Environment. The aim of the Institute is to develop the scientific background for national strategies and policies in the field of environmental protection and to support their implementation. It employs around a hundred research staff and has a remit covering the full range of environmental issues with research on:

- water protection
- land protection
- waste management
- protection of the atmosphere
- climate change
- environmental acoustics
- nature and landscape conservation
- environmental impact assessment.

The Institute gets 20% of its budget from the Ministry of Science and Higher Education, 50% from the Ministry of Environment, and 30% from commissioned research from other sources, mainly industry.

Findings

The experience of the IEP and the Ministry of Science and Higher Education is summarised below under the five areas of investigation. In addition, two relevant initiatives are described:

- the Information Processing Centre (OPI)
- the scientific network on “Pathways of pollutants and mitigation strategies of their impact on the ecosystems”.

Planning and management

The approach taken by IEP depends on the source of funding for the project. For work sponsored by the Ministry of Environment, research projects are generally planned on an annual cycle. Discussions about research needs usually start at a

working level. Subsequently, staff from the Institute and the Ministry sit down more formally to discuss what is needed. This leads to the development of a draft proposal which is reviewed by both sides at a higher level of management. Finally, the programme is signed off by the Minister and the Director of the Institute. The programme is funded from the National Fund for Environmental Protection and Water Management and the programme must also be approved by the Executive Board of the Fund.

Once they have agreed on a project, interaction between the Ministry and the Institute is planned in the proposal. Projects are divided into a number of steps: each step must be approved by the Ministry and by the Fund in order to release money to carry out the next step. This means that the Ministry influences the project as it is carried out - they do not wait to the end.

Representatives of the Ministry, the Institute and the Fund are appointed to be responsible for each project. Some projects have a steering committee which may include people from the Ministry, the Institute and the National Fund for Environmental Protection and Water Management, and experts from other institutes. People on the steering committees may well be users of the research.

For example, the steering committee for a project on persistent organic pollutants comprised 40 people. It was chaired by the Under-Secretary for the Ministry of Environment and had representatives from other ministries. It was a very useful body and it was good to have their advice. They were able to advise on sources of information from other sectors. It was important also that they approved each stage of the work.

The specifications for the programmes sponsored by the Ministry of Science and Higher Education under the National Framework Programme are quite general, typically around half a page for each area of a call for proposals. The projects are commissioned by the Ministry of Science and Higher Education but decisions on which projects to fund are made by agreement with appointed users including, for example, people in the Ministry of Environment. The science community has a strong influence on decisions on which projects are funded.

Communication of results

A technical report is always produced for projects funded by the Ministry of Environment. These technical reports can be quite long, and a summary is usually prepared for senior policymakers. If the group of potential users of a report is large then the report will be published in paper form. In any case, technical reports prepared for the Ministry of Environment are made available on the Ministry's website.

Scientific papers are also written: the Director of the Institute is insistent that they are prepared. Projects funded by the Ministry of Science and Higher Education are required to generate a published paper. The Ministry of Environment is less interested in published papers. IEP has to look to international journals to publish as very few journals on the Philadelphia list are in Polish. They endeavour to build in an allowance for the preparation of a published paper in project proposals.

They have their own journal at the Institute and also put papers into professional journals, for example on waste management. Such journals are useful to reach professionals working in environmental management but do not score as highly in the evaluations made by the Ministry of Science and Higher Education.

The best way of dissemination for bigger projects carried out by IEP is a workshop which gathers together the people who will be really interested, including those from industry. These people need to see that they have been listened to and that their views are reflected in the next step of the project. Workshops are held to coincide with the planned steps in the project. The Institute also organises a bi-annual conference on the cycling of elements in the environment, the papers from which are published. They also present their research at environmental fairs held for organisations working on environmental technologies.

The Ministry of Science and Higher Education publishes a list of funded research projects which is available in bookshops and on the website. There is a special Institute for the distribution of information on projects: OPI (described later in this country annex).

Interpreters and intermediaries

The provision of advice is an important component of IEP's role: a scientist at the Institute would typically spend around 80% of their time on advisory work and 20% on research. This brings a tension as the scientists need to carry out research projects in order to improve their knowledge.

The Institute is seen to be independent and they can present their own views. The role of the Institute is to present reliable scientific knowledge and decision makers generally have a high level of interest in science. They are frequently asked to prepare syntheses of the current state of knowledge on an issue. This requires them to present a balanced overview, particularly where experts disagree.

Projects are oriented to particular users and they must present the research in language they understand. Often the users are specialists and both sides use the same language. But if the users are policymakers it is necessary to present results in their language. For example, the Institute translated an IPCC TAR into Polish but at the same time put it into more understandable language for the Polish policymakers.

Consultants may act as interpreters and as the custodians of practical knowledge. However, there are few consultants in Poland and the research institutes fulfil their role to some extent. The Council for Science has an important role in providing advice to the Ministry of Science and Higher Education.

Engagement with stakeholders

For IEP their website is the best way to communicate with the wider public. They also prepare leaflets for the public where appropriate. The National Fund orders radio and TV programmes to be made on environmental issues and the Institute may well be involved.

With regard to the media, the initiative for contact usually comes from journalists. IEP does not have a dedicated person responsible for press contacts. The Institute's staff present their personal views in interacting with the media.

Science festivals are a new initiative in Poland and are oriented to young people. Nature protection and environmental issues are important parts of the festivals which are held all over Poland. Also there is an initiative for students who are brought together once a year for a week and told about developments in science. On the whole, schoolchildren in Poland are very interested in science.

Evaluation

There is no formal system for evaluating the uptake of IEP's research. Sometimes however it is relatively easy to see whether a recommendation has been acted upon.

There is an evaluation and classification of universities and research institutes carried out by the Ministry of Science and Higher Education every four years. Each Institute is classified according to a number of criteria including publications, the number of PhD students educated, involvement in international projects and commercialisation of research. There is an increasing emphasis on the application of research in a commercial setting but no credit is given for providing advice to policy.

According to the last MNiSW evaluation IEP was ranked 18th among 844 reviewed R&D, Polish Academy of Science and University Units in Poland.

Case Study: The Information Processing Centre (OPI)

The Information Processing Centre (OPI) was created in 1990 as a research and development institute. It is supervised by the Ministry of Science and Higher Education. Its central role is to gather, process and disseminate information about Polish science. OPI has developed an integrated database on Polish science (<http://bazy.opi.org.pl>) which includes the following information:

- Scientific research – SYNABA - containing over 120,000 reports from R&D projects, doctoral theses, and scientific expert reports made in research institutes and schools of higher education since 1990.
- Doctoral and qualifying dissertations - containing over 71 500 records of personal data on scientists achieving doctoral qualifications giving data on the dissertation theme and the conferring body.
- Scientific institutions - over 8100 descriptions of universities, research institutes and complementary institutions.
- Scientists and researchers - over 111 500 descriptions of scientists.

OPI also provides information services for the research sector in Poland especially for the Ministry of Science and Higher Education.

Case Study: Thematic scientific network: pathways of pollutants and mitigation strategies of their impact on the ecosystems

A network of excellence was established by eight Polish research institutes in 2004 to develop a critical mass of research activity on the pathways of pollutants in the environment and mitigation strategies of their impact on ecosystems. The network developed into an international one in 2005 and now comprises 24 research units from nine countries worldwide – Poland, Germany, Norway, Netherlands, France, Lithuania, Belgium, Russia and India.

The aims of the network are:

- to create an international forum for the exchange of scientific information in the area of interest;
- to create new research projects investigating the mechanisms of transport and transformation of pollutants in the environment and their impact on ecosystems, with a special emphasis on the food chain;
- to facilitate the exchange of ideas and scientists among scientific institutions participating in the network; and
- to establish a forum for active participation in integrated projects of EU framework programmes.

The network's activities relating to the dissemination of research include:

- running a database of ongoing research projects concerning the pathways of pollutants in the environment;
- organising a series of seminars to exchange information and experience between the participants of the network;
- organising workshops with the participation of industry, small and medium companies, the representatives of state and local administrations, as well as consumer organisations and other NGOs, to start a dialogue to enhance the use of research on environmental and food protection;
- organising an annual scientific conference with the participation of representatives of other national and European networks involved in similar research;
- publishing an electronic network information bulletin in Polish and English; and
- creating a website for the network in Polish and English.

Annex 11: Sweden

Introduction

This report for Sweden focuses on the research programme of the Swedish Environmental Protection Agency: Naturvårdsverket.

Contributors

The following staff of the Swedish EPA were interviewed during a visit to the Agency's offices in Stockholm on 22nd and 23rd August 2006:

Mr Jan Christiansson
Dr Marie Emanuelsson
Dr Erik Fellenius
Dr Kerstin Heikenfeldt
Dr Kerstin Jansbo
Dr Michael Johannesson
Prof Per Jonsson
Dr Ingbritt Kjerner
Dr Cecilia Lindblad
Prof Lars Lundgren
Dr Anna Sandquist

Background

The Swedish Environmental Protection Agency was created in 1967 and its central task has remained the same over the intervening period: to ensure that environmental policy decisions are implemented. It does this by guiding and coordinating environmental protection, producing knowledge and information, by reporting on the state of the environment, and by evaluating the efforts being made in various environmental fields.

The government, through the responsible Ministry, the Ministry of Sustainable Development, decides the work the Agency does, its orientation and its objectives. An important part of the Agency's role is to supply background material and expert knowledge as a basis for the government's national and international work on environmental objectives.

The Ministry does not have in-house scientists but rather looks to the Swedish EPA for its scientific advice. The reliance of the Ministry on EPA staff is reflected in their respective staff numbers: the Ministry employs around 100 people, whereas the EPA has 550 staff.

The aims of the EPA's research programme are to supply the scientific knowledge needed by the Agency and also that needed by the Ministry for its environmental policy making. The Ministry does not have a separate research programme and therefore relies on the EPA. It gives the EPA some instruction on its research needs but not much.

The EPA's annual research budget is €12 million. Other governmental sources of funding for environmental research in Sweden are FORMAS, which funds more

basic research and has an annual budget of €50 million, and MISTRA, a private research foundation for which the government elects the board and with an annual budget of €20 million. Projects and programmes are frequently carried out jointly with these other funding bodies.

The EPA research programme is comprised of three classes of project and programme:

- Around 10 individual programmes accounting for 70% of the budget, and each with a total funding of €2 to €4 million over five or six years. A research programme is usually carried out by people at several universities. There is a programme manager at one of the universities who receives the money from the EPA and manages the programme. Typically there will be several individual projects within the programme. The programme manager manages the programme according to a fairly detailed plan.
- Commissioned R&D where an operational department wants a particular answer. These are small projects which usually go to individual scientists and are managed through a direct link between the customer in the EPA and the researcher.
- Scientific assessments on problematic issues where the EPA are looking for recommendations. These require more money than the commissioned R&D projects and are usually carried out by a group of scientists from different areas who look at the issue from their individual perspectives.

The EPA has four operational departments and four secretariats of which the Research Secretariat, responsible for the overall research programme, is one. Around five years ago the EPA introduced a system of integrated responsibility for research in which the four operational departments have the responsibility for monitoring the individual research programmes. The Research Secretariat (of 15 people) is responsible for the overall planning and coordination of the programme. Each operational department has a research group chaired by a member of staff of the department (the engagement of operational department staff with the research programme is on a part time basis). The departmental chairs, together with the head of the Research Secretariat comprise the Research Committee responsible for the programme as a whole.

There is a separate advisory board, the Environmental Research Council, whose chair is elected by the Ministry, and which comprises 10 scientists elected by the Swedish EPA board.

Findings

The views of the interviewees on the Swedish EPA's approach to, and experience of, research dissemination and utilisation are summarised below under the five areas of investigation. Two case studies – relating to the communication of climate change and to eutrophication in the Baltic Sea – are then presented to illustrate particular issues relating to the dissemination and uptake of research.

The Swedish Environmental Protection Agency

Planning and management

Two to four research programmes are initiated each year. The starting point in setting up the research programmes is to establish the need for research through dialogue with the research community. This results in a specification for the programme, typically around one page, which is put on the Web as an invitation to make programme proposals. There is a two-step application process for research programmes. In the first step research groups submit a letter of intent. A shortlist of two or three research groups are then paid to develop more detailed proposals. Between the first and second steps the short-listed research groups get further advice on what is needed, including a day's workshop on the EPA's requirements for communication and dissemination of research results. However, the EPA is limited in how closely it can interact individually with each research group as this might compromise the integrity of the selection process.

A review panel is established to review the proposals. These panels are fairly evenly balanced between scientists and end-users (who may be from the EPA, other governmental bodies and NGOs). They try to get someone from the Environmental Research Council to chair the review panel. Someone with communication competence is now included in the panels. Three criteria are used to evaluate the proposals, gradings A to C being awarded against each:

- Scientific quality: in the same way as FORMAS
- Relevance to the Swedish EPA
- An instruction from the government to increase the proportion of women.

A dissemination plan is a requirement for the programme proposals and is evaluated as part of the review process.

The review panel's evaluations go to the Research Committee and to the Environmental Research Council. They in turn make recommendations to EPA's Director-General who takes the final decision. Disagreements during the selection process are not usually a problem, but have occurred, typically if gradings for scientific quality and relevance point in different directions. These disagreements may be resolved at the level of the review panel, between the Research Committee and Environmental Research Council, or ultimately by the EPA Director-General.

The EPA has quite a lot of influence in the planning and specification of the research programmes, but when the researchers have received the money the EPA is limited (by the legal framework in which it must operate) in how closely it can steer the programme. The programme manager (from the university leading the consortium) has a high degree of autonomy in how he or she delivers the programme. The Research Secretariat is therefore closely involved in the planning and negotiation stages of the programmes.

A programme steering committee is established to oversee the programme. The committee is typically comprised of EPA staff, representatives of local authorities

(counties and municipalities), the programme manager and some of the other researchers, and consultants. It is helpful if these people are well networked and are able to represent relevant constituencies. The needs of the EPA need to be sufficiently represented (there can be a problem getting operational staff to devote the necessary time if they do not feel the results will be sufficiently relevant or timely) and with an appropriate level of understanding of the science.

The individual projects within the programme tend not to have individual steering committees but they may have a reference group. A reference group involves a broader set of people, for example from other agencies and municipalities, with an interest in the results of the project. They will typically meet two or three times a year.

There is an evaluation of the research programme halfway through: after two or three years. If the results indicate that there should be a change of direction this can be done through the agreement of the representatives on the steering committee.

Two recent programmes - on remediation of contaminated soils and on wind power - have taken a more hands on approach, addressing definite and clearly identified knowledge gaps, with the users very closely involved from the beginning. Several calls for proposals had been made through the programme and a last call will include a synthesis of earlier reports. Each project has a contact person on the steering committee. The approach has ensured that customers are hungry for the information from the research projects, but has required significantly more management time.

Communication of results

The approaches used to communicate the results of the research programmes include reports, workshops, presentations and the Web.

There is a requirement to produce a summary report on the programme outcomes for the EPA but this may not be in a form suitable for other stakeholders. Some interviewees expressed the view that more effort could usefully be put into reporting of results in a form appropriate to users in the EPA. The motivation of researchers is generally to prepare papers for peer reviewed publication. These are an appropriate mechanism for communicating with the science community, but are less useful for operational decision makers.

The MARBIPP programme on the marine environment has employed two people in the research group for the last year of the programme to write up the research in a way that is suitable for a wider audience. The EPA person responsible for the programme has maintained a close contact with them.

Where a programme is intended to produce information for policy making in which there is a clearly identified end-point and timetable – for example the updating of an international protocol – then this should be part of the programme's communication strategy. The time of delivery of the output is critical to the stakeholder.

Workshops are held during, and at the end of, programmes involving researchers and users of the research. They may usefully include small, breakout

discussion groups during the day. There can be a problem getting users of research from the EPA and local authorities to attend due to their time pressures.

The Web is playing an increasingly important role in the dissemination of results. Most of the programmes have their own web site providing information on what is being done and reports as they become available. The EPA's web site includes an Internet bookshop which provides a "print on demand" facility, but there seems to be less and less call for this as time goes on.

Presentations of the research outcomes may be made to users in local authorities. For example, a series of presentations are being made to the relevant municipalities on the outputs from the marine biology programme.

Important outcomes of the research programmes are the relationships and networks of contacts that are developed, through which staff in the EPA can ring the relevant experts to ask for advice. However, there can be a problem that there is no formal mechanism for funding follow-up activities and the researchers may have other commitments.

The key to successful dissemination and utilisation of research is that the potential users really want to take the results on board.

Interpreters and Intermediaries

While not formally part of their job descriptions, interpretation and intermediation are important aspects of the role of EPA staff engaged with the research programme. Their effectiveness depends on their informal network of contacts, both within and outside the EPA, to ensure that the opportunities for knowledge transfer are realised.

Consulting firms often undertake this role, translating research results to a form more useful to users, and may be employed to support research programmes or to write up the outcomes of a workshop. In other countries research institutes also undertake this role but in Sweden the research institutes in the environmental area are not so prominent in this role.

A synthesis of what is known in relation to a particular issue may sometimes be commissioned in advance of the research programme. The international scene is important here - it is important to harvest work carried out elsewhere - and the Internet has made it easier to access research carried out in other countries.

Good interpreters are T-shaped: i.e. they have breadth as well as depth and are able to make the horizontal links.

Engagement with stakeholders

One of the EPA's main aims is to influence public behaviour in relation to the environment, for example to sort domestic waste. Easy to understand summaries of the relevant research are therefore needed. Journalists and the media may be used to get the message across and the EPA has a press office to prepare press releases and maintain contacts with the media. The website is also a key mechanism for communication with the general public.

Each year the EPA invites journalists to a two-day seminar to talk to them about environmental issues. The first day focuses on a particular theme (most

recently “sustainable consumption and production”); the second day has a more wide ranging series of presentations. 100 journalists applied to attend the most recent seminar.

Informal networks are important in maintaining contacts with other organisations with an interest in the EPA's research programme. Stakeholders such as NGOs, industry and agricultural organisations are often invited to workshops. The stakeholders may also fund their own research, and the EPA is often invited to participate and to be involved through steering committees.

An environmental magazine – MiljoAktuelt - is published by staff based at the EPA. Its readership is people involved in environment protection or who are interested in the environment. It aims to inform its readership about environmental issues and get them engaged with environmental protection. It may include articles on science news, but generally science progresses in short steps which are not in themselves of interest to the general reader. More often, the magazine reports on environmental problems where the associated scientific issues are an important aspect of the story. A good story is new, interesting, relevant, reliable and preferably astonishing.

A view was expressed that the EPA could usefully do more to take its research results to a broader audience. Most of his contacts tend to be at the county level, rather than the smaller municipality level.

Evaluation

There is no systematic approach to evaluating the dissemination and uptake of the results from the research programmes. However, the Research Secretariat does ask researchers about how their research has impacted on decisions and the extent to which they have participated in popular science reviews etc. Feedback forms are used for seminars and workshops.

While much of the decision-making in the operational departments is based on science they tend to lose sight of its origins. However, in some cases the use of the research is more obvious: for example work on the impacts of sulphur and nitrogen oxides was used directly in negotiations in the UN on trans-boundary air pollution.

Relevant measures for evaluation include:

- citations of research in the literature as a measure of the scientific quality of the research, and consequently giving policy makers confidence in its use;
- the transfer of researchers to be employed by the policy making organisation and thereby increasing its competence;
- the citation of research in policy papers; and
- interactions between the research group and stakeholders.

Case study: communication on climate change

In recent years the EPA has had a significant ongoing effort on communication of climate change. This has included a two-year campaign supported by the Swedish government with a budget of around €3 million per year. Their communication efforts have been mainly focused on municipalities, enterprises and NGOs rather than the general public. The IPCC reports have been a key source of the scientific material used in the communication activities.

Important mechanisms for communication have included the website, a newsletter, the media, and meetings and conferences.

At the start of the campaign they introduced a new theme on climate change to the EPA web site. This has attracted a lot of visitors to the site and is a cost-effective way of communicating. Information can easily be changed and kept up-to-date. They have the latest news on climate change each day and interested people can subscribe to an e-mail update.

The website is made for people who are interested in the issue of climate change. The intention is that they should be inspired by it, and consequently think it worthwhile to do something to address the problem. The audience for the website is mainly local authorities, other departments, members of Parliament, NGOs and journalists. They have created a link for enterprises and local authorities where they can access further details and practical information such as relevant laws, models of emissions etc.

Each month they prepare a climate change newsletter which summarises new reports, gives a calendar of events etc. It goes out as an e-mail (there are over 3000 subscribers) and onto the website as a PDF. The e-mails are useful in driving traffic to the website. They are intending to develop local newsletters for the municipalities.

Press releases are prepared with care for the media but inevitably messages are not always transferred accurately. If the press releases are good then journalists may take them as written. It helps to provide graphs and pictures that they can use.

EPA staff are always available to answer questions. The EPA's press office has relationships with journalists which are useful in ensuring coverage.

Conferences have included a major annual meeting which last November hosted 600 people and had Al Gore as a keynote speaker. Smaller conferences are held through the year and breakfast briefings are given to politicians when significant reports are released. TV personalities have been used to give talks to conferences and to tour schools to talk about climate change. A pamphlet containing 10 questions and answers on climate change has been used to support these presentations.

The public awareness of climate change has been measured before and after the campaign: now 96% of Swedish people are aware of the problem.

Case study: international panel review of eutrophication in the Baltic Sea

The eutrophication of the Baltic Sea is an important issue for the neighbouring states. It had previously been considered that nitrogen and phosphorus from anthropogenic activities is the prime cause. However, more recent results suggested that nitrogen fixation from the atmosphere may be playing a much more significant role than had previously been thought. This has been the subject of some controversy in the science community and could have significant implications for appropriate management strategies given the substantial investment that had been made in Sweden in reducing anthropogenic nitrogen. It was therefore decided in 2004 to convene an international panel of scientists to consider the evidence with a view to helping to resolve the controversy.

The Swedish EPA was responsible for managing the review process. A key concern was that the procedure for choosing the experts to sit on the panel should be objective and transparent. The procedure was developed in consultation with the science community who were also involved in making suggestions for panel members who could be accepted by both sides of the argument.

The panel, mainly comprised of US and Canadian scientists, came to Sweden in the summer of 2005 having previously considered relevant literature gathered for them by the Swedish EPA. They concluded that to address the eutrophication issue in the open Baltic Sea, efforts should be made to reduce anthropogenic phosphorus. However, they could not conclude on the issue of nitrogen and recommended further monitoring. It was important that the panel were left alone to write the report as the EPA needed to avoid any criticism that it had influenced the outcome.

There was a substantial interest in the panel report and the member of EPA staff responsible for the project was asked to give talks all over Sweden, to the government, and to a special session of Parliament. He had to ensure that he limited his presentation and responses to questions to a factual account of the panel's conclusions avoiding expressing any opinions. The panel report was also taken to the scientific community and through press releases to the public by the media.

The Swedish EPA response was issued in June of this year, also supported by a press release. An important outcome is that it resulted in a report that has been put on the EPA website, clearly demonstrating the future EPA strategy to combat eutrophication of the Baltic. This strategy may not have been that clear to the public before. After the publishing of the report, the EPA has received significantly less questions from the society (e.g. government, mass media, environmental administrations) about how to reduce the problems with eutrophication of the sea. This is perhaps due to a much clearer positioning of the Swedish EPA strategy to improve the conditions in the Baltic Sea.

Annex 12: UK

Introduction

This annex focuses on the science programme of the Environment Agency for England and Wales.

Contributors

The following staff from the Environment Agency's Science Group were interviewed in a series of meetings over the period May to August 2006:

Dr Craig Elliot
Mr Bob Harris
Dr Steve Killeen
Dr Natasha Martineau
Dr Larissa Naylor
Dr John Seager

Background

Government funding for research has increased substantially in the UK over the last ten years, and the levels of the environmental research have increased accordingly. This funding is channelled through a number of routes:

- the Research Councils, particularly the Natural Environment Research Council, who support blue skies and policy relevant research in universities and research institutes (their governance arrangements require that their funding of research is independent of political pressures);
- government departments, primarily the Department for Environment, Food and Rural Affairs (Defra);
- government agencies, particularly the Environment Agency, Scottish Environmental Protection Agency, English Nature (soon to be Natural England); and
- the devolved administrations for Scotland, Wales and Northern Ireland.

The Environment Research Funders' Forum has been established to ensure the coordination of research funding across these bodies. Against a background of generally increasing levels of research funding, the Environment Agency's research budget has experienced a gradual decline in real terms. This has led to an increasing emphasis on collaboration with other research funders. The Agency's annual science budget is around 22m euros of which approximately 14m euros is for research projects commissioned externally.

The Environment Agency is the leading public body protecting and improving the environment in England and Wales. It is responsible for the practical implementation of many aspects of European and domestic environmental legislation. It is an independent agency of the government, set up under an act of Parliament but

is directly responsible to Defra. The Agency's main objective is to provide a better environment for England and Wales and to contribute to achieving the goals of sustainable development. This is achieved through environmental management and regulation and also through educating, influencing and working in partnership with others.

The Agency's science strategy (www.environment-agency.gov.uk/science/922254/?version=1&lang=_e) focuses on the acquisition, development and transfer of new knowledge to the Agency, to meet strategic and policy needs and to gain learning from best practice. It sets out a science programme containing four main elements:

- **Environmental futures:** strategic science, including horizon scanning, to support long-term planning for tackling future environmental problems.
- **Policy priorities:** the themed science programmes to address the major medium-term policy challenges: addressing climate change; understanding how the environment affects human health; managing water catchments in an integrated way (integrated catchment science); protecting people and properties from the risk of flooding; and more sustainable ways to use natural resources.
- **Day-to-day operations:** current tools and techniques to support short to medium-term operations in environmental protection and water management.
- **New ways of working:** research initiatives, known as breakthrough projects, to make ways of working more efficient and effective.

An in-house Science Group of around 150 people is responsible for the planning and management of the science programme, and for support and advice to Agency policy makers and operational decision takers on science issues.

Findings

The views of the interviewees on the Environment Agency's approach to, and experience of, research dissemination and utilisation is summarised below under the five areas of investigation. The annex also presents two case studies:

- the flood risk management research programme
- the MarClim research project to evaluate the influence of climate change on inter-tidal biota.

The Environment Agency for England and Wales

Planning and management

The purpose of the Agency's science programme is to generate the knowledge, tools and techniques needed by its policy makers and operational decision takers. It is therefore important that research programme planning ties in with more general business planning within the organisation. This linkage has not always been good in the past but is better now. Organisational business planning happens on a five-year timescale (the corporate strategy), three year timescale (the corporate plan), and an annual planning round. Generally, research planning takes its lead from the organisational business planning, but some is science-led. A Science Programme Board, comprised of users from policy and operations, members of the Science Group, and external experts, oversees the planning and management of the science programme.

Historically, engagement of users in project and programme planning, and consequently the uptake of research, has been patchy. A key recent development has been the appointment of programme executives for each thematic programme. These are senior people in policy or operations who are responsible for ensuring that the research meets business needs and is taken up into policy and operations. Each thematic programme has a programme board comprising policy and operations customers and Science Group staff to oversee the planning, management and uptake of the research. A programme manager in Science Group manages the programme, and project managers are allocated to each project (the projects are usually commissioned with external universities, research institutes and consultancies) to ensure delivery to quality and budget.

Some policy and operations customers are better than others at identifying science needs: having a science background helps. Given their day-to-day pressures, a particular challenge is to get policy and operations customers to think of their research needs three to five years ahead. It is therefore essential to generate an effective dialogue between the customers identifying the needs, and members of Science Group who can say what is realistic. An important role of Science Group is to provide a conduit to the latest scientific opinions and developments, but external experts may be included directly in the dialogue with customers. An ongoing challenge is to ensure that the customers devote quality time to their engagement with the science programme: it needs to be recognised as a core part of their jobs. The close dialogue needs to be maintained through the research phase and into the uptake phase, continually reviewing the project to ensure that it remains relevant to policy and operational needs.

An important current initiative is on "benefits realisation": each project is to have an upfront plan setting out how the outcomes from the research will be taken up into the business. A responsibility is placed on an identified business user to take forward the output of the research project and embed it in the business. It is recognised that research outcomes cannot be guaranteed, nor that business priorities might not change, but to get the go-ahead, a research project must demonstrate

that the business is prepared to take it up. Consequential costs of implementation can be very high and need to be incorporated into business planning. In the past, insufficient costs have often been built into projects for dissemination and for supporting uptake.

A particular example is the Integrated Catchment Science (ICS) thematic programme. Each member of the programme board acts as a champion for a work package (there are seven in all, each comprising several research projects) ensuring a linkage into the business. But the ICS programme is ambitious in aiming to integrate across disciplines, scales and geography: because of history and the nature of legislation, policy and operations aren't always integrated in the same way. It is therefore important to be strategic in establishing the aims of the research programme: rather than asking customers what projects they want, they are asked what outcomes they want supported by science. These are then converted into scientific outcomes and the research programme manager works out how to deliver them.

Communication of results

All written documentation produced by the science programme has to pass through the Communications Team (comprising three people) within Science Group. This includes technical reports, summaries, databases, workshop reports and CD-ROMs.

Reviewed published papers are copied to them. The extent of their editorial input to the science programme documentation varies. At its most basic it is cosmetic: checking the grammar, ensuring the report is in the house style and formatting it. But mainly it is more than this.

A team of 10 to 15 freelance science writers and editors are employed to edit the reports generated by the science programme. All reports go to them. They ask questions from the point of view of a journalist: and identify where they would pick holes. They are quite proactive about things which do not make sense. 100 to 120 technical reports are prepared each year. They try to get quickly to an understanding of who the target audience is and what the project is about. This enables them to prioritise so that the Communications Team can focus on those projects with the biggest impact.

Science summaries are prepared by the science writers and are written for the appropriate non-technical audience. The first paragraph of the summary provides the overview of the project as in a newspaper article. It is intended to start producing a quarterly Environment Agency science newsletter which will summarise key outcomes from the programme and which will be intended for a wide audience internally and externally.

Research papers published in the peer reviewed literature are seen as a measure of the quality of the Agency's science programme. Researchers are therefore encouraged to build an allowance for the writing of such papers into their project proposals. The number of papers published is a measure in the Agency's corporate targets (the balanced scorecard).

Historically, the effectiveness of the communication of research results has been variable across the programme: there are some excellent examples, but equally there are cases where research reports have "gathered dust on the shelf".

There needs to be effective communication right the way through the research cycle. The “tractor factory” mentality for science (in which the user says what they want, science goes away and produces some new knowledge, and the user then says whether they like it or not, and whether they will adopt it) does not work. Science and policy need to work closely together as a team.

The approach to dissemination needs to be well thought through, planned ahead and tailored to the audience. Where the uptake of research is compulsory then it is important that the fora used to explain it are organised and structured. Approaches may be workshops, head office instructions or the Agency’s internal IT network. If the use of the research is not compulsory, and hence the aim of communication is to improve awareness, then more informal mechanisms may be used, for example cascades, themed workshops and connections to other internal and external events to showcase the science. It may also be built into training programmes. In developing decision support tools, training of groups of Agency staff and consultants has been followed up by the provision of a support desk for further online support.

In the past, the endpoint has sometimes been considered to be the sign off of the research report. This does not recognise that effective uptake needs to be a well-planned and resourced process in which the business takes, and backs up, positive decisions. There needs to be clear ownership of the uptake process. Too often, not enough energy and effort is allocated to the uptake stage.

There is a role for marketing skills: it helps to put yourself in the shoes of the potential user to consider what it could mean for them and how it can help them do their work better. It may be difficult for researchers to think in this way.

Interpreters and intermediaries

The interpretation of science, ensuring that it is communicated to policy and operations customers in a form that can be readily assimilated, is a key role for the Agency’s Science Group. However, the capacity and skills of the Agency’s science staff to fulfil this role need to be further strengthened.

The Agency also draws on external centres of expertise to act as interpreters. They need to understand the Agency and why it does what it does. This can be challenging for people with a strong academic focus who do not have the experience of making decisions in a regulatory context. The Agency has to make decisions and own them: it has to say why it has adopted certain scientific views to be used in particular circumstances. This puts an edge on the interpretation process. Dealing with uncertainty in this context is a particular challenge: policy makers tend to look for certainty so you have to convert uncertain science into a useable knowledge base.

Consultants have an important intermediary role to play, particularly given that regulated industries very often turn to them for advice. It is important therefore for the Agency to take the consultants along with them when developing new approaches and methodologies. The development of risk-based approaches to catchment management provides a good example of where engagement with the consulting community has ensured that they, and the Agency, are using common

approaches and models, therefore minimising potential sources of conflict. They very often act as the link between the regulator and the regulated organisations.

The Agency uses a variety of advisory committees: they can be a cost-effective and efficient way of getting scientific advice. Independent committees can be very helpful when decisions and environmental standards are challenged. The Agency is looking to get better engagement with high-level committees established separately by government.

The Agency itself acts as an interpreter in providing information on the state of the environment to the broad range of interested stakeholders and the public at large. A particular challenge has been to develop indicators which are able to summarise complex information in a simple way. Reports on particular issues, for example the disposal of tyres and of plastics in the environment, have proved to be influential in stimulating the policy debate. An important aspect of these reports has been the effective use of visual information.

Being effective in the role of interpreter requires the ability to understand issues from the perspectives of the scientist and the decision taker. You need to put yourself in the shoes of the decision taker. The development of these skills generally requires experience of both the science and policy worlds. You need to be able to articulate the weight of the scientific argument in policy debates. This requires you to have a flexible range of styles.

Engagement with Stakeholders

Generally, policy and operations staff lead on engagement with stakeholders. Science Group has traditionally not been closely involved, but there is a strong case that they should be when the issues being debated are heavily based in science. This can be difficult for science staff, requiring the development of new skills and involving some personal risk. The Agency is currently reviewing its stakeholder engagement activities.

Science reports are now one of four strands in the Agency's publishing strategy and programme which has helped science become more respected and to increase levels of awareness. A planning database of the new research publications that will be coming out over the next three months helps in interactions with the Press Office to plan press releases etc. They look for good stories for the Agency and those which fit well with current campaigns.

An important mechanism for engagement with stakeholders is collaborative research projects which involve stakeholder organisations. In these cases, stakeholders are involved in establishing research priorities, steering the project and communicating the results back to the stakeholder audience. Collaborators have included other government bodies, industry and NGOs.

The increasing emphasis on changing the behaviour of the public as the means of achieving environmental improvements puts an increasing onus on the effective communication of science. It is important to be able to communicate science in a clear way that resonates with the audience. There is a move away from science as a “closed shop” to greater public participation, and hence the need for a language of science that can be understood by the non-specialist.

Evaluation

Evaluation has historically been limited to “post-project appraisals” on samples of projects, which have focused primarily on whether the management of the projects has followed Agency procedures. Little has been done on the effectiveness of dissemination and uptake, and on the impact of research projects.

This is being addressed by the “benefits realisation” initiative described earlier. It is important to consider net benefits, i.e. taking into account the cost of the research. Evaluation is difficult, particularly given that the benefits may take many years to be realised. It may also be difficult to isolate the particular impact of a research project from the other factors that have resulted in benefits being achieved.

Case study: Joint Defra/EA flood and coastal erosion risk management R&D programme

Introduction

The joint programme between the Department of Environment Food and Rural Affairs (Defra) and the Environment Agency on flood and coastal erosion risk management was established in 2001. Its budget is currently €5.5 million per annum. Its aims are to develop the evidence needed to support policy-making, the tools for managing flood risk, and guidance to manage the assets involved in flood risk management. The end users of the research are the policy makers and operational decision takers in the Environment Agency and Defra, but also others involved in flood risk management and coastal erosion: local and coastal authorities, the Association of British Insurers, the construction and water industries etc.

The programme is overseen by a joint programme board comprising senior representatives of the Environment Agency and Defra. There are four themes each of which has a theme manager: they, together with two joint programme managers, comprise the programme management team. Each theme also has a “champion” to promote the theme and liaise with external programmes, and a theme advisory group comprising users and members of the science community to advise on research priorities, to provide peer review and to promote uptake. A programme advisory group, similarly constituted, provides advice at the overall programme level. The research projects (over 100 have been carried out to date) are generally commissioned with research groups in academia or with consultants.

An independent review of the programme was carried out in 2005 and has informed this analysis. The approach and experience of the programme relevant to the concerns of the study are summarised below under the five headings used elsewhere in this report.

Planning and management

The programme and theme advisory groups, reflecting the representation of end users in their membership, play an important role in ensuring that the programme meets the needs of end users. The advisory groups meet two or three times a year. To be successful, this approach requires a shared view of the direction of travel: it would not work if there were fundamental differences of view about what the programme as a whole should achieve.

However, the groups are advisory: Defra and the Agency can decide differently if they think it appropriate. There is also sufficient flexibility so that if an urgent and high priority issue comes along it can be driven through the system. The recent review recommended the strengthening of user representation on the advisory groups.

At the project level, the project manager (who is typically a member of Agency or Defra staff) is supported by a project board. Experience to date indicates that successful projects usually have good user representation on the project board and the board is actively involved in consideration of dissemination. However, project boards are resource intensive and the review recommended that consideration be

given to whether they are used for all projects or just those which are more complex. The review considered experience of successful and less successful projects. Characteristics of the latter included:

- the research issue was not sufficiently defined or was not a strong one for end users;
- objectives were poorly defined in terms of uptake or there was poor delivery to the user; and
- there was poor support or context setting from end users.

The cradle to grave project management approach of the Environment Agency has made the identification and involvement of end users a more fundamental part of the process. The dissemination plan is developed, at least in general principle, at the outset. However, it may well be revisited as the project goes on. It may be that a project releases an output to a very limited number of users, for example a proof of concept. But it will then have a distinct stage to look at how this is subsequently taken forward, deciding on the detail of the dissemination approach.

Communication of results

The review, while recognising that dissemination had been substantially strengthened in the joint programme compared to previous arrangements, recommended that significantly more attention and resources be given to the purposeful pursuit of the delivery of R&D results and their uptake by end-users. The stakeholders expressed the view that a greater emphasis should be placed on meeting the needs of end users and demonstrating the utility of outputs to them.

The joint programme has a web site (www.defra.gov.uk/environ/fcd/research); some individual projects do also. It provides pdf's of project reports and details of current projects. It is recognised that the website could be improved to act as a "one stop shop" for the programme. It should provide more information on "what this research will do for you". The review recommended that it should also provide updates on ongoing research projects and facilities for discussion groups for particular research areas.

Other mechanisms for the dissemination of research results and to support their uptake include:

- project reports: technical reports and technical summaries;
- peer reviewed published papers;
- newsletters;
- conferences: in particular the annual flooding and coastal management conference organised by Defra; and
- training courses (consideration is being given to linking to the continuous professional development initiatives of the chartered institutes).

A questionnaire to the user community as part of the review revealed that users do not access information from the research programme from any single source. The

joint programme newsletter was identified as the most effective source of dissemination, closely followed by the joint programme website, word-of-mouth and the annual Defra conference.

The joint programme is currently acting on a number of recommendations arising from the review on dissemination and supporting the uptake of results as follows:

- more use of conferences to present interim outputs;
- e-mail messaging to update those who have expressed an interest in a project;
- speeding up the delivery of completed research results into the user community: this should be part of the contractual responsibility of re-research contractors; and
- more use of workshops and training courses to ensure that potential users are up to speed with the new tools, techniques and thinking arising from the programme.

Interpreters and intermediaries

A central role of the joint programme is considered to be the translation of available evidence and science into practical tools and guidance that aid decision-making and help practitioners. The theme advisory groups and theme champions play an important part of this given their roles and wide representation.

Collaborative work with other bodies is also important in respect of translation and intermediation. For example the joint programme works closely with CIRIA, the construction industry research association. CIRIA provides direct access to the big players in the construction industry. It is also an independent organisation and therefore influences and move things forward in ways that otherwise the Environment Agency could not. The relationship between construction companies and the Environment Agency can sometimes be adversarial. CIRIA is looked on by the construction industry as its own, and so working through them in promoting good practice can be very helpful. Who is presenting the knowledge is important and it has to be presented in the right language.

Professional bodies also have an important role to play, for example the Institute of Chartered Engineers. Their report on “Learning to live with rivers” was very helpful in identifying skill gaps. They also work with the Association of British Insurers to influence insurers, and with the water industry, particularly through their research Association UKWIR. These bodies act as manageable focal points for discussion, as it would not be possible to have discussions with the individual organisations.

Engagement with stakeholders

The joint programme website has general information about the programme and enables the research reports to be downloaded for free. Where appropriate, the research outputs are repackaged for the public. For example, work on resilience

and recovery from floods resulted in leaflets that were sent to everyone in the flood risk areas.

It is considered that a balance needs to be struck in communicating with the general public. You have to provide sufficient information that they can be confident that you're not trying to do things without them knowing about it. But you do not want to alarm people. For example, you may be doing trials of a model to predict flooding which might create false alarms about their potential reality. You need to think carefully about what information is going out and how people will receive it: it can have a fundamental impact on their life and their property.

Timing is also an important issue. For example, a recent exercise conducted case studies of potential flooding in the Thames estuary. This work was carried out during a period of local elections and the messages emerging were potentially sensitive. The media were brought in at the end of the week's exercise when they had confidence about the results of the models. The local area office was closely involved in developing the messages and managing the media contacts. It is advantageous to use local structures and people in communicating locally.

Evaluation

So far the main mechanism for evaluation of the joint programme has been a periodic review. In future, the programme will look at evaluation more thoroughly and develop metrics of dissemination and uptake of outputs. The intention is to measure both outputs and outcomes. Outputs are relatively easy to quantify, but outcomes are not so distinct. Consideration is being given to tracking where reports have gone to and to review periodically where reports have influenced policy outcomes. It is important that the evaluation process is not too onerous.

The review pointed to the need to establish more well-defined objectives for projects and themes as a basis for review. It considered it important to differentiate between different types of research, for example:

- a highly user focused project or theme where it should be possible to check delivery against well defined objectives; and
- projects or themes which are more exploratory or underpinning, where you can be less specific about the delivery of outputs.

Case study: the Marclim Research Project

Introduction

MarClim was a four-year project carried out over the period 2000 to 2005 to assess and predict the influence of climate change. This was achieved by using inter-tidal rocky shore biota and assessing the resultant implications for the conservation, management and protection of the marine environment in Britain and Ireland. A key feature of the research was the assimilation of a large collection of independently acquired historical data sets.

The project was carried out by a consortium led by the Marine Biological Association in partnership with Plymouth Marine Laboratory, the Scottish Association for Marine Science, the University of Plymouth and University College Cork. It was funded by a wider consortium of organisations (including the Environment Agency) under the umbrella of the UK Climate Impacts Programme (UKCIP: a Defra initiative).

The approach and experience of the project relevant to the concerns of the study are summarised below under the five headings used elsewhere in this report.

Planning and management

An Advisory Group comprising around 20 funders, end-users and principal scientists played a key role in overseeing the project and ensuring that it met end-user needs. A project management group, comprising scientists and a subset of funders, sat below the Advisory Group and was responsible for the planning and management of the project.

The effectiveness of the Advisory Group was one of the significant conclusions arising from the project. Prior to the formation of MarClim, no national forum existed through which to discuss Marine climate change trends and issues. Since its inception, the Advisory Group has enabled the project to undertake its work in an open and interactive manner with funders and other interested parties. It has built and strengthened links between the policy, science, conservation and climate change communities. This enabled effective networking and strong linkages to be made during the MarClim work across all areas, and enhanced the value and ownership of the end products and conclusions.

The Advisory Group has proved itself to have wider value in relation to cross-agency thinking and planning. Consequently it has been developed into a national Marine Climate Change Impacts Partnership (MCCIP: launched in March 2005) focused on developing adaptive capacity to climate risks in the marine environment.

Two policy advisor workshops convened by UKCIP during the course of the project in 2001 and 2004 also played an important role in engaging users and ensuring the project delivered useful outputs.

Within the Environment Agency the uptake of the project outputs had not been planned in advance. It required a significant amount of energy and initiative of the member of Science Group responsible for the link with the project to ensure that

dissemination within the Agency was adequately resourced and appropriate actions taken.

Communication of results

The project created a web site (www.mba.ac.uk/marclim) which lists the key findings and conclusions, makes available the reports and publications from the project, and lists the presentations made.

Communication of results through written material includes:

- 20 peer reviewed publications aimed at the scientific audience;
- a report aimed at the policy community (<http://www.english-nature.org.uk/pubs/publication/PDF/671.pdf>) setting out the policy implications of the work and authored by representatives on the Advisory Group from policy-making partners; and
- in the Environment Agency, a two-page glossy summary aimed at a wide audience and a three-page summary aimed at users of the research and considering the implications for the Agency.

Written reports were augmented by a workshop in London involving around 100 people and an academic conference in Plymouth which brought together the marine scientists with those concerned with freshwater. Bringing these two communities together proved to be beneficial in identifying similar trends in the two environments.

The MCCIP has established an advisory group of scientific experts who the policy people can draw on as and when they need advice. This represents a pool of expert, vetted people who are neutral academics that government can draw on.

Interpreters and intermediaries

The report for policy makers and the summary reports within the Agency played an important role in interpreting the research results for the user community. The MCCIP will continue to have an important position as an intermediary organisation between the research and policy communities.

Within the Environment Agency, the member of the Science Group staff responsible for the linkage with the project, made presentations to relevant user groups in the Agency, for example the Marine Policy Group on how they could adapt their monitoring programmes. Also within the Agency, she ran a session on climate change and biodiversity centred on the MarClim project at the annual workshop of the Conservation and Ecology Function.

Engagement with Stakeholders

The website and workshops have been important in engaging with a broader range of interested parties. There is an intention to develop a story for one of the broadsheet newspapers.

Evaluation

The Advisory Group monitored progress through the project and adjusted priorities accordingly. As a result, the report for policy makers was introduced to the reporting schedule of the project. There has been no formal evaluation of the process of dissemination and uptake within the Agency.

Dissemination and implementation of environmental research

– including guidelines for best practice

Government ministries and agencies in Europe make substantial investments in research projects and programmes to generate the knowledge, tools and techniques necessary to underpin effective environmental policy making and regulation. This report summarises the findings of a study of the approaches to the dissemination and implementation of research in Government ministries and agencies responsible for funding environmental research in Europe.

The study has been carried out as part of the work programme of the SKEP (Scientific Knowledge for Environmental Protection) ERA-NET. The aims of the study have been to:

- compare and contrast approaches to dissemination and implementation of research in SKEP member organisations;
- identify what works (and what doesn't) and why; and
- develop guidelines for "good practice".

The study explores the following five areas:

- the **planning and management** of research projects and programmes
- the **communication of results**
- the roles of **interpreters and intermediaries** in making results available to
- **engagement with stakeholders**
- the **evaluation** of processes of dissemination and implementation.

Guidelines for research funders on research dissemination and implementation were developed on the basis of the findings of the study and are included in the report.

