

# The 2008 Evaluation of SYKE

The Finnish Environment Institute

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ENVIRONMENTAL  
PROTECTION





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### The Finnish Environment Institute

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## Executive Summary

*The 2008 Evaluation Panel of the Finnish Environment Institute (SYKE) assessed (1) the relevance and impacts of SYKE's activities as a basis for Finnish and international environmental policy; (2) the extent, quality, and balance of SYKE's activities; (3) SYKE's renewal and development ability and intellectual agility; (4) SYKE's role in the Finnish innovation system and SYKE's national and international collaboration; and (5) the risks and benefits of SYKE's funding structure.*

The Panel received all required background material and visited SYKE in November 2008 to interview programme leaders, division leaders, department heads, the management board and the advisory board. Additionally, representatives of the main ministries, collaborating institutes and universities and other relevant organisations (e.g. Academy of Finland, Tekes, SITRA and representatives of the private sector) were interviewed. All this information provided an adequate overview of SYKE's position and role both in Finland and internationally.

The Panel encountered an active and vital institute focusing on research and development, statu-

tory tasks, environmental monitoring and expert services. The approach to report the findings of the Panel included an analysis of the different types of environmental and organisational challenges that SYKE is facing. The Panel realized that the coming years will show significant shifts in the importance of environmental problems. Locally and regionally, aspects of physical planning and ecosystem services and their valuation, for example, will be included more broadly in environmental management. Simultaneously, global challenges such as the need to deal with, amongst others, the loss of biodiversity and the need to cope with climate change will increase in importance. The organisation's challenges include a further promotion of internationally oriented research and collaboration with policy makers, and modification of financial and personnel resources in line with the Finnish government policies. Additionally, Finnish funding agencies expect public-private partnerships to develop innovative research resulting in new tools and products. To comprehensively deal with all these challenges, the Panel decided to address them in its report. Firstly, the administrative and structural challenges are discussed, followed by

the methodological challenges to develop the most suited approaches to address environmental and sustainable development issues. Finally the longer term strategic challenges are discussed.

As a response to an earlier evaluation in 1998, SYKE decided to separate the research and expert services department to enhance the international scientific credibility and quality, partly through international collaboration. This has resulted in a relatively large increase in SYKE's scientific output, including several publications in renowned journals, and a large increase in citations. The Research Department has been successful in obtaining external funding and has increased its scientific credibility. The Expert Services Department has had fewer opportunities for external funding. The department is rather stretched on resources because of the increasing need for services and, probably, not all operational costs are covered. Although collaborations between these departments exist in several projects, the Panel questions the justification of this separation of these two departments with regard to coping with all the current and upcoming challenges. Additional interdisciplinary collaboration among researchers and experts could

be stimulated through specific (internal to SYKE) awards and incentives. A stronger integration of the two departments, however, could improve the expert services, will create more flexibility and resilience for all activities, increases synergistic funding opportunities and could increase SYKE's societal relevance.

Another structural challenge lies with the advisory board, which currently only has a minor role in developing strategic choices and setting priorities. The Panel concluded that the role and status of this Board could be enhanced by appointing an independent chair and giving clear advice on SYKE's strategy and direction. As many of SYKE's activities gain an international character and should become increasingly societal relevant, the Panel recommends to expand the advisory board with additional members, representing the private sector, NGOs, market organisation and SYKE's international collaborations.

Regarding the earlier content challenges, the Panel concluded that SYKE has responded adequately to emerging issues. SYKE's national and international reputation in research and development, implementing statutory tasks, environ-



mental monitoring and providing expert services is good. However, the policy and societal relevance and impact of SYKE's activities can be extended. The Panel sees ample opportunities for SYKE to take a more pro-active role in assessing policy progress towards environmental targets, developing strategies and scenarios for sustainable development, and informing the policy-making process on implications of different targets for environmental ambitions. This can both be done for Finland and the European Union. The Panel recognizes that this would imply a widening of SYKE's responsibilities from mainly policy implementation and monitoring towards environmental assessment and policy evaluation.

The Panel also questions the 24/7 operational activities implemented by SYKE, such as the abatement of oil spills. Although, the Panel sees a strong continued role for SYKE in developing the appropriate methods, tools and approaches for effective abatement of oil spills, the current imbedding of the operational activities within SYKE should be critically reviewed.

The Panel concluded that SYKE's methodological strength lays in the development of scien-

tific approaches and tools based on the collection, management and application of large environmental datasets that are available or compiled within SYKE. However, under the current and emerging future conditions this descriptive and non-integrated research restricts the societal perception of SYKE's strength. The Panel recommends strengthening the science-policy-interaction by creating a participatory integrated assessment approach that combines the environmental understanding, created by SYKE's different tasks, and the needs of SYKE's various stakeholders. In such an integrated assessment insights from different natural-science, social-science and economic disciplines should come together in order to provide a comprehensive assessment of environmental and sustainable development issues. In this respect, the availability of spatially explicit environmental and natural resource data has huge potential in combination with socio-economic data to play an essential role in the development of an innovative integrated assessment approach.

The Panel argues that SYKE's own role and position in the Finnish environmental landscape could be more transparent. This is, for example,

illustrated that some regarded SYKE as an “environmentalist” knowledge provider, some as “an academic institution”. Efforts to invest in a clear communication of SYKE’s own position, including the double or even threefold role it actually plays, is required. SYKE’s Communication Unit could therefore actively convey SYKE’s scientific and environmental credibility to enhance its reputation, and to thoroughly explain the importance and added value of the expert services. This will improve SYKE’s political and public visibility. By using advanced press techniques, including internet and YouTube, SYKE’s societal visibility and its role in the innovation system would be enhanced.

Finally, the strategic challenges that face SYKE are many fold. The Finnish innovation system provides many opportunities to combine SYKE’s

strengths to meet the needs of different stakeholders. The Panel sees a strong role for SYKE to enhance the integrated assessment capacity, which should take the science-society-policy interaction as its starting point. This means, however, that SYKE could develop a comprehensible future strategy to respond to all external processes and to set clear priorities to implement this strategy. This could enhance the adequacy, relevance, timeliness and utilization of SYKE’s knowledge and information. In this respect the planned increase in SYKE’s co-operation with national and foreign universities, the likely establishment of an Environment and Natural Resources Consortium, and participating in the national programmes of Centres of Excellence in research and Strategic Centres for Science, Technology and Innovation (SHOK) are all essential.

## ACKNOWLEDGEMENTS

We strongly appreciate the hospitality provided by Director General of SYKE Dr. Lea Kauppi and the Division manager Ismo Tiainen. Their strong support helped us to form a thorough evaluation panel ready for an intensive evaluation week. We recognise their courage for organizing this review in times when the roles and organization of the sectoral research institutes are under debate in Finland and other constraints to the functioning of these institutes are proposed and implemented.

We strongly appreciated the support to the Panel by the staff of Gaia Consulting Oy: Dr. Mari Hjelt, Dr. Paavo-Petri Ahonen, Mrs. Sanna Ahvenharju, Mr. Jussi Nikula, Mrs. Alina Pathan and Dr. Piia Pessala. Their support during the interviews and their rapidly provided concise reports helped us to synthesis all information in a timely manner. Also the informal additional information on the Finnish ministerial and research structure was indispensable and very valuable.

We personally thank Ms. Laila Liukka (SYKE) for her support in arranging all appointments for the interviews with persons with busy schedules during the Panel's visit to Finland. She also organized all transport within the Helsinki area for the team members to and from appointments. Effectively managing these complex logistics really increased the effectiveness of the evaluation Panel.

Finally, we thank all who we interviewed for their open, frank and revealing attitude. Without their input, we would never have obtained such a good picture of an unquestionably positively transforming institute with a complex mandate in times where scientific credibility, salience, policy relevance, value for money, innovation and internationalization determine the rules of the game. Without their collaboration obtaining all the necessary information and impression would have been impossible.



# 1 Introduction

The Finnish Environment Institute (SYKE) was established in 1995, at the same time when major structural changes were made in the Finnish environmental administration. SYKE is currently both a research institute and a centre for environmental expertise in Finland. SYKE's expert services provide assistance on a wide range of environmental issues for administrators, local authorities, industries, firms and other organisations. SYKE closely monitors environmental trends and the state of the environment in Finland in co-operation with Finland's thirteen regional environment centres. SYKE serves as the national environmental data centre in Finland. SYKE's research and development programmes assess environmental problems from a multi-disciplinary perspective, by integrating socio-economic considerations into scientific research. The research and development programmes focus on a wide range of environmental issues, from global (e.g. climate change and loss of biodiversity), regional (e.g. acidification) or, in some cases, local issues (e.g. soil pollution).

Two ministries oversee the functioning of SYKE. The Ministry of the Environment (MoE) is responsible for the overall control and for the majority of

activities in SYKE, while the Ministry of Agriculture and Forestry (MoAF) controls activities related to the management and use of water resources.

SYKE was evaluated by an international panel in 1998<sup>1</sup>, three years after its establishment. In recent years, several quality and risk assessments have been carried out internally. After a thorough discussion in 2007-2008, it was decided to carry out a new and external international evaluation in 2008, ten years after the first one. This is in line with the recommendation given by the Finnish Science and Technology Council in 1993 to evaluate all sectoral research institutes in seven to ten years intervals. A similar recommendation was also given in the review prepared by the one-man committee for the Advisory Board for Sectoral Research in 2008.

The evaluation in 1998 concluded with a number of operational recommendations to improve SYKE's international and national outreach. At the time, it was too early to look at the wider impacts

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1 Hepworth, R., L.-E. Liljelund, J. Theys, V. Wetzel and J. Hukkinen, 1998. Futures for FEI. International Evaluation of the Finnish Environment Institute. The Finnish Environment Report 269, December 1998, Ministry of the Environment, Helsinki. 128 pp.

## THE 2008 EVALUATION OF SYKE INTRODUCTION

SYKE has had by then. However, the 1998 evaluation emphasized a need for a stronger international collaboration and improving the research quality. During the last decade, SYKE has actively participated in several large competitive EU-projects. This has boosted the number and quality of publications in internationally renowned journals. Since 1998, SYKE has also made concrete improvements in many other fields.

Both the earlier and current evaluation show that research and development has a long tradition in SYKE. Both evaluations indicate that SYKE is highly respected among Finnish universities and the other Finnish sectoral research institutes. It can be concluded that SYKE's international scientific impact is improving and will probably continue to improve in the near future. The 1998 recommendation for further internationalisation of SYKE's research and development activities has enhanced involvement in international research projects funded by DG RTD of the European Commission. Participation in these projects has definitely fostered the international visibility and scientific credibility of SYKE. Furthermore, the in-house availability of national environmental databases, which have provided the up-to-date data and information on the status of the environment of the whole country or the wider region, has largely contributed to SYKE's visibility. These trends show that SYKE has responded adequately to the recommendations of the earlier evaluation in 1998 and is developing towards a major international player among the European environmental research institutes.

Since 1998, there have been a number of changes in the operational environment of SYKE. Globalization and internationalization, climate change and energy production, biodiversity and ecosystem services, and sustainable production and consumption are only few of the general topics that currently affect Finnish environmental policy. These topics have been taken up and are now covered by SYKE's research and development and expert services. It seems difficult to include such timely topics into ongoing research programmes, especially because SYKE historically emphasised water research<sup>2</sup>. However, SYKE has successfully created several large programmes, divisions and projects over the last decade to address these issues.

Currently, a number of structural changes in Finnish governmental administration and research system are ongoing. For example, the sectoral research system is under a major restructuring of which the outcome is for the time being unknown. The latter is illustrated by the intended and agreed split of the Marine Research Institute and the merger of its marine research and marine safety services with respectively to SYKE and the Finnish Meteorological Institute. In the week of the current evaluation this plan was challenged by the opposition in Parliament. Furthermore, the Finnish regional administration system will be reorganized. This system includes the regional environmental

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<sup>2</sup> SYKE stems from National Board of Waters and the Environment and its research division.

centres and environmental permit authorities, which are important clients and partners for SYKE. Finally, the governmental productivity programme creates pressure to achieve more with less human resources. On the other hand, these changes open up opportunities to reconsider and critically examine SYKE's current position. The overall purpose of the evaluation is to assess and provide information on how and to what extent SYKE fulfils its tasks and duties and how well SYKE is prepared to meet future challenges not only in the environmental sector itself but also in its changing operational environment. The evaluation will examine what weaknesses, strengths, opportunities, and threats there are and provide guidance for the planning of necessary measures to improve SYKE's overall performance. The Administrative Department under the Director General is excluded from the current evaluation.

An international evaluation panel of six members was appointed by the Ministry of Environment in August 2008 and the Panel carried out the evaluation between October and December 2008. The Panel was chaired by **Prof. Dr. Rik Leemans** (Environmental Systems Analysis Group, Department of Environmental Sciences, Wageningen University & Research, The Netherlands), and the other members were:

- **Prof. Dr. Leen Hordijk**, Director, Institute for Environment and Sustainability Joint Research Centre, Ispra, Italy
- **Dr. Milena Horvat**, Head of the Department of Environmental Studies, Jožef Stefan Institute, Ljubljana, Slovenia
- **Prof. Dr. Thomas B. Johansson**, International Institute for Industrial Environmental Economics, Lund University, Sweden
- **Prof. Dr. Pieter Leroy**, Political Sciences of the Environment, Nijmegen University, The Netherlands
- **Ms. Kaja Peterson**, Programme director, Stockholm Environment Institute Tallinn Centre (SEI), Tallinn, Estonia

Short bio-sketches of all members are listed in Appendix 1. In this report the Panel summarizes the main results of the evaluation. Chapter 2 describes the evaluation process and the main material used in the evaluation. Chapter 3 presents the current and future context in which SYKE operates and how its role and structure have been defined. The Panel was strongly interested in this context and linked it to the theoretical concept of the policy cycle. From the insights that emerged, a framework classifying the different future challenges of SYKE was designed. This framework, described in chapter 3, was used in chapter 4 to report on the major findings of the Panel. The executive summary synthesises the major findings and recommendations.





## 2 Evaluation process

The evaluation started with an extensive information collection completed internally by SYKE (Appendix 2). The background material included facts of SYKE's operations, information on SYKE's research programmes and expert services, the different ministerial agreements, and a series of general information on the Finnish context of environmental policies and management. The background material included the results from dedicated surveys that were completed for this evaluation to get internal views from SYKE managers, programme leaders and division heads, as well from SYKE's regional and international collaborators. The background material package was submitted to the panellists in October. It included a sixty pages long summary of the institute, its structure, its procedures and its programmes and projects, and over additional twenty annexes, covering different agreements, aspects and products. Together over nine-hundred pages of written material were provided to the panellists.

Through a tendering process that took place in June 2008, SYKE acquired external consulting support for the Panel. Gaia Consulting Oy received a contract for the design and organization of the

internal SYKE survey, the international survey and interview questions, and the design of the work programme for the visit of the Panellists and expert support for the panellists. Six Gaia experts (Dr. Mari Hjelt, Dr. Paavo-Petri Ahonen, Mrs. Sanna Ahvenharju, Mr. Jussi Nikula, Mrs. Alina Pathan and Dr. Piia Pessala) accompanied and assisted the panellists during their visit in Finland and took notes during the interviews. They also provided additional essential information on Finnish policies, institutional structures, culture and language<sup>3</sup>.

The Panellists' main work took place in Helsinki from 23 to 28 November 2008. The panellists were welcomed on Sunday evening by SYKE's Director General, Dr. L. Kauppi and Division manager I. Tiainen and some of their senior staff and introduced to Finnish environmental management and SYKE's role therein. Dr. Kauppi presented the five essential evaluation issues (see p. 17) that should guide the evaluation panel. These questions were discussed with the Panel's chair, Prof. R. Leemans, early November and also used to prepare the

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<sup>3</sup> An intriguing piece of information was that Finnish the word "politiikka" means both policy and politics.

interview questionnaires by Prof. R. Leemans, Dr. M. Hjelt and Division manager I. Tiainen. The specific questions in this questionnaire, which were submitted to all interviewees in advance, are listed in Appendix 3. The International collaborators obtained a shorter version of this questionnaire without the questions on the Finnish situation and the innovation system.

On Monday morning 24 November, the Panel gathered at SYKE to discuss the evaluation agenda, procedures and requested some additional material. Later that day, the panellists started with their individual interviews with SYKE division and programme heads (Appendix 3). On Tuesday, the panellists had a joint meeting with SYKE's Advisory Board and the Director General (Appendix 4).

On Wednesday, Thursday and Friday, the core information for the evaluation was gathered through interviews that SYKE organized with representatives of ministries, SYKE's collabora-

tors, users, and Finnish research and innovation system representatives. Most of the interviews were done individually, whereas some were small group meetings attended by a few panellists. All external interviewees are listed in Appendix 5. The Panel obtained, analysed and synthesised the insights, comments and suggestions of over hundred individuals who were interviewed or who provided written responses. Without their contemplative and considerate contributions, this evaluation could never have been accomplished in a week's time.

At the end of each day during their visit, the panellists met together presenting and synthesizing the results. The initial evaluation results were presented to SYKE on Friday 28 November, after which the Panel finalized the report. A draft report was submitted to SYKE and Gaia Oy late December for checking the facts. The final report was presented in January 2009 to SYKE's Director General, Dr. L. Kauppi and her staff.

## ORGANIZING ISSUES OF SYKE'S EVALUATION

**The relevance of SYKE's activities as a basis for Finnish and international environmental policy.** This includes an evaluation of SYKE's application of scientific results in the institute's expert services and also the balance between day-to-day activities and long-term research and development.

**The extent, quality, and balance of SYKE's activities in national and international context, as well as its national and international position and impact.** This includes an evaluation of possible professional or quality-related strengths, weaknesses, or deficiencies in the activities.

**The renewal and development ability and intellectual agility of SYKE, including how the institute is prepared to meet future challenges.** This includes its ability to innovate and change practices and think laterally about problems, and to come up with new and innovative solutions. This includes management and development of human resources and competence.

**The role of SYKE in the Finnish innovation system and SYKE's national and international collaboration.** This involves considering how existing relationships and networks are managed and coordinated and how new ones can be established and maintained.

**Risks and benefits inherent in the funding structure within SYKE and the advantages and disadvantages of the income portfolio.**



### 3 A framework to evaluate SYKE's role and functioning

In order to be able to manage large amounts of information, perceptions, opinions and assessments of SYKE's role in the Finnish landscape of environmental research and policy, the Panel put forward a few organising frameworks. As these are essentially meant to help to reduce the complexity, they should definitely not be taken as a static reflection of reality, but as mere heuristic instruments. Below, we restrict ourselves to a brief presentation of these frameworks as those help structuring the following chapters.

The first thing, though, that the Panel had to bear in mind was the environmental context itself in which SYKE is operating, and which represent the major environmental challenges that the Finnish society, including SYKE, faces.

Environmental concerns have to be seen in the contest of globalization. Consumption and production is increasingly geographically separated, often across national borders. This complicates action on environmental issues that extend beyond jurisdictional borders. Although the environmental and resource impacts of consumption in Finland extend to many other countries, SYKE's mandate mainly relates to the state of the Finnish environment but

is not limited to Finland. The Finnish national programme to promote sustainable consumption and production (KULTU), for example, has the aim of raising the eco-efficiency to world top levels. It encourages all suppliers to adopt environmentally favorable solutions.

#### The context of environmental problems in Finland

Environmental challenges in Finland are multiple and have been in focus already for a long time. The challenges extend from local to national and regional to global.

Water availability and water quality issues have been central to environmental concerns in Finland. The new EU Water Framework Directive sets out in part new directions for monitoring and integrated management plans. These are now being implemented.

Air quality has been an area of concern but emissions of various pollutants have been reduced over the years. Urban air quality and impacts of acidifying substances are largely and adequately addressed.

New issues are evolving, for example management of risks dealing with chemicals, an area where the new EU regulation, REACH, which stands for **Registration, Evaluation, and Authorisation of Chemicals**, is creating a framework now to be implemented. The increasing use of nanotechnologies creates little known but potentially important questions about impacts on health and environment.

Over the decades, conservation of biodiversity has become increasingly important in Finland and for SYKE. Special attention is given to invasive species, which become pests and could endanger native species. The threat of invasive species could become worse under, for example, climate change and globalisation. Additionally, the use of ecosystem services as an innovative approach to assess and value the different functions and roles of ecosystems requires the development of a series of different methods that bridge ecology and economics. All these issues concern the regional management of ecosystems and biodiversity, which is not SYKE's research responsibility alone but also of other sectoral research institutes and universities. Strong collaborative efforts are therefore needed. Especially, when simultaneously targets are developed for an increasing share of biofuels and other renewable energy sources, and shifts in forestry, paper and pulp industries are developed. This requires enhancing integrated management of all natural resources and ecosystem services. Finland is a Party of the Convention on Biological Diversity which together with the EU's Habitats Directive lay out long term objectives.

The 2006-2016 strategy and action programme for biodiversity in Finland lays out the specifics on this.

Regionally, many important Finnish environmental issues are related to the status of the Baltic Sea. The Baltic Sea suffers from eutrophication and over fishing, persistent pollutants and oil spill threats. Together with other coastal states, Finland is very concerned about these issues and a strong collaboration of all countries around the Baltic to address these issues has been developed. The Baltic Sea Action Plan defines thresholds and targets with regards to the water quality. These targets define the required emission reduction levels from Finland.

Finland is a Party to the Convention on Long Range Transboundary Air Pollutants (LRTAP) and thus has assumed and delivered on emission reduction obligations.

Also the arctic regions with their indigenous communities in Lapland are of regional importance. These regions could be especially vulnerable to climate change and have their own specific resource problems<sup>4</sup>. Regional collaboration with Norway, Sweden and Russia helps to address their livelihood issues.

Globally, the most important issue is climate change. Finland is party to the United Nations Framework Convention on Climate Change (UNFCCC) and its Kyoto Protocol. The Govern-

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<sup>4</sup> Lange, M.A., H. Roderfeld and R. Leemans, 2008. Modelling climate change in the European North. *Climatic Change* 87: 1-303.

ment recognizes climate change as “among the largest challenges of our time”.<sup>5</sup> Finland’s assignment under the European bubble is to keep emissions at the 1990 level for the period 2008-2012. Emissions are now 10% above this target. The new emission reduction and renewable energy targets for 2020, which was agreed upon in early December by the European commission and ratified by the EU parliament, will provide additional challenges for Finland to implement relevant and efficient additional climate policies.

For the longer term, global emissions have to be reduced by at least 50% by 2050 from 1990 levels, to keep global warming below 2°C, in line with current understanding of climate change and what may constitute “dangerous” climate change<sup>6</sup>. Recently, several voices have been heard arguing that such a temperature would lead to impacts beyond “dangerous”<sup>7</sup>. Finland, the European Union and other industrialized countries would have to cut emissions to close to zero by 2050 to be in line with these insights.

Finally, many of these environmental problems interact with each other and with other national and international trends in society. This could create unexpected new problems, such as the already mentioned increased emergence of invasive species

under climate change. Another emerging problem is the acidification of oceans and sea due to the uptake of CO<sub>2</sub> into surface waters. This acidification could lead to shifts in algae communities (i.e. less calcareous algae and more siliceous, such as diatoms) and change food chains. This ocean acidification problem is only recently recognized and clearly shows that existing problems (e.g. the increase in atmospheric CO<sub>2</sub> concentration) return with new consequences that occur at a larger scale and have consequences far away from the original CO<sub>2</sub> sources. These consequences seem more difficult to address.

Many of these emerging issues transcend the current environmental problems. To address them adequately not only the physical, chemical and ecological components of the systems need to be understood but also the socio-economic aspects. These socio-economic aspects are important to allow comprehension of proximate causes of the problems and are also an essential constituent of possible solutions. For example, the recently developed ecological footprint and virtual water indicators, although controversial, shows the need to reduce the impact of consumption patterns and highlight equity issues between and within countries.

Most of the environmental problems have specific spatial and temporal properties. To include these aspects integrated assessment approaches linked to physical planning and human well-being have to be further developed and applied. This increasing need for integrative tools provides additional opportunities. The annual report Environ-

5 The Operating and Financial Plan of the Finnish Environment Institute for 2009-2012, p.3.

6 IPCC, 2007. Climate Change 2007: Synthesis Report. Cambridge University Press, Cambridge. 24 pp.

7 Ekman, B., J. Rockström, A. Wijkman, “Grasping the Climate Crises”, A provocation from the Tällberg Foundation. Presented at COP-14, Poznan, December 2008

mental Statistics of Finland<sup>8</sup>, for example, present a valuable account of emissions, use of natural resources and other essential information. It does not present, however, an analysis of the ambient concentrations of pollutants, or the impacts on the environment and public health of these. Also in the current Finnish State of the Environment report, the objectives of Finland's environmental polices have not been clearly assessed. This is especially true for the medium to long term policies that would set the sights for societal developments with respect to the environment and sustainability. This creates significant opportunities in evaluating the performance of Finnish environmental policies and could change the context of some of the research and development programmes and expert services of SYKE.

### Different stakeholders, standards and expectations

Next to changing environmental conditions, operational conditions also change. SYKE's position and role alters as a result. The extensive scope of SYKE's expert services and research and development programmes has created a wide spectrum of collaborators and stakeholders, each of them have a different point of view or perceptions on SYKE's contribution, on the type of knowledge and information needed and on the properties and quality of SYKE's products.

Being supervised by MoE and MoAF, the 1) Result Agreement, which mainly set targets for R&D-projects but also for some expert service-projects, and 2) Services Agreement, which includes the continuous service-tasks and duties, between SYKE and these two ministries<sup>9</sup> imply the most diverse and demanding roles. The service agreements set the scope of the work and define the outputs. These can be regarded as continuous tasks of a public agency. Others, such as the Forest Agency (Metsähallitus) and the Road Administration also rely on SYKE's data and expertise. SYKE provides the Forest Agency with monitoring data on species and habitats and the Road Administration with expert advice on the impacts of road management (especially de-icing) on surface and ground water, biodiversity and land use.

As settled in the service agreement with MoE, SYKE acts as a competent authority helping to implement different tasks based on EU-legislation. On the other hand, SYKE's experts receive requests from industrial producers and private firms to assist in identifying and solving environmental problems. SYKE is the competent authority for CITES, EMAS, the Basel convention and different chemicals legislation (biocides directive, detergent regulation, ozone regulation, fluorinated greenhouse gases regulation, POP-substances regulation, PIC-regulation). All these tasks have enabled SYKE to establish good links with the industry, public and governmental organisations.

<sup>8</sup> Statistics Finland, 2008. Environmental Statistics of Finland 2007. Statistics Finland, Helsinki. 196 pp.

<sup>9</sup> For more information of the performance management, see Chapter 2.8. Performance management, page 28 in the "Background Material for the Evaluation Panel".



SYKE has taken initiative to broaden its scope of activities, also outside of Finland. The international expert services are coordinated by the Director's office. SYKE's researchers and experts participate in the implementation of foreign aid projects, which are financed mainly by the Ministry for the Foreign Affairs of Finland, EU, World Bank and Asian Development Bank. SYKE's experts provide technical advice on policy formulation, environmental administration and capacity building. SYKE works together with Finnish and international consulting companies and local organizations in these fully externally funded international development projects.

Besides all these collaborative efforts, the Finnish government has also implemented a series of policies to further increase the productivity and decrease the labour force in the government. These policies are separate from simultaneous increase in ambition of environmental policies at national and European level. This productivity programme means that over the coming years, not all open positions will be filled and overall SYKE's work force will decline, while its responsibilities remain unchanged and the workload tends to increase. For the moment, this only seems to count for government related activities but this is not finally decided upon by the responsible Finance Ministry and Parliament. The Panel recommends that research projects and other activities, which are externally funded, are exempted from the productivity programme. If not, the execution of these projects would be jeopardized and it will surely limit SYKE's competitive edge, which has

been effectively developed over the last decade. In addition, it would strongly limit SYKE's possible response to lower staff numbers and increasing work loads.

In comparison with most other sectoral research institutes, over the last decade SYKE has been successful in obtaining external funding, which now amounts to approximately 40% of total funding (see SYKE's annual report 2007 and Table 5 on page 58 of the main background document). This was partly accomplished through participating in EU-funded projects, and partly by setting up new collaborative efforts in Finland. The suggestion by some politicians to subtract the external funding from the basic funding of the sectoral research institutes will rapidly decrease the motivation to apply for external funding and consequently jeopardize international cooperation. Such a proposal risks threatening the quality and success of the entrepreneurship of not only SYKE but also all the other sectoral research institutes. The Panel finds this initiative unproductive and futile. Finally, the Finnish government, as part of the Lisbon agreements, is strongly stimulating research and development that will provide innovations to society, including the private sector. In 2008 Finland has prepared a national innovation strategy that will further increase the role of research and development in national policy making. Many of the innovation funding programmes, which are funded and governed by Tekes, aim to bring together partners from the sectoral research institutes, universities and the private sectors. SYKE has up to now successfully collaborated in several of these

innovation projects but several interviewees indicate that there is ample room for expanding these projects.

The above discussion shows that SYKE has a very specific role to play not only within the Finnish society but also within the EU. SYKE is a governmental research institute with many statutory tasks, environmental monitoring activities, expert services, 24/7 operational responsibilities (e.g. abatement of oil spills) and research and development programmes. All these activities require excellent knowledge of the environmental and ecological systems in all their aspects, and good understanding of societal and market trends and their environmental consequences, and finally assist in developing adequate responses to manage environmental and resource problems. Deciding and implementing these policies is the responsibility of the policy makers and ministries. SYKE is thus mainly a knowledge and expert services institute that bridges between the science community, governance bodies at different policy levels, and society.

SYKE is balancing between the different roles as a typical boundary institute, which connects different parts of society and societal actors. During all the interviews, nobody questioned the need for scientific quality and forefront research to uphold high-quality and timely expert services and other activities. This shows that there already exists a specific balance between the roles. But the Panel believes that SYKE's most important niche is to provide environmental information to effectively develop, implement, monitor and evaluate poli-

cies. SYKE role is thus located closer to the research and policy actors than the broader actors in society (Figure 1).

### The policy cycle

SYKE's is a typical boundary institute, which supports policies as depicted by the policy cycle (Figure 2, for a concise discussion of the policy cycle, see, for example, the Millennium Ecosystem Assessment<sup>10</sup>). This policy cycle is a long-standing conceptual framework from textbooks on policy studies. In its simplest version, it clearly originates from management, reflecting a simple quality control loop: problem identification, target setting, strategy and action, monitoring and evaluation, and, finally, correction. Such a policy cycle process should result in an improved situation. In policy studies, different versions have been elaborated, though essentially they all come down to similar representations in which "policy" is conceived as a series of more or less consecutive actions. Common elements are always the recognition of the problem and the development of quantifiable policy targets to solve the problem. Self-evidently, in policy-making this loop is iterated and re-iterated.

This policy cycle (Figure 2) is particularly useful to follow by organisations like SYKE. The policy cycle starts with the identification of a (new) problem, which requires strategy and a set of

10 Chopra, K., R. Leemans, P. Kumar and H. Simons, editors. 2005. *Ecosystems and human well-being: Policy responses*. Island Press, Washington DC. ([www.maweb.org](http://www.maweb.org))

actions possibly including policies to bring about change. Specific policies are then developed and implemented. Implementing policies are the main responsibility of ministries and parliament. They have to define and set quantifiable targets and goals, which is rarely done explicitly. The implementation and effectiveness of a policy need to be monitored and evaluated. This means that appropriate indicators and their measurements have to be developed. This is a task of the research community but indicators must be useful and acceptable to or chosen by policy makers. The evaluation builds upon the agreed strategic goals and targets and will unambiguously establish whether targets are

reached and, if not, what the distance to the targets are, and try to indentify the main causes behind these implementation deficits. If necessary, the strategy has to be adjusted.

SYKE, first of all, intervenes at different points and in different stages of this policy cycle. When doing so, whether deliberately or implicitly, SYKE and the knowledge and expertise it provides, play different roles. Hence at least three empirical and evaluative questions follow:

(1) which of the (ideal-typically) consecutive stages of the policy cycle does SYKE (and its different programmes and divisions) pay (most) attention to or, respectively, invest in; (2) are



Figure 1. The niche of SYKE in the interactive field of different societal, market, research and policy actors

these respective contributions in line with SYKE's strengths and strategic decisions, and (3) do these contributions maximize SYKE's potential role in Finnish environmental policy making. These questions have been addressed by the Panel.

### SYKE's role in the policy cycle

SYKE expert services currently focus on the implementation (together with the regional environmental centres), monitoring and some evaluation (Figure 3). There seems to be too little room for identifying emerging environmental issues within SYKE. This is, for example, illustrated by the remarks that several interviewees made on the

EU biofuel policy target in November 2007. SYKE's expertise on the environmental consequences of biofuels was not sufficient to utilize it effectively in the national preparation stage of the EU biofuel policy target. The trend towards more biofuels as a climate mitigation policy, however, could have been anticipated because IPCC already discussed it in its 2<sup>nd</sup> assessment report<sup>11</sup> and many publications on biofuels have appeared in the scientific literature over the last decade. Addressing emerging issues in a timely manner demands for

11 Watson, R.T., M.C. Zinyowera, R.H. Moss and D.J. Dokken, 1997. The regional impacts of climate change: An assessment of vulnerability. Cambridge University Press, Cambridge. 517 pp.



Figure 2. The general policy cycle.

making expertise available for early signalling, in identifying the very nexus of an issue, and in forecasting its possible and plausible effects and possible responses. Although SYKE managed to improve its capacity and is ready to meet the information needs for many emerging issues, this role should be further strengthened and addressed explicitly in SYKE strategy formulation.

The link between policy evaluation and strategy development is relatively weak within SYKE. The published Finnish state-of-the-environment

reports<sup>12</sup> publish important data on many obvious trends but rarely link them to policy targets, let alone to the mechanisms that explain the distances to targets, and explore how to overcome these gaps. The latter bridges policy evaluation and policy design. Doing so could strengthen SYKE's role as an independent expert service agency of environmental assessments. This could increase the utility nationally (i.e. ministries and parliament) and internationally (e.g. European Environment Agency in Copenhagen).

12 Niemi, J. (Editor), FE26/2006 Environmental Monitoring in Finland 2006-2008. The Finnish Environment 26/2006, Environmental protection, 70 p. ISBN 952-11-2305-2, and www.ymparisto.fi "State of the Environment"

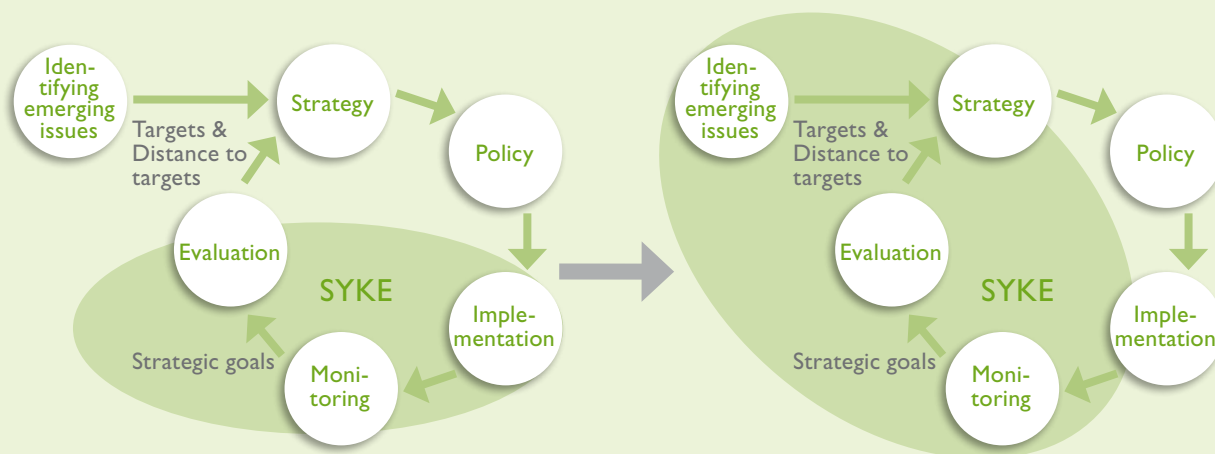


Figure 3. SYKE's current (left) and desirable future (right) role in the policy cycle.

The Panel sees many opportunities for expanding SYKE's role towards more effective identification of emerging issues, assessment of targets and strategy development (see Figure 3 and the discussion below). The research and development programmes could contribute to strengthening this expanded role, especially in developing timely integrated assessment approaches, appropriate indicators and the needed understanding of cause-effect relationships and adequate responses of (emerging) environmental issues.

### Four interrelated challenges

Organization studies provide several conceptual frameworks to reduce an (often complex) organizational setting to a few characteristics. Throughout its work, the Panel distinguished four essential challenges in SYKE's contemporary and future work (Figure 4). First, substance or content challenges refer to (new) themes and issues that SYKE, both in its expert services and research and development programmes, could and should pay more attention to. Combining existing fields of expertise with the required new ones, and providing relevant and integrated knowledge and insights on these challenges, do trigger methodological challenges, mainly refer-

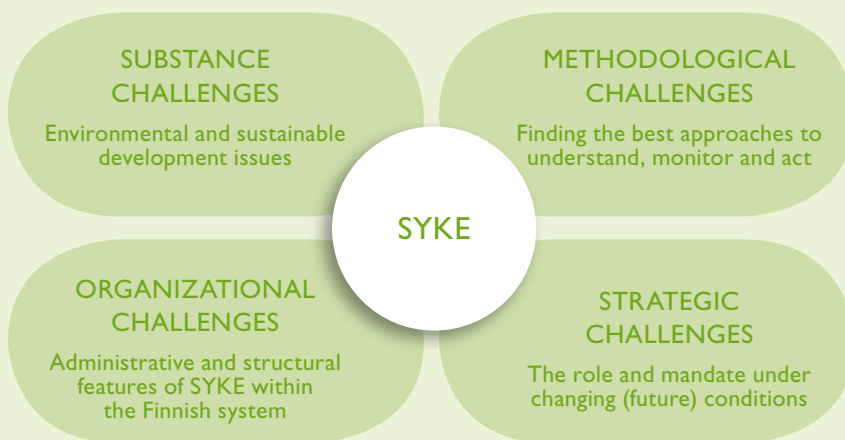


Figure 4. The four challenges that structure this evaluation report.

ring to the combination, integration and presentation of specific content knowledge. Both these substance and methodological challenges, in turn, presuppose some internal changes, labelled here as organizational challenges. Those challenges mainly regard changes in personnel profile, regard new fields of expertise to be further developed, and internal instruments to endorse and reinforce these trends. Fourthly and finally, all of the changes mentioned above largely originate from SYKE's changing environment: new substance challenges onto the Finnish environment (see above), new political and governance challenges (including processes of regionalization), new developments in research (both at universities and with regard to the so-called sectoral research institutes) and the like. The latter have been labelled as strategic challenges.

It is obvious that, though we can analytically distinguish these four challenges, they are closely interlinked, as will be clear from the examples given in the remainder of this report.

### **SYKE at the crossroads of different challenges**

SYKE's role and position is relatively clear in the Finnish research and policy landscape. However, the governmental productivity programme does not allow expanding the number of personnel. Therefore other means of funding research and expert activities need to be found. The already successful participation in projects funded by the EU or the Finnish innovation programme could be increased. Also some of SYKE's expertise and data and information systems could provide innovative products for, for example, physical planning and environmental resource management. The Panel sees several opportunities for SYKE to strengthen its activities. But this implies that SYKE's role and position has to further evolve and that the different research, monitoring and expert services need to be better integrated to create added value.





## 4 Findings of the evaluation

### Substance challenges

Over the last decade SYKE's research and development programmes have focussed on enhanced participation in several EU-DG RTD funded and other international projects. The clear success of this trend is demonstrated by an increasing number of influential articles in scientific journals. Other research projects have focussed more on scientific output as well. All these efforts resulted in an increased number of publications and consequent citations over the years. A straightforward citation analysis with the ISI-based Web of Science (see Appendix 6) shows that there have been 810 published articles in internationally renown journals in the period 1995-2008, with 33, 91, 110, 106 and 112 articles in respectively 1998, 2005, 2006, 2007 and 2008. This indicates a steady increase over the last decade. Only approximately 10% of the articles published before 2008 have never been cited, which is far better than the international average<sup>13</sup>. SYKE's Hirsch-factor has over this period increased to a level of 38,

<sup>13</sup> More than half of all published papers will never be cited.

which is satisfactory over such a relatively short period.

From this analysis, the Panel concludes that SYKE's international scientific impact has largely improved and will probably continue to improve in the near future. The recommendation from the 1998 evaluation for further internationalisation of SYKE's research and development activities has definitely enhanced involvement in international research projects, which included, for example, ATEAM, ENSEMBLES, ALARM, PRUDENCE and ALTER-Net. Participation in these projects has unquestionably furthered the international visibility and scientific credibility of SYKE. It is clear from the citation analysis that these collaborative projects have produced some of the most frequently cited articles by SYKE researchers (Appendix 6).

The number of high-quality publications now seems to stabilize at above 100 ISI-journal papers per year. The Panel, however, has the impression that these publications are not equally distributed across the different programmes and projects. The citation analysis further shows that SYKE's strongest research and development activities are

related to climate change, air pollutant impacts, biogeochemistry, biodiversity and the behavior of chemicals in freshwater and in marine environments. The internationalisation of research and development seem to have been driven by a small group of key senior researchers. Some individuals were much more productive in this respect than others. Large differences are also related to the fact that several programme leaders indicated that they had no explicit publication strategy. The Panel therefore recommends to create additional incentives (in addition to the multidisciplinary ones) to further enhance scientific output of all researchers. Possibilities include to stimulate a shift away from book chapters and symposium proceedings towards journal articles and to define minimum publication criteria, to which each researcher should comply with.

SYKE has excelled in providing many expert and operational services, information on trends from several monitoring networks and research insights to especially MoE and MoAF. These ministries were generally very satisfied with SYKE's performance and impressed with SYKE scientific quality as indicated by the increasing number of publications and citations. They admitted the apparent pressure from the governmental productivity programme to reduce staff and agreed that this is at odds with the required increasing number of expert services. Without a necessary increase in resources, the quality of these services could be at risk in the near future. They also recognized the need for basic and applied research at internationally recognized standards to be able to continue to perform expert

services in a timely manner. The Panel therefore recommends setting priorities for all the expert services, including ending some of them, in order to bring their workload more in balance with the personnel and financial resources.

SYKE's expert services and research and development programmes are separate activities for different ministries and other users. These activities, which include impact and life cycle assessments, data gathering and monitoring and many different analyses and tests of SYKE's accredited laboratory, are all received very well. The interviewees with regional interests mentioned especially their contentment on the provision of spatially explicitly GIS data and the development of new regional applications in managing and minimizing environmental problems through physical planning. This area of research and services could well further develop in a highly profitable area of collaboration with SYKE. The Panel found that the quality of the information that SYKE provides is generally considered very good. In contrast, its societal and policy relevance can be further improved.

In various European countries, environmental research institutes have over time grown into a broader role of strategy formulation, policy advice and scenario development (c.f. Figure 3). This broader function has, at least formally or explicitly, not yet been taken on by SYKE and apparently the relevant MoE or other ministries have not found it opportune to assign such tasks to SYKE. For example, SYKE has the expertise and information to assess the correspondence with or distance between the actual reality and the policy targets on

a regular basis. If SYKE would perform this work, it would provide essential feedback within the policy cycle. The Panel is of the opinion that SYKE's experience and current credibility definitely warrants such a dialogue between SYKE and the responsible ministries on this role. Obviously, steps toward a larger role in policy advice and strategy formulation should be accompanied by additional staff investments because of the increase in work load.

The Panel found that SYKE has shown some foresight in emerging issues like adaptation to climate change and material efficiency. However, other emerging issues have not been signalled by SYKE in a timely fashion. The Panel holds the opinion that SYKE could have played a more important and even a strong integrating role, if more foresight had been exercised. The Panel therefore advises SYKE to pay structural attention to foresight and its signalling functions.

SYKE's role, the costs and personnel involved and, most importantly, SYKE's effectiveness in a number of statutory activities within Finland has been questioned by several interviewees. These activities include SYKE's responsibility for 1) early warning systems, and 2) oil spills emergency responses. Most of them see SYKE as an institute that develops and provides tools for environmental quality control rather than implementing and keeping operational responsibility for "routine" activities. SYKE's routine operational responsibility should be seriously examined. In an alternative model, the systems and tools could be developed and verified by SYKE, while the operational responsibilities could be outsourced to more

suited implementing bodies. The Panel questions the responsibility of SYKE to provide continuous 24/7 operational activities. Although, the Panel sees a strong continued role for SYKE in developing the appropriate tools, their current imbedding within SYKE should be critically reviewed.

Based on SYKE's knowledge and expertise as well as its position in Finland, the users (and particularly those from the industrial sector) expressed a need for SYKE's to be more pro-active in new and emerging environmental issues, for which new innovative and/or improved instruments and tools are needed. They saw an explicit role in the innovation system for SYKE even when this meant that SYKE's expertise base should be broadened. The Panel found that many interviewees have high expectations towards SYKE to extend its natural-science environmental expertise towards environmental economics and environmental technology. Therefore, the Panel believes that SYKE should investigate in what way it would live up to all these expectations; or, if other strategic choices will be made, inform its constituency about the choices made. In this way SYKE could avoid that its customers complain about unfulfilled expectations.

### Methodological challenges

SYKE has further developed and applied many useful tools, such as environmental impact assessment, life cycle analysis, scenario development and geographic information systems. SYKE has provided not only guidance and training to

different clients but also published guidance documents, such as chemical guidelines for industry and characterisation or remediation guides (both in Finnish and English). The value of these activities depends on the timeliness of the information used and on the underlying scientific credibility. The users were very satisfied with the results of these applications and documents. The timeliest applications concerned the implementation of the emissions and climate change scenarios of the Intergovernmental Panel on Climate Change (IPCC) in global, European and Finnish impact assessments<sup>14</sup> and the contribution to the IPCC's assessment reports in 2001 and 2007.

The international assessments have shown that dealing with the current environmental problems does not only require a good understanding of the physical, chemical, technical and ecological dimension of that problem but should also include the socio-economic dimensions thereof. The resulting multi- and inter-disciplinary approaches are not only needed to understand the intricate web of causes and effects but, in addition, strongly contribute to identify and advance solutions. Such an increased emphasis on solutions helps to increase the innovative character of SYKE's research but it

can only be successful when it is simultaneously also accepted by most stakeholders.

Up to now, SYKE's expertise is strongly dominated by disciplines like chemistry, ecology and water sciences. This is partly due to historic reasons. This approach is excellent for understanding major parts of most environmental sustainability issues but, however, too narrow to cope with the more sustainability the issues, which more strongly involve society. The Panel recommends that expertise on social sciences, economics and engineering could be further enhanced within SYKE and through closer collaborations with other sectoral research institutes (e.g. the Government Research Institute for Economic Research and the Technical Research Centre of Finland), international and national universities and industry. To facilitate such interdisciplinary collaboration, SYKE should have a basic level of in-house socio-economic expertise<sup>15</sup> to enable effective communication of problems, perspectives and approaches between collaborators and partners.

The Panel notes that especially the applications pursuing the extensive spatial GIS databases and other information systems are under utilized in SYKE's research and other collaborative efforts. These data and tools provide an excellent opportunity to develop innovative regional applications for, for example, physical planning and nature conservation. The development of these applications can possibly be funded by Tekes and/or

14 See for example: Carter, T.R., S. Fronek and I. Bärlund, 2004. FINSKEN: a framework for developing consistent global change scenarios for Finland in the 21st century. *Boreal Environment Research* 2: 91-108; and Ruosteenoja, K., T.M. Carter, K. Jylhä and H. Tuomenvirta, 2003. Future climate in world regions: an intercomparison of model-based projections for the new IPCC emission scenarios. *International Cooperation Report 644*, July 2003, The Finnish Environment Institute, Helsinki. 83 pp.

15 The Panel believes that hiring a young scientist trained in ecological-economics from the London School of Economics, as intended by the Director General, is a good start.

SITRA based on competitive proposals from SYKE and its partners in the private sector and in other sectoral research institutes.

SYKE still has a major challenge ahead. Many interviewees expressed their intuitive feeling that SYKE's experts and researchers were too often strong environmental advocates for the environmentalists' case, while they expected a more objective and distanced science-based attitude in implementing statutory tasks, conducting research and development, providing expert services and managing monitoring networks. On the long term, SYKE's scientific quality should objectively be judged on the basis of increasing citations of the relevant scientific and societal results. On the short term it must be reviewed on publications in the most appropriate international scientific journals (which is largely depending on audience and is not per definition synonymous with a high impact factor) on the one hand, and on the societal and political relevance and impact of its work on the other.

The Panel concludes that there is much to gain for a proper communication strategy to enhance the external perception of SYKE. This perception should be based on the scientific quality of SYKE's research and development programmes, monitoring networks, expert services and environmental assessments. Not only does SYKE carry out different tasks (some of which are not self-evidently compatible) but SYKE and the knowledge it provides do play different roles in the different stages of the policy cycle. This should be clearly communicated. In addition, while doing so, SYKE

tries to respond to the divergent knowledge needs of different target groups and audiences. The Panel recommends that the Communication Unit must take a more active role in providing press releases and website coverage of, for example, important new and relevant research publications, and outcomes of major environmental assessments and trend analyses. The Communication Unit should also actively monitor the societal impact. This will enhance the visibility and scientific credibility of SYKE.

Another important way to improve SYKE's external perception is to further develop the integrated assessment capacity. Integrated assessment (IA) is a process that combines, interprets and communicates knowledge from different scientific disciplines in such a way that the whole cause-effect chain of a problem is comprehensively appraised. The insights generated by IAs could inform decision makers and assist decision making in several sections of the policy cycle. IA thus comprises the analysis and review of scientific information for the explicit purpose of facilitating possible actions. In this context, IA means assembling, summarizing, organizing, interpreting, and possibly reconciling pieces of existing knowledge, and communicating them so that they are relevant and helpful to an intelligent but inexpert decision maker. Providing such a synoptic view requires new analytical tools and procedures to integrate a wide range of disciplinary knowledge. Over the last decades these tools have been matured and are nowadays frequently applied.

IA envisages to bridge between science and policy in order to develop adequate solutions. IA is therefore also an excellent tool to assess the progress towards policy targets. This not only requires input from researchers but also an active and continuous dialogue with different stakeholders (including decision makers) to inform the researchers about the societal needs. IA also provides the decision makers with the most up-to-date scientific insights. IA therefore has been linked to participatory dialogues to enhance the societal

relevance<sup>16</sup>. SYKE's researchers already have some experiences with these approaches but the Panel recommends that participatory integrated assessments (PIA) would be further developed in SYKE in order to improve the science-society-policy interaction. SYKE could create different dialogue approaches with stakeholders. The Panel believes that this will help SYKE's researchers to improve the articulation of their scientific questions, while increasing the societal relevance. At the same time, it believes PIAs do not jeopardize scientific quality

<sup>16</sup> See, for example, McNie, E.C., 2007. Reconciling the supply of scientific information with user demands: an analysis of the problem and review of the literature. *Environmental Science & Policy* 10: 17-38.

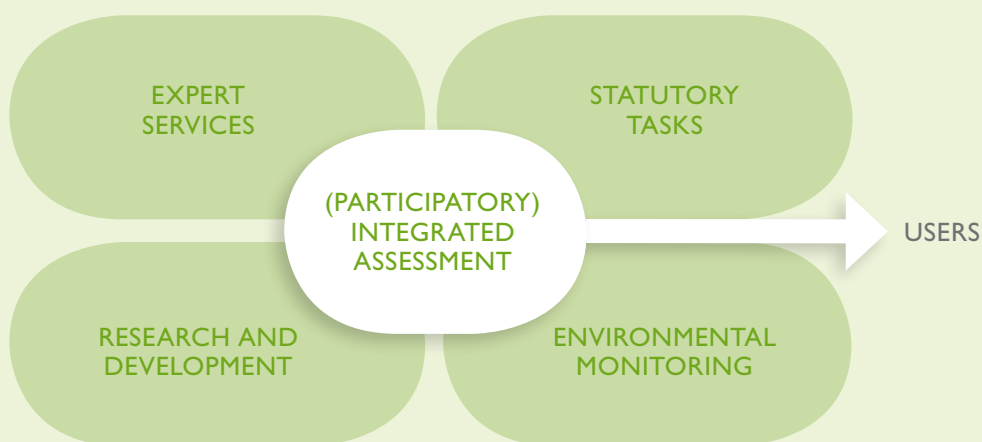


Figure 5. The desired integrating approach between the four different components of SYKE with the policy community and other users.

as is frequently suggested. This is clearly shown by the stakeholder dialogue in the ATEAM project, which involved several SYKE researchers and which was published in *Science*<sup>17</sup>.

Currently, the main components of SYKE's activities are providing expert services, conducting research and development programmes, implementation of statutory tasks and managing environmental monitoring networks. These activities were presented to the Panel in their contextual relationship. The research and development programmes were seen as an essential integrating component. The Panel is of the opinion that, although research provides essential insights and information to all other SYKE's activities, it is not an effective integrating and synthesizing activity. Because, like the other activities, it has its own development cycle (e.g. problem identification, tool selection, experimentation, conclusion), which is comparable to the policy cycle but not always with similar dynamics.

The largely different dynamics between all these cycles make harmonization between research activities, expert services, monitoring and policy evaluation, and communication towards all stakeholders and the broader public extremely difficult. The panel is of the opinion that the (participatory) IA could well play the required strong integrating role (Figure 5) in connecting SYKE's major activities and tasks with the decision makers and other user communities. The identification of users and stakeholders to set up PIAs should, however, be

done carefully and repeated regularly in order to increase the timeliness of the assessments and to articulate more precisely the needs of end users.

### Organizational challenges

#### Conclusion about the organization

SYKE's research and development programmes, statutory tasks, environmental monitoring and expert services are all highly appreciated by the ministries, collaborators and other users. Strategic collaborative alliances have been formed to improve these activities. Internationally, the PEER network of European environmental research institutes provides an excellent platform to communicate with the European Environment Agency (EEA) and the European Commission. SYKE's proactive involvement is highly appreciated by the other partner institutes. The ALTER-net research network has developed a strong research, training and assessment network on biodiversity and nature conservation. The success of this network is also due to SYKE's active role.

SYKE's role and functioning with regard to the regional environmental centres is strong. SYKE provides the expertise and develops the scientific approaches to deal with the regional environmental problems. In this context water and chemicals related problems are still emphasized, while some interviewees desired a broader spectrum of collaboration. Currently, the users in regional centres and in particular the industrial sector, highly appreciate provision of the high quality assistance in numerous environmental issues, particularly in

<sup>17</sup> Schröter, D et al., 2005. Ecosystem service supply and vulnerability to global change in Europe. *Science* 310: 1333-1337.

integrated impact assessments, life cycle analysis and support in issues of strategic importance for which a critical mass of experts and expertise is needed.

Additionally, the links to the other sectoral research institutes were judged to be instrumental to understand climate change (close collaboration with, for example, the Finnish Meteorological Institute) and biodiversity and natural resources (collaborations with the Finnish Forest Research Institute, the Finnish Game and Fisheries Institute and the Agrifood Research Finland). The collaboration with the universities through regional SYKE offices with shared professorships and PhD-students is successful for both parties and has led to an increase in successful defences of PhD-theses by SYKE's research staff. These regional research centres, however, are relatively small and lack a critical research mass. The emphasis on only few research topics that are well embedded in the respective university, however, create ample opportunities for synergy, even with only few SYKE regional employees.

SYKE has been involved in many development cooperation projects outside Europe providing support to national and regional environmental and water administrations. Projects are currently ongoing e.g. in South Africa, Georgia, Nepal, Mekong region and in the Mediterranean region. These projects apply SYKE's expertise, models and approaches to different conditions. This could well strengthen the science. Currently these international development projects are coordinated by the Director's Office because tendering and service

contract management requires special expertise. These development projects rely on the expertise in the Research and Expert Services Departments, the Data and Information Centre, the Laboratory and sometimes also the regional environmental centers. This organizational feature creates some confusion among clients and (possible) target groups. The panel advises that these development projects could well be managed by the Research Department or the Expert Services Department depending on the content of the project. This will also strengthen their scientific embedding and international relevance, and improves the linkages with staff in all departments.

SYKE is strongly appreciated as a national and international collaborator. So far SYKE meets the expectations of all international collaborators that were interviewed. Some respondents, however, expressed concern as in some cases experts with short-term contracts have not been replaced by appropriate expertise. Moreover expertise available at SYKE for a very long time, particularly in water science in general, may not be available in the future due to the retirement of key experts and lack of appropriate planning and possibilities (e.g. because of the governmental productivity programme) for their replacement. These collaborations, however, currently strongly depend on limited research topics and expert services.

Additionally, not all needed disciplinary expertise is currently available in SYKE. Many interviewees mentioned that the focus of SYKE was too often towards the natural science aspects of environmental and resource problems, while the



socio-economic expertise was considered to be weak. The Panel therefore recommends that more emphasis should be directed towards further developing the socio-economic expertise. This could help, for example, to address the emerging topics of the valuation of ecosystem services and to give advice of the impacts of consumption through different ecological footprint approaches. The Panel suggests that there should be relatively large investments in these new areas of competence (such as resource economics, ecological economics and social and political sciences). Having this expertise will also enhance the collaboration with especially the Government Institute for Economic Research and with the other sectoral research institutes and the private sector, and will provide additional and essential information to MoE and MoAF.

Further and expanded collaboration and broadening the expertise was discussed with the department heads and the programme and division leaders. They fully acknowledged the importance of the issue but also warned that it could be difficult because of the limited possibilities to hire new experts and the rigidity of the institutional structure. They stated that most of the staff were involved in long-term projects and could not take up new responsibilities very flexibly. According to the Panel, it increases vulnerability

when individuals are linked inflexibly to specific tasks and activities. This organizational feature also constraints personal development and expertise. The Panel therefore recommends that SYKE's management should discuss how to create a more flexible workforce and to enhance the reliability of SYKE's products by creating backups for essential experts and expertise.

Top priorities should be to strengthen SYKE's role and increase SYKE's resilience and readiness for future policy changes. The Panel therefore recommends that multi- and interdisciplinary research projects (including those that bridge to disciplinary experts in other sectoral research institutes) would be further endorsed and reinforced with strategic money, with personnel policy and with rewards for exemplary programme or projects.

Further to meeting of stakeholders' needs, many of the interviewees expressed their wish that SYKE should become more dynamic to respond to the new emerging environmental challenges and opportunities to collaborate. The current motivation of SYKE expert and project teams to collaborate (for which annual selection procedures exist) should be further encouraged. For example, adding additional incentives, such as awards for the most excellent and innovative collaborations, should stimulate interdepartmental collaboration and external collaboration.

### **Organizational challenges on governance and on the advisory board**

The Panel also evaluated the organisational structure of SYKE (Figure 6). SYKE's governance structure includes the Director General, who is assisted by the Advisory Board. The exact role of this Board is not only unclear to the Panel but also to many of the interviewees. Currently the Advisory Board contains members from two ministries, three universities, two other sectoral institutes, two companies, one regional centre and one city, and two representatives from SYKE's staff (Appendix 4).

The Panel advises that SYKE and MoE thoroughly reconsider the role of the Advisory Board. The Advisory Board should play a more prominent advisory role in strategy discussions and formulation, scientific quality review and stakeholder involvement. Depending on the tasks assigned to the Advisory Board, its membership should be adapted and international participation could be considered. The Panel also advises to appoint an independent chair, who underlines SYKE's interests. In general, the Advisory Board members should act as real ambassadors for SYKE while actively guiding the Institute in its strategy formulation and customer orientation.

The Director General and the Director's Office have a supportive role in managing, facilitating and stimulating the four different departments of SYKE (Figure 6) and provide the operational resources to develop and enhance a creative and innovative atmosphere in which research and development programmes, the expert services, the statutory tasks and the environmental monitoring thrive.

There are several opportunities for SYKE's leadership to comply with the productivity programme that is initiated by the Finnish government. This requires, however, that clear priorities are defined and implemented. The Panel judges that an ad-hoc or opportunistic execution of the programme is undesirable. The Director General should strongly argue with the responsible ministries to keep the externally funded staff outside the objectives of the productivity programme because this creates a perverse incentive that decreases the desire to search external funding. The Panel finds such incentives not acceptable.

The work-floor consists of the Laboratory, the Research Department (with four regional offices), the Expert Services Department and the Data and Information Centre.

SYKE's laboratory has been accredited to environmental testing methods by the Finnish accreditation body and comply with internationally accepted ISO standards. The Laboratory provides many services to SYKE research projects and expert services and to the regional environmental centres. In addition, it provides several reference laboratory services such as interlaboratory comparisons and method standardization to both public and private sector. The laboratory has also a very important role as the Environmental Reference Laboratory. In this role it has a lot of clients, such as other Finnish laboratories, research institutes, universities, consultants and industry. The Panel recommends investigating the possibilities to deliver and expand these laboratory services on a full-cost basis.

THE 2008 EVALUATION OF SYKE FINDINGS OF THE EVALUATION

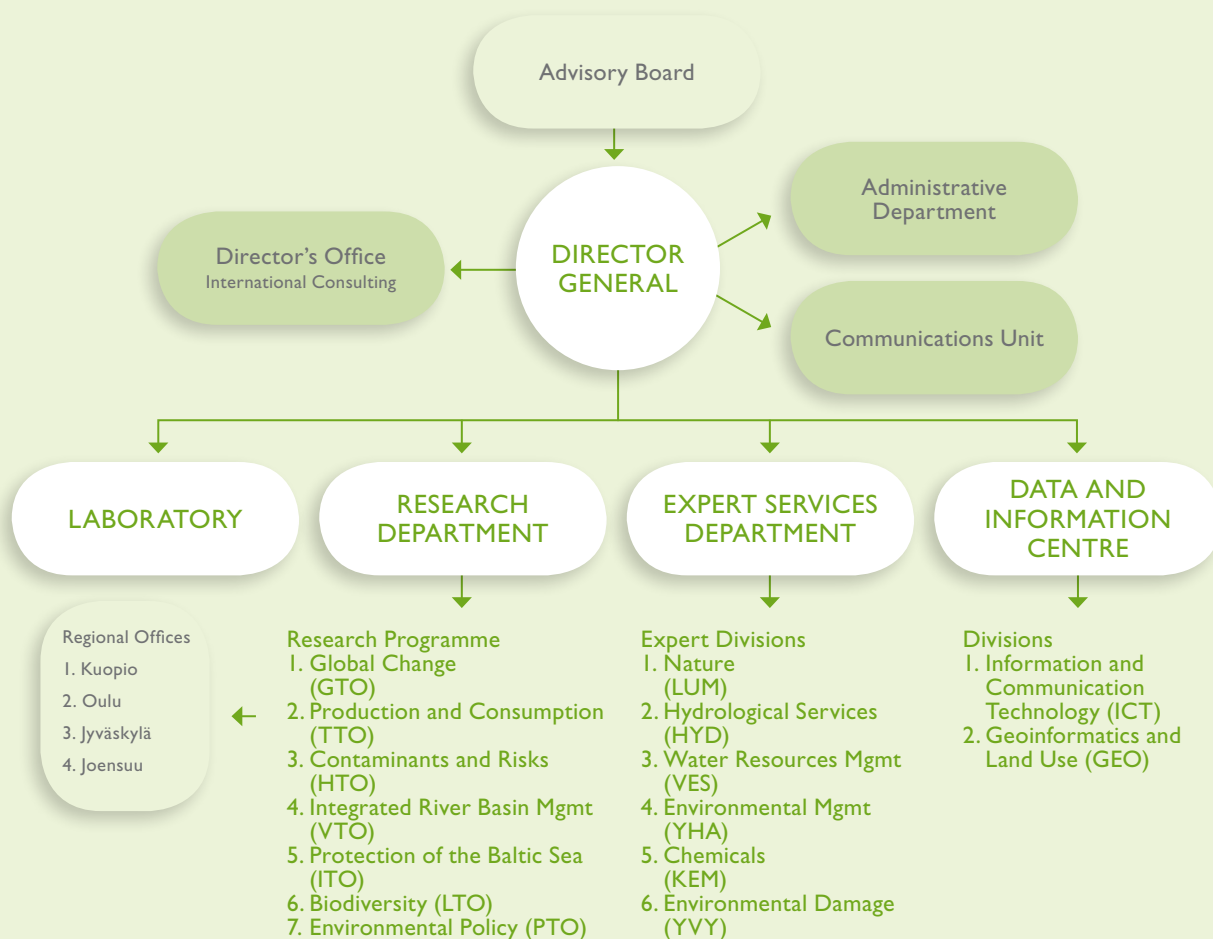


Figure 6. The organisational structure of SYKE in 2008.

The Data and Information Centre has over the last decade created an immense added value by collecting and incorporating Finnish environmental and biodiversity data in comprehensive geographic information systems (GIS). This could become an enormously beneficial resource when linked with additional remote sensing data from satellites, monitoring networks and models. It could not only inform in a timely (and interactive) manner the participatory integrated assessments but also provide additional tools for new dedicated applications with the other sectoral research institutes and the private sector. These databases and GIS applications together with SYKE's expertise to use and analyse it, could become a major source for ample new innovative projects, potentially funded through the foundations Tekes and SITRA. If possible, such applications could even provide a profit to SYKE.

The management structure of SYKE is clear and shows a hierarchy of responsibilities. However, the institute also has developed a matrix structure of programmes and divisions with clear management responsibilities and projects, which are led by individual researchers or experts without clear management responsibilities, and which often cut across programmes and divisions. An annual proposal and selection procedure for funding and initiating these projects has been implemented with relatively clear responsibilities for the programme/division leaders, department heads and director general. These projects provide the opportunity for enhancing the interdisciplinarity of the research and expert services and for increasing their societal

relevance. It remains, however, unclear to the Panel which factors influence the selection and which factors determine the success of these projects. The Panel recommends that the role of the projects as a tool to increase interdisciplinarity, to expand towards the needed socio-economic expertise and to enhance (participatory) integrated assessments, is further evaluated and considered.

In the interviews with the Panel, most partners and collaborators of SYKE emphasized the need for more flexible operations of SYKE to meet all different needs and requests. Many interviewees regarded SYKE's current organisation, in which expert services on the one hand and research and development on the other, are separated as an obstacle to the flexibility and potential dynamics of the institute. Several of them indicated that the expert services and the research and development departments should be more integrated.

These two departments with their specific tasks were established after the 1998 evaluation. At that time, this was appropriate to boost the quality and international recognition of the research done by the Research Department. These goals have largely been accomplished (see above and Appendix 6). The split between the departments, nowadays, is regarded as less effective by division heads and programme heads. The leaders of the expert services divisions especially feel the tightening financial and personnel resources, while the leaders of the research programme feel that they have relatively more opportunities to successfully apply for external funding. Under these current conditions, it seems as if the gaps between the two depart-

ments is widening. This will have consequences for essential collaborations and the necessary flow of information between researchers and experts. Expert services should rely on the latest reliable information from research and from monitoring networks.

Although, in several projects close collaborations and links between the Research Department and the Expert Services Department already exist, the current situation is far from perfect. The Panel therefore recommends SYKE's management and Advisory Board to discuss the advantages and disadvantages of keeping these two departments separate and make a strategic decision on reducing or removing the obvious barriers between research and expert services. Such reduction could increase the flexibility of SYKE in responding to current and future user needs.

The international consulting group within the Directors' Office negotiates and coordinates the environmental expertise from the different departments. It is kept separate from the departments to have a single focus office for international consultancy type expert services and research projects, and to stress its neutral role in negotiations with all the departments. The final imbedding of the international development projects, however, could also be moved closer to the Research and Expert Services Departments to provide a stronger link with other projects and activities.

Finally, the Communication Unit has an important role to play in the communication and dissemination of SYKE's result and products to national and international audiences. The Panel recom-

mends to further investing in communication about SYKE's different activities and roles. This will enhance the transparency, salience and credibility of SYKE's activities.

### Strategic challenges

Both from the guiding questions (see p. 17) and from the interviews with people inside and outside SYKE, it has become clear to the Panel that the national innovation strategy and other ongoing reforms will induce a significant change in the Finnish research and development landscape. It is fair to say, however, that the Panel had difficulty to get an appropriate understanding of the practical meaning of the future implications of these changes for SYKE, partly because the national innovation strategy and related innovation programmes involve strong partnerships with partners from the private sector. But even the politicians and higher civil servants, whom we interviewed, still echoed major uncertainties about the topical, organizational and budgetary implications of the innovation strategy.

Given these uncertainties, SYKE's strategy to contribute to the innovation system has remained implicit so far. Even as the actual meaning of the innovation strategy and its adjacent changes remain uncertain, and even given this uncertainty, it is important to explicitly develop a pro-active SYKE innovation strategy (together with SYKE's leading researchers and experts, the Department heads and the Advisory Board) and to communicate about it both internally and externally to

adjacent research institutes, ministries and private organizations. This strategy should include ways to enhance participation in the programmes of the Finnish innovation system. The directors of the programmes coordinated by Tekes and SITRA clearly indicated that SYKE has ample more possibilities than those that the institute currently exploits, to develop successful proposals and increase the funding from these programmes. The Panel also believes that SYKE's expertise in environmental assessment and the availability of state-of-the-art environmental databases and GIS at SYKE could, for example, generate innovative opportunities in advanced physical planning and environmental management.

Current discussions in Finland about the future structure of scientific research, including the discussions about the position of the sectoral research institutes, rather create than reduce opportunities for SYKE. The Panel noticed that, although several innovative proposals were successfully granted, so far SYKE has been rather observing these processes from a distance rather than taking an active role. The Panel advises that the Institute uses its strong environmental and resource position in Finland to play an active role in the discussions leading to successful innovation projects. In order to do so, it is important that SYKE develops a strategy that further positions the Institute in the national and international environment and that also identifies the most appropriate partners.

As already has been explained in the methodology section, participatory integrated assessment approaches can facilitate a dialogue between SYKE

researchers and stakeholders of their research. These approaches can help to articulate the relevant questions and identify the most important partners. Strengthening the science-society-policy interaction by developing such a future-oriented integrated assessment in order to enhance the adequacy, relevance, timeliness and utilisation of SYKE's knowledge and information, could be one of the main motives to put these assessment approaches central to the future strategy of SYKE.

SYKE's work, self-evidently, also covers different geographical scales from local to global. Next to that, SYKE's work also addresses agencies, public authorities as well as the private sector, at different levels of governance. As the substantial priorities, the interactions with partners and the funding potentials differ over these three distinguishable levels, the question arises whether and how SYKE addresses a fair share of attention to each of these levels. None of the outside SYKE interviewees disputed the actual current balance and equity of SYKE's coverage of and attention to these different levels.

In general, the Panel was pleased seeing SYKE's activities highly appreciated by almost all outside interviewees. In addition, the institute as a whole has a largely shared good reputation for both the quality of its work and its networking. This notwithstanding, the Panel also observes some obscurity and confusion among actual and potential Finnish agencies on SYKE's role and position either in the political, the research and the consultancy realms. Some interviewees question SYKE's boundary

role between policy making and research, others have difficulty in clearly understanding the relation between SYKE's research and its consultancy services, etc.

Many people echoed the fact that, despite the well appreciated efforts of the communication unit on substantial matters, SYKE has not been sufficiently clear on its own role and position in the Finnish environmental research and policy landscape. The latter is illustrated by the fact that some interviewees take SYKE as part of the Ministry of the Environment; some stressed the role of SYKE as an objective and independent research organisation, while others regarded SYKE as an "environmentalist" knowledge provider. The Panel recommends SYKE to start to invest in a clear communication plan of SYKE's own position, including the double or even threefold roles that it actually plays. Such a plan would further enhance SYKE's societal and political visibility and scientific reputation. The Panel believes, however, that this communication plan should be preceded by a transparent debate, both internally and with SYKE's most important partners, about a deliberate innovation strategy.

To the Panel this future strategy, in line with what has been mentioned and pointed at in the above, should address a gross list and, consequently, a clear prioritization of the substance areas SYKE has addressed so far and has to address in the near future. The Panel advises to consider hitherto somewhat under-addressed issues, such as climate change adaptation and mitigation strategies, in order to actively widen the scope of these research fields. In terms of expert services,

it includes clear decisions and priorities on what services to be delivered and which to be stopped – as they either are insufficiently backed by research, are not cost-effective or are easily to be taken over by other agencies in the Finnish environmental landscape.

SYKE's co-operation with Finnish universities, at both national and regional level and with universities abroad should systematically increase. This strengthened co-operation should allow SYKE to (a) assure its scientific quality standards in the domains already covered, (b) to widen its research to new areas and with new disciplinary perspectives (see above on environmental economics and social sciences of the environment as the Panel suggests). This cooperation, therefore, could be elaborated in a series of forms: joint research projects and applications, in joint PhD-projects, in internships (especially also for foreign researchers) and in participation of SYKE-personnel in university education programmes (providing topical contributions, guest lectures, empirical cases, etc.). In return universities could take care of some in-house training for SYKE personnel on new topics and areas, on European and global developments in environmental research and politics etc.

The cooperation with Finnish universities and other sectoral research institutes could be further developed to become an even more competitive partner in applications for research grants. Especially those proposals that aim to link SYKE with national programmes of Centres of Excellence in research and the Centres of Strategic Centres in Science, Technology and Innovations (SHOK) are

essential. In order to have access to the funds of the European Commission's Research and Development Programme, SYKE could actively search for partners in the EU. SYKE could strengthen its research capacity by inviting foreign researchers to work at SYKE. The funds for such exchange could be found in, for example, the Marie Curie Programme. Working together with Finnish universities provides the universities with highly professional supervisors of PhD students and post-docs and in turn SYKE can expand and raise academic credibility of its research teams.

Finally, the proposed formation of an Environment and Natural Resources Consortium can become a major player in natural resource research

and management both nationally and internationally. A similar consortium called Stockholm Resilience Centre<sup>18</sup> was established in the campus of the Stockholm University in 2007 and is already strongly recognized internationally. Experiences abroad with collaborative centres that depend on virtual bonds and are not co-located at one physical location, have a high likelihood to fail. The proposed move of this consortium to the Viikki campus of Helsinki University is highly recommended by the Panel.

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18 <http://www.stockholmresilience.org/2.aeea46911a3127427980003200.html>



## Appendix I. Bio-sketches of the Evaluation Panel

### **Prof. Dr. Rik Leemans**

Prof. Dr. Rik Leemans heads the Environmental Systems Analysis group ([www.esa.wur.nl](http://www.esa.wur.nl)) of Wageningen University (Wageningen, The Netherlands), directs the WIMEK graduate school and chairs the Earth System Science Partnership ([www.essp.org](http://www.essp.org)). He further contributes to several (inter)national committees concerned with various aspects of global change. He currently leads several multidisciplinary projects to develop integrated assessment models for global biodiversity and local/regional ecosystem vulnerability. He was involved in all assessments of the Intergovernmental Panel on Climate Change (IPCC) and co-chaired the Response Option Working group of the Millennium Ecosystem Assessment.

His early studies at Uppsala University (Sweden) emphasised the successional dynamics and structure of boreal forests. His subsequent research position at the International Institute of Applied System Analyses (IIASA, Austria) focussed on boreal forest models. During the nineties, he was a senior scientist of the Dutch National Institute of Public Health and the Environment (RIVM), where he led the development of integrated assessment model, IMAGE-2. His main research interests concern biodiversity, vegetation structure and dynamics, land-use and cover change, biogeochemical cycles, ecosystem services and sustainable development.

### **Dr. Leen Hordijk**

Prof. Dr. Leen Hordijk is currently Director of the Institute for Environment and Sustainability of the European Commission's Joint Research Center in Ispra, Italy. Prior to this post he served for six years as Director of the International Institute for Applied Systems Analysis (IIASA), in Laxenburg, Austria, while on leave from his position as professor of Environmental Systems Analysis at Wageningen University in the Netherlands. Leen Hordijk pioneered the development of methods for linking environmental science and economics for integrated assessments of air pollution problems in Europe. His approaches are recognized as among the most effective ever developed for linking science and policy in international environmental affairs. He was Chairman of the Division of the Social Sciences of the Netherlands Organization for Scientific Research (NWO) and of the Netherlands National Research Program on Climate Change and Global Air Pollution (NOP).

**Dr. Milena Horvat**

Prof. Dr. Milena Horvat has been Head of the Department of Environmental Sciences of the Jožef Stefan Institute (JSI) in Ljubljana, Slovenia. She has also been the Head of the Ecotechnology programme at the International Postgraduate School Jožef Stefan in Ljubljana, Slovenia and the coordinator of the Center of Excellence for Environmental Technology (CEET) supported by the EU Structural Fund (nominated for the EU Regional Award in 2008). Her previous employment included coordination of international projects related to marine pollution studies at the International Atomic Energy Agency, March 1992-December 1996. She has published over 120 papers and 10 monographs mainly related to trace metal research in the environment and human health. In 2002 she received an award Ambassador of Science of the R Slovenia for her international scientific achievements.

**Prof. Dr. Thomas B Johansson**

Prof. Dr. Thomas B Johansson is Director of the International Institute for Industrial Environmental Economics at Lund University ([www.iiee.lu.se](http://www.iiee.lu.se); Lund, Sweden). Prof. Johansson's research is on energy for sustainable development, starting with the demands for change on energy systems derived from social, economic, climate, environmental, and security concerns. This is followed by analysis of technology and resource options to build energy systems that address the concerns quantitatively, and policies for implementation of such systems. He received the Volvo Environment Prize 2000.

He was Director of the UNDP Energy and Atmosphere Programme 1994-2001, and is currently Co-Chair of the Global Energy Assessment ([www.globalenergyassessment.org](http://www.globalenergyassessment.org)).

**Prof. Dr. Pieter Leroy**

Prof. Dr. Pieter Leroy is full professor of Political Sciences of the Environment at Radboud University (Nijmegen, the Netherlands). He graduated in sociology at the Catholic University Leuven, Belgium (1976), and obtained the doctors degree in social and political sciences at Antwerp University, Belgium (1983).

At Nijmegen University he is responsible for the academic master programme in Social and Political Sciences of the Environment (SPSE). His recent research focuses on the emergence and functioning of new policy arrangements in the environmental domain, in a context of more encompassing political changes. The former include either decision making or implementation practices, the latter refer to multi actor and multi level governance, and to new interrelations between state, market and civil society. Apart from certain policy domains such as waste management, water policies, nature conservation and others, his research focuses on topics such as public participation, the role of environmental knowledge in decision-making, the science-policy interface and (participatory) environmental policy evaluation. Recent PhD's mainly focused on comparative policy analysis in EU-countries in areas such as land use planning, nature conservation, water management, airport noise pollution etc.

Pieter Leroy has a long lasting experience with environmental reporting in Belgium, the Netherlands and France, be it as a researcher, a consultant or a member of advisory or scientific boards. He recently co-authored – with Ann Crabbé – *The Handbook of Environmental Policy Evaluation*, Earthscan, London, 2008.

**Ms. Kaja Peterson**

Kaja Peterson has been working at the Stockholm Environment Institute Tallinn centre since 1993, first as a researcher, and since 1998 as a programme director of Sustainability Studies Programme of the institute. She has graduated from the Tartu University, Estonia, as a biologist-ecologist and from the Manchester University, UK in Environmental Science. Her main fields of study are environmental policy, environmental governance and environmental management tools. She has taken special interest in environmental assessment tools, such as EIA and SEA, and sustainability indicators. She has also addressed the issues of nature conservation policy and management at national level. She was leading the team of experts to analyze the nature conservation administration in Estonia. She has published research articles on these issues. K. Peterson has been coordinating research teams in several projects of the EU 6th Framework Programme. She has also be part of International teams of experts to review the environmental performance of Lithuania, and implementation of Convention on Biological Diversity in Kyrgyzstan, Kazakhstan and Lithuania. She is the member of several governmental commissions, such as on Sustain-able Development, the Monitoring Commission of the Rural Development and others. K. Peterson is a member of the Estonian Ornithological Society and a founding member of the Tallinn Bird Club.

## Appendix 2. List of background material

- SYKE, 2008. Evaluation of the Finnish Environment Institute (SYKE). Background material for the Evaluation Panel, November 2008, Helsinki. 67 pp.
- Annex 1. Futures for FEI, International Evaluation of the Finnish Environment Institute, 1998. Summary
- Annex 2. SYKE's operating and financial plan for 2009-2012
- Annex 3. FinnSight 2015 - Science and Technology in Finland in the 2010s
- Annex 4. The Sectoral Research Review of a one-man committee. Advisory Board for Sectoral Research. 2008
- Annex 5. Research in Finland 2007
- Annex 6. Division of person-years
- Annex 7. Additional information about the laboratory
- Annex 8. Service agreement SYKE-Ministry of the Environment
- Annex 9. Service Agreement SYKE-Ministry of the Agriculture and Forestry
- Annex 10. SYKE's annual report 2007
- Annex 11. Selected projects
- Annex 12. Selected publications
- Annex 13. The abstracts of the doctoral theses
- Annex 14. Statutory tasks and examples of expert services' indicators
- Annex 15. The role of SYKE in environmental monitoring
- Annex 16. The role of SYKE in environmental reporting
- Annex 17. Networks, international organisations and processes
- Annex 18. The statistics of the personnel at SYKE for the past five years
- Annex 19. Environmental information systems and databases
- Annex 20. Results of the self-assessment per programme/division:  
Annex 20a. Distributed only for the panellists  
Annex 20b. Self-assessment questions attached to this document
- Annex 21. The quality of services to the regional environmental centres
- Annex 22. A list of relevant national thematic evaluations
- Annex 23. Finland's natural resources and the environment (2006)
- Annex 24. Sustainable development indicator's (2007)
- Annex 25. Facts on Finland's environmental administration (2008)
- Annex 26. SYKE's brochures:

	Annex 26a.	SYKE in a nutshell
	Annex 26b.	Research at the Finnish Environment Institute
	Annex 26c.	SYKE's expert services
	Annex 26d.	Geoinformatics and land-use division
	Annex 26e.	SYKE's Laboratory
	Annex 26f.	SYKE's Information Service
Annex 27.		Refereed articles in scientific periodicals 2004-2007

#### List of brochures and transparencies

- PEER brochures
- Finnish Environment Institute -brochure 2007.
- Changes in our contacts -brochure 2007.
- Theme indicators 2004-2006.
- What is Eco-Benchmark and how it was developed? 2006.
- Water quality of lakes, rivers and sea areas in Finland in 2000-2003. 2005.
- CORINE Land Cover 2000. 2005.
- SYKE's information service. 2005.
- SYKE's Expert Services 2004.
- The Finnish Environment Institute
- Annual report 2003
- Making it happen - Best practices from Finland
- Ministry of the Environment, Finnish Environment Institute, 2004.
- The Baltic Sea transparencies (Helsinki: Finnish Environment Institute, 2004)
- The State of the Baltic Sea.
- Marine life, environmental problems and conservation (Helsinki: Ministry of the Environment, Finnish Environment Institute and Finnish Institute of Marine Research.)
- Oil and chemical spill response in Finland 2004.
- Seatrack Web 2.0 – a web based oil drift forecasting system for emergency purposes 2004.
- ECOREG :The eco-efficiency of regions – case Kymenlaakso 2003.
- Everyman's right in Finland
- SYKE's laboratory 2003/2008.
- Geoinformatics and Land Use Division 2003.
- Material Use Efficiency –transparencies.

### Appendix 3. Template questions for interviews

1. What is your and your organisation's connection to SYKE? Could you please provide a short overview of your collaboration with SYKE in the past?

**The relevance of SYKE's activities as a basis for Finnish and international environmental policy. This includes an evaluation of SYKE's application of scientific results in the institute's expert services and also the balance between day-to-day activities and long-term research and development.**

2. In your view, what are the main environmental policy issues SYKE has been working with and where SYKE has had an impact?
3. In your opinion, has SYKE been prioritizing the right issues in its activities?
4. How well are you aware of SYKE's expert services and research activities?
5. Do you think that the balance between expert services and research activities is good in SYKE?
6. What do you consider to be SYKE's main strengths in providing expertise for environmental policy making?
7. What do you consider to be SYKE's main weaknesses in providing expertise for environmental policy making?

**The extent, quality, and balance of SYKE's activities in national and international context, as well as its national and international position and impact. This includes an evaluation of possible professional or quality-related strengths, weaknesses, or deficiencies in the activities.**

8. In your opinion, how have the international activities of SYKE developed during the last 10 years?
9. Do you think that presently there is a good balance at SYKE between regional, national and international activities?
10. What are your thoughts of SYKE's capability to keep the balance between different dimensions (e.g., international and national activities, and other various expectations)?

**The renewal and development ability and intellectual agility of SYKE, including how the institute is prepared to meet future challenges; its ability to innovate and change practices and think laterally about problems, and to come up with new and innovative solutions. This includes management and development of human resources and competence.**

11. Do you consider SYKE's strategic future oriented activities sufficient?
12. What do you consider to be SYKE's main strengths in relation to the institute's ability to innovate and renew itself?
13. What do you consider to be SYKE's main weaknesses in relation to the institute's ability to innovate and renew itself?
14. The role of SYKE in the Finnish innovation system and SYKE's national and international collaboration? This involves considering how existing relationships and networks are managed and coordinated and how new ones can be established and maintained.
15. What do you think SYKE's role is within the Finnish innovation system?
16. How well has SYKE succeeded in this role?
17. In your opinion, how well does SYKE reach its clients and potential users of knowledge?
18. How has SYKE's networking evolved and developed during the last five years?
19. In your opinion, has SYKE's collaboration been focusing on right areas and partners?
20. What do you consider to be SYKE's main strengths in managing collaboration?
21. What do you consider to be SYKE's main weaknesses in managing the collaboration?

**Risks and benefits inherent in the funding structure within SYKE and the advantages and disadvantages of the income portfolio**

22. What is your opinion of the funding structure of SYKE? (During last years, about 60% has been budget funding and about 40% external funding).

## Appendix 4. SYKE Interviewees

### Members of SYKE's staff

Family Name	First Name	Position
Estlander	Alec	Division Manager, AO/YHA
Forssius	Martin	Research Manager, TO/GTO
Furman	Eeva	Research Manager, TO/PTO
Heikkinen	Harri	Division Manager, TK/ICT
Heiskanen	Anna-Stina	Research Manager, TO/ITO
Henriksson	Pasi	Director of Administration, HAL
Hildén	Mikael	Programme Director, TO
Jäppinen	Jukka-Pekka	Division Manager, AO/LUM
Kallio-Mannila	Kaija	Division Manager, AO/KEM
Kämäri	Juha	Professor, TO
Kauppi	Lea	Director General
Kukkamäki	Markku	Division Manager, AO/YVY
Luotola	Marja	Chief of Laboratory, LAB
Maunula	Markku	Division Manager, AO/VES
Nikunen	Esa	Department Director, AO
Norros	Kirsi	Communication Director, VIE
Nysten	Taina	Research Manager, TO/HTO
Puupponen	Markku	Division Manager, AO/HYD
Rekolainen	Seppo	Research Manager, TO/VTO
Seppälä	Jyri	Research Manager, TO/TTO
Soini	Kristiina	Director, TK
Sucksdorff	Yrjö	Division Manager, TK/GEO
Tiainen	Ismo	Division Manager, EK
Toivonen	Heikki	Research Director, TO
Virkkala	Raimo	Research Manager, TO/LTO



### Members of the Advisory Board

Family Name	First Name	Position
Alestalo	Mikko	Finnish Meteorological Institute
Gunnar	Leena	Southeast Finland Regional Environment Centre
Haila	Yrjö	University of Tampere
Jalkanen	Pekka	Ministry of the Environment (chairman of the Advisory Board)
Kansanen	Pekka	City of Helsinki
Kauppi	Lea	SYKE, Director General
Laine	Kari	University of Oulu
Niemelä	Jari	University of Helsinki
Rehell	Ulla	KESKO
Ruohonen-Lehto	Marja	SYKE, representative of the personnel
Temmes	Armi	Helsinki School of Economics
Tiainen	Ismo	SYKE (secretary)
Vartiainen	Terttu	University of Kuopio
Vestala	Leena	Ministry of Education

## Appendix 5. Non-SYKE Interviewees

<b>Family Name</b>	<b>First Name</b>	<b>Ministry, Institute or Organization</b>
Alestalo	Mikko	Finnish Meteorological Institute
Anttinen	Pertti	Ministry for Foreign Affairs
Båsk	Erik	John Nurminen Foundation
Ekdahl	Elias	Geological Survey of Finland (GTK)
Gebremedhin	Anna	Ministry for Foreign Affairs
Haila	Yrjö	University of Tampere
Härkönen	Hannu	Fortum Oy
Heikkilä	Heikki	Ministry of the Environment
Helle	Eero	Game and Fisheries Research Institute (RKTL)
Herlin	Ilkka	Gargotec
Honkasalo	Antero	Ministry of the Environment
Hukkinen	Janne	University of Helsinki
Idman	Hannu	Geological Survey of Finland (GTK)
Jalkanen	Pekka	Ministry of the Environment
Jeskanen-Sundström	Heli	Statistics Finland
Kaatra	Kai	Ministry of Agriculture and Forestry
Kaivos	Pirjo	The Federation of Finnish Technology Industries
Kettunen	Juhani	Game and Fisheries Research Institute (RKTL)
Kinnunen	Jouko	MOTIVA Oy
Kourilehto	Kari	Ministry of the Environment
Kuittinen	Risto	Geodetic Institute
Kylä-Harakka-Ruonala	Tellervo	Confederation of Finnish Industries
Lahtinen	Marilla	Ministry of Social Affairs and Health
Laine	Kari	University of Oulu
Lehtonen	Teija	Ramboll Finland Oy
Leppänen	Mikko	Ramboll Finland Oy
Malin	Väinö	Ministry of the Environment
Manninen	Pentti	Ramboll Finland Oy
Merivirta	Raija	Finnish Road Administration
Nenonen	Keijo	Geological Survey of Finland (GTK)

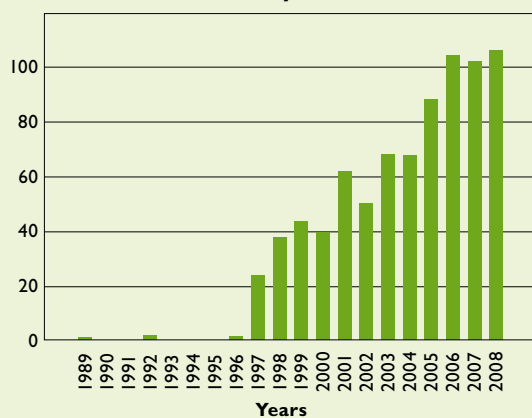
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<b>Family Name</b>	<b>First Name</b>	<b>Ministry, Institute or Organization</b>
Niemelä	Jari	University of Helsinki
Noponen	Jukka	The Finnish Innovation Fund (SITRA)
Ollikainen	Markku	University of Helsinki
Peltonen	Mikko	Ministry of Agriculture and Forestry
Penttinen	Katri	Ympäristöyhdistysten liitto ry
Perrels	Adriaan	Government Institute for Economic Research (VATT)
Porvari	Marjukka	John Nurminen Foundation
Rantasaari	Olavi	Ministry of the Environment
Rautio	Hannu	Finnish Forest Research Institute(METLA)
Rautio	Kaarina	Uusimaa Regional Council
Rehell	Ulla	KESKO
Säämänen	Tuula	Finnish Road Administration
Saari	Risto	Ministry of Transport and Communications
Saarnivaara	Veli-Pekka	Finnish Funding Agency for Technology and Innovation (Tekes)
Säteri	Helena	Ministry of the Environment
Sormunen	Kirsi	Nokia
Suuronen	Petri	Game and Fisheries Research Institute (RKTL)
Taalas	Petteri	Finnish Meteorological Institute
Tapio	Raimo	Finnish Road Administration
Temmes	Armi	Helsinki School of Economics (HSE)
Tommila	Esa	Ekokem
Tynkkynen	Oras	Parliament of Finland
Väisänen	Rauno	Metsähallitus
Väisänen	Tero	North Ostrobothnia Regional Environment Centre
Vaittinen	Jarmo	Ministry of Agriculture and Forestry
Vartia	Pentti	The Research Institute of the Finnish Economy (ETLA)
Vartiainen	Perttu	University of Joensuu
Vestala	Leena	Ministry of Education
Vornamo	Hannu	Chemical Industry Federation of Finland

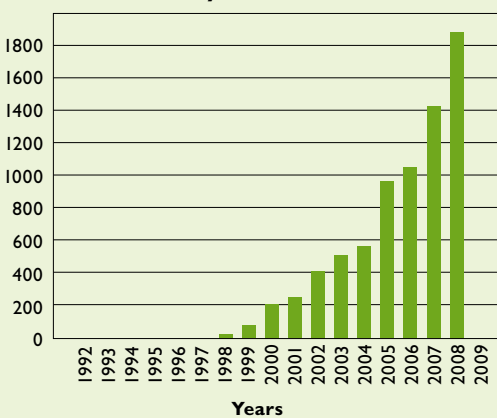
## Appendix 6. ISI Web of Science Citation Analysis

SYKE's 50 most cited papers that contribute to the H-index from the International Web of Science of ISI. The ISI database was assessed in November 2008 by searching for SYKE or Finnish Envir\* Inst\* in Affiliation.

**Published items in each year**



**Citations in each year**



**Results found: 806**

**Sum of the Times Cited: 7,433**

**Average Citations per Item: 9.22**

**h-index: 36**

2005	2006	2007	2008	2009	Total	Average Citations per Year
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968	1065	1429	1886	0	7,433	247.77
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- Author(s):** Stoddard, JL; Jeffries, DS; Lukewille, A; et al.

**Title:** Regional trends in aquatic recovery from acidification in North America and Europe

**Source:** NATURE, 401 (6753): 575-578 OCT 7 1999

**ISSN:** 0028-0836

40	35	23	35	0	289	28.90
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	2005	2006	2007	2008	2009	Total	Average Citations per Year
	968	1065	1429	1886	0	7,433	247.77
2. <b>Author(s):</b> Magnuson, JJ; Robertson, DM; Benson, BJ; et al. <b>Title:</b> Historical trends in lake and river ice cover in the Northern Hemisphere <b>Source:</b> SCIENCE, 289 (5485): 1743-1746 SEP 8 2000 <b>ISSN:</b> 0036-8075	26	28	28	34	0	207	23.00
3. <b>Author(s):</b> Siitonen, J; Martikainen, P; Punttila, P; et al. <b>Title:</b> Coarse woody debris and stand characteristics in mature managed and old-growth boreal mesic forests in southern Finland <b>Source:</b> FOREST ECOLOGY AND MANAGEMENT, 128 (3): 211-225 APR 1 2000 <b>ISSN:</b> 0378-1127	16	17	16	22	0	110	12.22
4. <b>Author(s):</b> Martikainen, P; Siitonen, J; Punttila, P; et al. <b>Title:</b> Species richness of Coleoptera in mature managed and old-growth boreal forests in southern Finland <b>Source:</b> BIOLOGICAL CONSERVATION, 94 (2): 199-209 JUL 2000 <b>ISSN:</b> 0006-3207	16	19	17	19	0	102	11.33
5. <b>Author(s):</b> Schroter, D; Cramer, W; Leemans, R; et al. <b>Title:</b> Ecosystem service supply and vulnerability to global change in Europe <b>Source:</b> SCIENCE, 310 (5752): 1333-1337 NOV 25 2005 <b>ISSN:</b> 0036-8075	0	13	33	39	0	85	21.25

THE 2008 EVALUATION OF SYKE APPENDIX 6/3

	2005	2006	2007	2008	2009	Total	Average Citations per Year
	<b>968</b>	<b>1065</b>	<b>1429</b>	<b>1886</b>	<b>0</b>	<b>7,433</b>	<b>247.77</b>
6. <b>Author(s):</b> Pennanen, T; Fritze, H; Vanhala, P; et al. <b>Title:</b> Structure of a microbial community in soil after prolonged addition of low levels of simulated acid rain <b>Source:</b> APPLIED AND ENVIRONMENTAL MICROBIOLOGY, 64 (6): 2173-2180 JUN 1998 <b>ISSN:</b> 0099-2240	2	6	10	7	0	69	6.27
7. <b>Author(s):</b> Dise, NB; Matzner, E; Forsius, M <b>Title:</b> Evaluation of organic horizon C : N ratio as an indicator of nitrate leaching in conifer forests across Europe <b>Source:</b> ENVIRONMENTAL POLLUTION, 102: 453-456 Suppl. 1 1998 <b>ISSN:</b> 0269-7491	6	8	12	8	0	63	6.30
8. <b>Author(s):</b> Lahti, K; Rapala, J; Fardig, M; et al. <b>Title:</b> Persistence of cyanobacterial hepatotoxin, microcystin-LR in particulate material and dissolved in lake water <b>Source:</b> WATER RESEARCH, 31 (5): 1005-1012 MAY 1997 <b>ISSN:</b> 0043-1354	7	10	5	7	0	62	5.17
9. <b>Author(s):</b> MacDonald, JA; Dise, NB; Matzner, E; et al. <b>Title:</b> Nitrogen input together with ecosystem nitrogen enrichment predict nitrate leaching from European forests <b>Source:</b> GLOBAL CHANGE BIOLOGY, 8 (10): 1028-1033 OCT 2002 <b>ISSN:</b> 1354-1013	11	11	13	16	0	61	8.71

THE 2008 EVALUATION OF SYKE APPENDIX 6/4

	2005	2006	2007	2008	2009	Total	Average Citations per Year
	968	1065	1429	1886	0	7,433	247.77
10. <b>Author(s):</b> Timonen, S; Jorgensen, KS; Haahtela, K; et al. <b>Title:</b> Bacterial community structure at defined locations of <i>Pinus sylvestris</i> Suillus bovinus and <i>Pinus sylvestris</i> Paxillus involutus mycorrhizospheres in dry pine forest humus and nursery peat <b>Source:</b> CANADIAN JOURNAL OF MICROBIOLOGY, 44 (6): 499-513 JUN 1998 <b>ISSN:</b> 0008-4166	4	7	5	3	0	58	5.27
11. <b>Author(s):</b> Skjelkvale, BL; Mannio, J; Wilander, A; et al. <b>Title:</b> Recovery from acidification of lakes in Finland, Norway and Sweden 1990-1999 <b>Source:</b> HYDROLOGY AND EARTH SYSTEM SCIENCES, 5 (3): 327-337 Sp. Iss. SI SEP 2001 <b>ISSN:</b> 1027-5606	12	6	10	13	0	57	8.14
12. <b>Author(s):</b> Rounsevell, MDA; Ewert, F; Reginster, I; et al. <b>Title:</b> Future scenarios of European agricultural land use II. Projecting changes in cropland and grassland <b>Source:</b> AGRICULTURE ECOSYSTEMS & ENVIRONMENT, 107 (2-3): 117-135 MAY 20 2005 <b>ISSN:</b> 0167-8809	4	17	20	15	0	56	14.00
13. <b>Author(s):</b> Heikkinen, RK; Luoto, M; Virkkala, R; et al. <b>Title:</b> Effects of habitat cover, landscape structure and spatial variables on the abundance of birds in an agricultural-forest mosaic <b>Source:</b> JOURNAL OF APPLIED ECOLOGY, 41 (5): 824-835 OCT 2004 <b>ISSN:</b> 0021-8901	3	12	24	17	0	56	11.20

THE 2008 EVALUATION OF SYKE APPENDIX 6/5

	2005	2006	2007	2008	2009	Total	Average Citations per Year
	<b>968</b>	<b>1065</b>	<b>1429</b>	<b>1886</b>	<b>0</b>	<b>7,433</b>	<b>247.77</b>
14. <b>Author(s):</b> Laine, MM; Jorgensen, KS <b>Title:</b> Effective and safe composting of chlorophenol-contaminated soil in pilot scale <b>Source:</b> ENVIRONMENTAL SCIENCE & TECHNOLOGY, 31 (2): 371-378 FEB 1997 <b>ISSN:</b> 0013-936X	4	3	0	7	0	55	4.58
15. <b>Author(s):</b> Jorgensen, KS; Puustinen, J; Suortti, AM <b>Title:</b> Bioremediation of petroleum hydrocarbon-contaminated soil by composting in biopiles <b>Source:</b> ENVIRONMENTAL POLLUTION, 107 (2): 245-254 2000 <b>ISSN:</b> 0269-7491	9	10	8	13	0	54	6.00
16. <b>Author(s):</b> Vielma, J; Makinen, T; Ekholm, P; et al. <b>Title:</b> Influence of dietary soy and phytase levels on performance and body composition of large rainbow trout ( <i>Oncorhynchus mykiss</i> ) and algal availability of phosphorus load <b>Source:</b> AQUACULTURE, 183 (3-4): 349-362 MAR 15 2000 <b>ISSN:</b> 0044-8486	4	6	12	10	0	52	5.78
17. <b>Author(s):</b> Koivula, M; Punttila, P; Haila, Y; et al. <b>Title:</b> Leaf litter and the small-scale distribution of carabid beetles (Coleoptera, Carabidae) in the boreal forest <b>Source:</b> ECOGRAPHY, 22 (4): 424-435 AUG 1999 <b>ISSN:</b> 0906-7590	5	13	5	10	0	51	5.10



THE 2008 EVALUATION OF SYKE APPENDIX 6/6

	2005	2006	2007	2008	2009	Total	Average Citations per Year
	<b>968</b>	<b>1065</b>	<b>1429</b>	<b>1886</b>	<b>0</b>	<b>7,433</b>	<b>247.77</b>
18. <b>Author(s):</b> Henriksen, A; Skjelkvale, BL; Mannio, J; et al. <b>Title:</b> Northern European Lake Survey, 1995 - Finland, Norway, Sweden, Denmark, Russian Kola, Russian Karelia, Scotland and Wales <b>Source:</b> AMBIO, 27 (2): 80-91 MAR 1998 <b>ISSN:</b> 0044-7447	8	3	2	3	0	50	4.55
19. <b>Author(s):</b> Kortelainen, P; Saukkonen, S; Mattsson, T <b>Title:</b> Leaching of nitrogen from forested catchments in Finland <b>Source:</b> GLOBAL BIOGEOCHEMICAL CYCLES, 11 (4): 627-638 DEC 1997 <b>ISSN:</b> 0886-6236	9	5	8	6	0	49	4.08
20. <b>Author(s):</b> Martikainen, P; Siitonen, J; Kaila, L; et al. <b>Title:</b> Bark beetles (Coleoptera, Scolytidae) and associated beetle species in mature managed and old-growth boreal forests in southern Finland <b>Source:</b> FOREST ECOLOGY AND MANAGEMENT, 116 (1-3): 233-245 APR 12 1999 <b>ISSN:</b> 0378-1127	8	7	5	5	0	48	4.80
21. <b>Author(s):</b> Rapala, J; Erkomaa, K; Kukkonen, J; et al. <b>Title:</b> Detection of microcystins with protein phosphatase inhibition assay, high-performance liquid chromatography-UV detection and enzyme-linked immunosorbent assay - Comparison of methods <b>Source:</b> ANALYTICA CHIMICA ACTA, 466 (2): 213-231 AUG 27 2002 <b>ISSN:</b> 0003-2670	9	11	8	9	0	46	6.57

THE 2008 EVALUATION OF SYKE APPENDIX 6/7

	2005	2006	2007	2008	2009	Total	Average Citations per Year
	<b>968</b>	<b>1065</b>	<b>1429</b>	<b>1886</b>	<b>0</b>	<b>7,433</b>	<b>247.77</b>
22. <b>Author(s):</b> Sipia, VO; Kankaanpaa, HT; Flinkman, J; et al. <b>Title:</b> Time-dependent accumulation of cyanobacterial hepatotoxins in flounders ( <i>Platichthys flesus</i> ) and mussels ( <i>Mytilus edulis</i> ) from the northern Baltic Sea <b>Source:</b> ENVIRONMENTAL TOXICOLOGY, 16 (4): 330-336 AUG 2001 <b>ISSN:</b> 1520-4081	8	9	8	9	0	46	5.75
23. <b>Author(s):</b> Pitkanen, H; Lehtoranta, J; Raike, A <b>Title:</b> Internal nutrient fluxes counteract decreases in external load: The case of the estuarial eastern Gulf of Finland, Baltic Sea <b>Source:</b> AMBIO, 30 (4-5): 195-201 AUG 2001 <b>ISSN:</b> 0044-7447	10	4	13	13	0	45	5.62
24. <b>Author(s):</b> Niemi, RM; Heiskanen, I; Wallenius, K; et al. <b>Title:</b> Extraction and purification of DNA in rhizosphere soil samples for PCR-DGGE analysis of bacterial consortia <b>Source:</b> JOURNAL OF MICROBIOLOGICAL METHODS, 45 (3): 155-165 JUL 2001 <b>ISSN:</b> 0167-7012	8	7	10	6	0	45	5.62
25. <b>Author(s):</b> Johnson, AC; Aerni, HR; Gerritsen, A; et al. <b>Title:</b> Comparing steroid estrogen, and nonylphenol content across a range of European sewage plants with different treatment and management practices <b>Source:</b> WATER RESEARCH, 39 (1): 47-58 JAN 2005 <b>ISSN:</b> 0043-1354	1	7	15	19	0	42	10.50

THE 2008 EVALUATION OF SYKE APPENDIX 6/8

	2005	2006	2007	2008	2009	Total	Average Citations per Year
	<b>968</b>	<b>1065</b>	<b>1429</b>	<b>1886</b>	<b>0</b>	<b>7,433</b>	<b>247.77</b>
26. <b>Author(s):</b> Sipia, V; Kankaanpaa, H; Lahti, K; et al. <b>Title:</b> Detection of Nodularin in flounders and cod from the Baltic Sea <b>Source:</b> ENVIRONMENTAL TOXICOLOGY, 16 (2): 121-126 APR 2001 <b>ISSN:</b> 1520-4081	6	5	5	5	0	42	5.25
27. <b>Author(s):</b> Landers, DH; Gubala, C; Verta, M; et al. <b>Title:</b> Using lake sediment mercury flux ratios to evaluate the regional and continental dimensions of mercury deposition in arctic and boreal ecosystems <b>Source:</b> ATMOSPHERIC ENVIRONMENT, 32 (5): 919-928 MAR 1998 <b>ISSN:</b> 1352-2310	6	2	3	4	0	42	3.82
28. <b>Author(s):</b> Heino, J; Muotka, T; Paavola, R <b>Title:</b> Determinants of macroinvertebrate diversity in headwater streams: regional and local influences <b>Source:</b> JOURNAL OF ANIMAL ECOLOGY, 72 (3): 425-434 MAY 2003 <b>ISSN:</b> 0021-8790	13	9	6	9	0	40	6.67
29. <b>Author(s):</b> Kuussaari, M; Singer, M; Hanski, I <b>Title:</b> Local specialization and landscape-level influence on host use in an herbivorous insect <b>Source:</b> ECOLOGY, 81 (8): 2177-2187 AUG 2000 <b>ISSN:</b> 0012-9658	8	4	5	7	0	39	4.33
30. <b>Author(s):</b> Penttila, R; Siitonen, J; Kuusinen, M <b>Title:</b> Polypore diversity in managed and old-growth boreal Picea abies forests in southern Finland <b>Source:</b> BIOLOGICAL CONSERVATION, 117 (3): 271-283 MAY 2004 <b>ISSN:</b> 0006-3207	7	9	13	9	0	38	7.60

THE 2008 EVALUATION OF SYKE APPENDIX 6/9

	2005	2006	2007	2008	2009	Total	Average Citations per Year
	<b>968</b>	<b>1065</b>	<b>1429</b>	<b>1886</b>	<b>0</b>	<b>7,433</b>	<b>247.77</b>
31. <b>Author(s):</b> Rounsevell, MDA; Reginster, I; Araujo, MB; et al. <b>Title:</b> A coherent set of future land use change scenarios for Europe <b>Source:</b> AGRICULTURE ECOSYSTEMS & ENVIRONMENT, 114 (1): 57-68 MAY 2006 <b>ISSN:</b> 0167-8809		3	13	21	0	37	12.33
32. <b>Author(s):</b> Raike, A; Pietilainen, OP; Rekolainen, S; et al. <b>Title:</b> Trends of phosphorus, nitrogen and chlorophyll a concentrations in Finnish rivers and lakes in 1975-2000 <b>Source:</b> SCIENCE OF THE TOTAL ENVIRONMENT, 310 (1-3): 47-59 JUL 1 2003 <b>ISSN:</b> 0048-9697	11	6	5	11	0	37	6.17
33. <b>Author(s):</b> Striegl, RG; Kortelainen, P; Chanton, JP; et al. <b>Title:</b> Carbon dioxide partial pressure and C-13 content of north temperate and boreal lakes at spring ice melt <b>Source:</b> LIMNOLOGY AND OCEANOGRAPHY, 46 (4): 941-945 JUN 2001 <b>ISSN:</b> 0024-3590	8	9	4	7	0	37	4.62
34. <b>Author(s):</b> Kortelainen, P; Saukkonen, S <b>Title:</b> Leaching of nutrients, organic carbon and iron from Finnish forestry land <b>Source:</b> WATER AIR AND SOIL POLLUTION, 105 (1-2): 239-250 JUL 1998 <b>ISSN:</b> 0049-6979	10	3	6	5	0	37	3.36
35. <b>Author(s):</b> Luoto, M; Toivonen, T; Heikkinen, RK <b>Title:</b> Prediction of total and rare plant species richness in agricultural landscapes from satellite images and topographic data <b>Source:</b> LANDSCAPE ECOLOGY, 17 (3): 195-217 2002 <b>ISSN:</b> 0921-2973	10	5	5	7	0	36	5.14

THE 2008 EVALUATION OF SYKE APPENDIX 6/10

	2005	2006	2007	2008	2009	Total	Average Citations per Year
	<b>968</b>	<b>1065</b>	<b>1429</b>	<b>1886</b>	<b>0</b>	<b>7,433</b>	<b>247.77</b>
36. <b>Author(s):</b> Pykala, J <b>Title:</b> Mitigating human effects on European biodiversity through traditional animal husbandry <b>Source:</b> CONSERVATION BIOLOGY, 14 (3): 705-712 JUN 2000 <b>ISSN:</b> 0888-8892	5	5	8	4	0	36	4.00
37. <b>Author(s):</b> Kremp, A; Heiskanen, AS <b>Title:</b> Sexuality and cyst formation of the spring-bloom dinoflagellate <i>Scrippsiella hangoei</i> in the coastal northern Baltic Sea <b>Source:</b> MARINE BIOLOGY, 134 (4): 771-777 SEP 1999 <b>ISSN:</b> 0025-3162	5	4	5	3	0	36	3.60
38. <b>Author(s):</b> Liski, J; Palosuo, T; Peltoniemi, M; et al. <b>Title:</b> Carbon and decomposition model Yasso for forest soils <b>Source:</b> ECOLOGICAL MODELLING, 189 (1-2): 168-182 NOV 25 2005 <b>ISSN:</b> 0304-3800	1	6	10	18	0	35	8.75
39. <b>Author(s):</b> Kallio, K; Kutser, T; Hannonen, T; et al. <b>Title:</b> Retrieval of water quality from airborne imaging spectrometry of various lake types in different seasons <b>Source:</b> SCIENCE OF THE TOTAL ENVIRONMENT, 268 (1-3): 59-77 MAR 14 2001 <b>ISSN:</b> 0048-9697	6	4	7	7	0	34	4.25
40. <b>Author(s):</b> Grace, JB; Jutila, H <b>Title:</b> The relationship between species density and community biomass in grazed and ungrazed coastal meadows <b>Source:</b> OIKOS, 85 (3): 398-408 JUN 1999 <b>ISSN:</b> 0030-1299	4	6	3	2	0	34	3.40

THE 2008 EVALUATION OF SYKE APPENDIX 6/I I

	2005	2006	2007	2008	2009	Total	Average Citations per Year
	<b>968</b>	<b>1065</b>	<b>1429</b>	<b>1886</b>	<b>0</b>	<b>7,433</b>	<b>247.77</b>
41. <b>Author(s):</b> Vuorenmaa, J; Rekolainen, S; Lepisto, A; et al. <b>Title:</b> Losses of nitrogen and phosphorus from agricultural and forest areas in Finland during the 1980s and 1990s <b>Source:</b> ENVIRONMENTAL MONITORING AND ASSESSMENT, 76 (2): 213-248 JUN 2002 <b>ISSN:</b> 0167-6369	11	7	2	8	0	33	4.71
42. <b>Author(s):</b> Luoto, M; Poyry, J; Heikkinen, RK; et al. <b>Title:</b> Uncertainty of bioclimate envelope models based on the geographical distribution of species <b>Source:</b> GLOBAL ECOLOGY AND BIOGEOGRAPHY, 14 (6): 575-584 NOV 2005 <b>ISSN:</b> 1466-822X	0	6	13	13	0	32	8.00
43. <b>Author(s):</b> Schopp, W; Posch, M; Mylona, S; et al. <b>Title:</b> Long-term development of acid deposition (1880-2030) in sensitive freshwater regions in Europe <b>Source:</b> HYDROLOGY AND EARTH SYSTEM SCIENCES, 7 (4): 436-446 AUG 2003 <b>ISSN:</b> 1027-5606	9	5	5	8	0	32	6.40
44. <b>Author(s):</b> Paavola, R; Muotka, T; Virtanen, R; et al. <b>Title:</b> Are biological classifications of headwater streams concordant across multiple taxonomic groups? <b>Source:</b> FRESHWATER BIOLOGY, 48 (10): 1912-1923 OCT 2003 <b>ISSN:</b> 0046-5070	7	7	5	10	0	32	5.33

THE 2008 EVALUATION OF SYKE APPENDIX 6/12

	2005	2006	2007	2008	2009	Total	Average Citations per Year
	<b>968</b>	<b>1065</b>	<b>1429</b>	<b>1886</b>	<b>0</b>	<b>7,433</b>	<b>247.77</b>
45. <b>Author(s):</b> Viitasalo, M; Rosenberg, M; Heiskanen, AS; et al. <b>Title:</b> Sedimentation of copepod fecal material in the coastal northern Baltic Sea: Where did all the pellets go? <b>Source:</b> LIMNOLOGY AND OCEANOGRAPHY, 44 (6): 1388-1399 SEP 1999 <b>ISSN:</b> 0024-3590	3	5	4	2	0	31	3.10
46. <b>Author(s):</b> Heiskanen, AS; Tallberg, P <b>Title:</b> Sedimentation and particulate nutrient dynamics along a coastal gradient from a fjord-like bay to the open sea <b>Source:</b> HYDROBIOLOGIA, 393: 127-140 1999 <b>ISSN:</b> 0018-8158	5	4	2	4	0	31	3.10
47. <b>Author(s):</b> Nick, G; Jussila, M; Hoste, B; et al. <b>Title:</b> Rhizobia isolated from root nodules of tropical leguminous trees characterized using DNA-DNA dot-blot hybridisation and rep-PCR genomic fingerprinting <b>Source:</b> SYSTEMATIC AND APPLIED MICROBIOLOGY, 22 (2): 287-299 MAY 1999 <b>ISSN:</b> 0723-2020	1	4	4	5	0	31	3.10
48. <b>Author(s):</b> Kuikka, S; Hilden, M; Gislason, H; et al. <b>Title:</b> Modeling environmentally driven uncertainties in Baltic cod ( <i>Gadus morhua</i> ) management by Bayesian influence diagrams <b>Source:</b> CANADIAN JOURNAL OF FISHERIES AND AQUATIC SCIENCES, 56 (4): 629-641 APR 1999 <b>ISSN:</b> 0706-652X	3	0	10	4	0	31	3.10

THE 2008 EVALUATION OF SYKE APPENDIX 6/13

	2005	2006	2007	2008	2009	Total	Average Citations per Year
	<b>968</b>	<b>1065</b>	<b>1429</b>	<b>1886</b>	<b>0</b>	<b>7,433</b>	<b>247.77</b>
49. <b>Author(s):</b> Valpasvuo-Jaatinen, P; Rekolainen, S; Latostenmaa, H <b>Title:</b> Finnish agriculture and its sustainability: Environmental impacts <b>Source:</b> AMBIO, 26 (7): 448-455 NOV 1997 <b>ISSN:</b> 0044-7447	2	5	1	6	0	31	2.82
50. <b>Author(s):</b> Pulliainen, J; Kallio, K; Eloheimo, K; et al. <b>Title:</b> A semi-operative approach to lake water quality retrieval from remote sensing data <b>Source:</b> SCIENCE OF THE TOTAL ENVIRONMENT, 268 (1-3): 79-93 MAR 14 2001 <b>ISSN:</b> 0048-9697	2	4	7	4	0	30	3.75



## DOCUMENTATION PAGE

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<i>Author(s)</i>	Rik Leemans, Leen Hordijk, Milena Horvat, Thomas B. Johansson, Pieter Leroy and Kaja Peterson		
<i>Title of publication</i>	<b>The 2008 Evaluation of SYKE, The Finnish Environment Institute</b>		
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<i>Abstract</i>	<p>An independent panel of six international experts assessed SYKE's research and expert services with the help of background material, questionnaires, and interviews, in November 2008.</p> <p>The Panel's review revealed an active and vital institute. SYKE's methodological strength lies in the development of scientific approaches and tools based on the collection, management, and application of large environmental data-sets which are available or compiled within SYKE.</p> <p>The Panel's main recommendations concerned the organisational separation of research and expert services, the 24/7 operational activities, the role of the Advisory Board, and SYKE's role and position in the Finnish environmental land-scape, especially in the policy cycle.</p> <p>The Panel sees ample opportunities for SYKE to take a more proactive role in assessing policy progress towards environmental targets, developing strategies and scenarios for sustainable development, and informing the policy-making process on implications of different targets for environmental ambitions.</p> <p>The Panel recommends strengthening the science-policy-interaction by creating a participatory integrated assessment approach which combines the environmental understanding, created by SYKE's different tasks, and the needs of SYKE's various stakeholders. The availability of spatially explicit environmental data has a huge potential in combination with socio-economic data, to play an essential role in the development of an innovative integrated assessment approach.</p> <p>According to the Panel the planned increase in SYKE's cooperation with national and foreign universities, The establishment of an Environment and Natural Resources Consortium, and participating in the national programmes of Centres of Excellence in research and of Strategic Centres for Science, Technology and Innovation are all essential for SYKE's development</p>		
<i>Keywords</i>	Research institutions, evaluation, development, Finnish Environment Institute		
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Julkaisun teema	Environmental Protection (Ympäristönsuojelu)			
Julkaisun osat/ muut saman projektin tuottamat julkaisut	Julkaisu on saatavana myös Internetistä: <a href="http://www.ymparisto.fi/publications">www.ymparisto.fi/publications</a> (englanniksi)			
Tiivistelmä	<p>Riippumaton kuusijäseninen kansainvälinen asiantuntijapaneeli arvioi SYKE:n tutkimustoimintaa ja asiantuntijapalveluita marraskuussa 2008. Työssään se hyödynsi saamiensa taustamateriaaleja ja tekemiänsä kysely- ja haastatteluaineistoja.</p> <p>Arviointipaneelin mukaan SYKE on aktiivinen ja elinvoimainen laitos. SYKE:n menetelmälliset vahvuudet ovat laitoksen kehittämässä tieteellisissä lähestymistavoissa ja työkaluissa, jotka pohjautuvat sen laajoihin ympäristötietovarantoihin.</p> <p>Panelistien keskeisimmät suositukset liittyvät tutkimuksen ja asiantuntijapalveluiden organisatoriseen jakoon, operatiivisiin 24/7-palveluihin, neuvottelukunnan rooliin sekä SYKE:n rooliin ja asemaan ympäristönsuojelun kentässä, erityisesti ympäristöpolitiikan tukemisessa.</p> <p>Panelistien näkemysten mukaan SYKEllä on hyvät mahdollisuudet vahvistaa ennakoivaa roolia monessa: arvioida ympäristöpolitiikan toteutumista, kehittää kestävä kehityksen strategioita ja skenaarioita sekä tuottaa tietoa eri politiikkavaihtoehtojen ympäristövaikutuksista.</p> <p>Panelistit suosittelevat tutkimuksen ja politiikan välisen yhteyden vahvistamista luomalla osallistumiseen ja kokonaisvaltaiseen arviointiin perustuva lähestymistapa, jossa hyödynnetään SYKE:n ympäristöosaamista ja sidosryhmien tarpeita. SYKE:n ympäristöön liittyvät paikkatiedot ja sosio-ekonomiset tiedot mahdollistavat yhdessä innovatiivisten yhdenmennyksen arviointien tekemisen.</p> <p>Panelistien näkemyksen mukaan tavoite lisätä SYKE:n yhteistyötä kansallisten ja kansainvälisten yliopistojen kanssa, ympäristö ja luonnonvarat -konsortion perustaminen sekä osallistuminen strategisen huippuosaamisen keskittymien ohjelmiin ovat kaikki tärkeitä SYKE:n kehittymisen kannalta.</p>			
Asiasanat	Tutkimuslaitokset, arviointi, kehittäminen, Suomen ympäristökeskus			
Rahoittaja/toimeksiantaja				
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Julkaisun kustantaja	Suomen ympäristökeskus (SYKE) PL 140, 00251 HELSINKI			
Painopaikka ja -aika	Vammalan Kirjapaino Oy, Sastamala 2009			

## PRESENTATIONSBLAD

Utgivare	Finlands miljöcentral (SYKE)			Datum	Mars 2009
Författare	Rik Leemans, Leen Hordijk, Milena Horvat, Thomas B. Johansson, Pieter Leroy och Kaja Peterson				
Publikations titel	<b>The 2008 Evaluation of SYKE, The Finnish Environment Institute</b> (Utvärderingen av SYKE 2008, Finlands miljöcentral)				
Publikationsserie och nummer	Miljön i Finland 4/2009				
Publikationens tema	Miljövård				
Publikationens delar/ andra publikationer inom samma projekt	Publikationen finns tillgänglig också på Internet: <a href="http://www.ymparisto.fi/publications">www.ymparisto.fi/publications</a> (på engelska)				
Sammandrag	<p>En oavhängig internationell sakkunnigpanel utvärderade forskningsverksamheten och experttjänsterna vid SYKE i november 2008. I sitt arbete utnyttjade panelen det bakgrundsmaterial som den erhållit och förfrågningar och intervjuer som den gjort.</p> <p>Enligt värderingspanelen är SYKE ett aktivt och vitalt institut. SYKEs metodrelaterade styrka ligger i de vetenskapliga synsätt och redskap som det utvecklat och som grundar sig på dess vidsträckta miljödataresurser.</p> <p>Panelens mest centrala rekommendationer är förknippade med den organisatoriska delningen av forskning och experttjänster, med de operativa 24/7-tjänsterna, delegationens roll samt SYKEs roll och ställning i miljöskyddet, i synnerhet i stödet av miljöpolitiken.</p> <p>Enligt panelmedlemmarna har SYKE goda möjligheter att förstärka sin föregripande roll på många områden: att bedöma hur miljöpolitik förverkligas, att utveckla strategier och scenarier för hållbar utveckling samt att producera uppgifter om olika policyalternativs miljökonsekvenser.</p> <p>Panelmedlemmarna rekommenderade att sambandet mellan forskning och politik förstärks genom att skapa ett synsätt som bygger på deltagande och helhetsinriktad bedömning, där SYKEs miljökunskande och intressgruppers behov utnyttjas. SYKEs miljörelaterade geografiska information och socioekonomiska data gör det möjligt att göra innovativa integrerade uppskattningar.</p> <p>Panelen ansåg, att målet att öka SYKEs samarbete med nationella och internationella universitet, att inrätta ett miljö- och naturresurskonsortium samt att delta i program som centraler för strategiskt toppkunskande har, är alla viktiga för att utveckla SYKE.</p>				
Nyckelord	Forskningscentra, utvärdering, utveckling, Finlands miljöcentral				
Finansiär/ uppdragsgivare					
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Tryckeri/tryckningsort och -år	Vammalan Kirjapaino Oy, Sastamala 2009				

An independent panel of six international experts assessed SYKE's research and expert services in November 2008. The Panel's review revealed an active and vital institute, which is highly appreciated by its partners and stakeholders. The Panel also identified challenges and development needs. This report describes the findings and recommendations of the evaluation panel.



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