

THE NATIONAL IMPACT OF THE FINNISH BIODIVERSITY  
RESEARCH PROGRAMME FIBRE

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## FOCUS OF THIS REPORT

In December 1995, the Finnish Council of State made a Decision-in-Principle concerning action on the research and safeguarding of biological diversity in Finland. The main purpose of the document was to initiate the preparation of a National Action Plan for Biodiversity and thus implement action requested after the ratification of the Convention on Biological Diversity. The Decision-in-Principle also stated that the Academy of Finland should head the preparation of a multidisciplinary research programme on biological diversity. The six-year Finnish Biodiversity Research Programme, (FIBRE) was launched in 1997.

The focus of this report is to examine the national and societal impacts of the biodiversity research programme. It reports on the programme's performance in terms of Finnish societal needs for biodiversity research. The aim of this report though has not been to evaluate the scientific output of the programme or to evaluate the programme as a whole. The evaluation of the social benefits as well as the scientific quality of the FIBRE programme will be the task of the international evaluation panel that will perform the evaluation in February 2003. The findings of this report will be presented to the panel as a survey conducted to assess the national impacts of FIBRE.

The report on the national impact of FIBRE was ordered (as a consulting service) from the Finland Futures Research Centre, Turku School of Economics and Business Administration and the Department of Regional Studies and Environmental Policy, the University of Tampere. The consultants were Dr Merja Otronen, of the Finland Futures Research Centre and Dr Juhani Tirkkonen, from the Department of Regional Studies and Environmental Policy, the University of Tampere. The report has been financed by the Ministry of Agriculture and Forestry, the National Technology Agency, the Ministry of Transport and Communications and the Ministry for Foreign Affairs. The following members of the steering committee have formed a steering group for the report: Professor Pasi Puttonen from the Academy of Finland and the University of Helsinki, Senior Adviser Matti Heikurainen from the Ministry of Agriculture and Forestry, Senior Adviser Raija Merivirta from the Finnish National Road Administration, Senior Adviser Saara Jääskeläinen from the Ministry of Transport and Communications, Consulting Officer Pertti Rassi from the Ministry of the Environment, Counsellor Anu Pärnänen-Landtman and Environmental Adviser Matti Nummelin from the Ministry for Foreign Affairs, Senior Technology Adviser Helena Manninen and Senior Technical Advisor Robin Gustafsson from Tekes, the National Technology Agency and Programme Director Mari Walls and Scientific Secretary Marja Vieno from the FIBRE coordination office.

The report consists of two parts that examine the impacts of FIBRE from different perspectives. The first part "The national impacts of FIBRE" was written by Merja Otronen, of the Finland Futures Research Centre, it closely examines the programme via the immediate actors of the programme and the end-users of the research results. The keywords include programme goals, result dissemination and the societal impact of the programme. Juhani Tirkkonen and his co-workers, at the University of Tampere, wrote the second part of the report "Biodiversity in Finnish society". Their report widens the stakeholder groups and examines biodiversity issues of national relevance in more general terms. The second part reports on biodiversity as a socio-economic issue in Finnish society and also presents a media analysis on the visibility of FIBRE in Finnish newspapers.

# I: THE NATIONAL IMPACT OF FIBRE

Merja Otronen

## 1. INTRODUCTION

This part of the report consists of two chapters. The first chapter “The programme’s management in view of its national impact” analyses the programme’s management. The aim has been to identify the challenges, problems and success factors encountered by the management. The emphasis is on the question of how FIBRE’s management has dealt with the very different needs and interests of the funding bodies in relation to project selection and result dissemination. The second chapter “The research programme in view of its national impact” examines programme level parameters such as goals, research benefits, networks, result dissemination and the impact of FIBRE research. It also considers some project level parameters.

The data used in this part derive from several sources. FIBRE’s management was examined by interviewing some members of the steering committee and by analysing the minutes of the committee meetings. The programme level parameters were examined by interviewing steering committee members, some end-users and some FIBRE researchers. The interviews were conducted from April to June 2002. The 20 people interviewed are listed in Appendix 1. In addition, there were discussions with the researchers of the BITUMI project and a short e-mail questionnaire was sent to the doctoral students involved in FIBRE projects. The progress reports submitted to the co-ordinating office and the participant lists from FIBRE events have been used to clarify some details.

## 2. FRAMEWORK FOR ANALYSING FIBRE’S NATIONAL IMPACT

### 2.1. SOCIETAL ROLE OF ENVIRONMENTAL RESEARCH

Environmental research is a field where the application of research results has always been important. This need to apply results and to find answers to concrete environmental questions has become even more essential during the last decades due to many environmental problems being recognised as global in scale. It has been recognised that a healthy environment is one of the main determinants of sustainable socio-economic development. This has led to many international initiatives aimed at promoting sustainable development, most importantly the UNCED Conference in Rio de Janeiro in 1992.

Environmental policies have scientific and technological dimensions that require support from high quality scientific research. This has put pressure on the environmental sciences to provide decision-makers with relevant knowledge (European Commission 2000a, Lubchenco 1999). Thus integrating research into socio-economic development has become an important issue throughout Europe, as there are similar national science policies in many European countries (Scott 2000). Together with the changing role of science, changes in research funding during the last decades have also put a strong emphasis on the applicability and dissemination of research results. The decrease in budget funding for universities in most European countries plus the increased proportion of externally directed, and/or increased competition for national or international funding has prompted this development (see e.g. Nieminen and Kaukonen 2001).

## 2.2. BENEFITS OF THE RESEARCH

Benefits of the research are found in the process of knowledge production and capacity building. In a paper on the impact of publicly funded research on innovation Salter et al. (2000, see also Salter and Martin 2001) list several benefits of the research. One obvious benefit is in increasing the stock of useful knowledge. Research also benefits society by training skilled graduates, creating new scientific instrumentation and methodologies, forming networks and stimulating social interaction. In addition, research provides an increased capacity for scientific and technological problem solving, and contributes to creating new enterprises and provisions for social knowledge.

The traditional method of scientific knowledge transfer has been some form of documentation. However, the attempt to understand the complex ways in which science interacts with the rest of the society has shifted emphasis from *explicit knowledge* to *tacit knowledge* (Nonaka and Nishiguchi 2001). Tacit knowledge, person embodied knowledge, refers to a person's general ability to interpret and use knowledge. Tacit knowledge is held by individuals and groups and it is often transferred through scientific training and the networks that research generates. In environmental research, different ways of using knowledge are also important (Scott 2000, 2001). In this respect the scientific knowledge produced and used in a society can be divided into *instrumental* and *conceptual* knowledge (Caplan et al. 1975) or into information and ideas or concepts. In more complicated decision-making situations, only conceptual knowledge may be useful. Finally, the *time-scale* of knowledge use is an important factor (e.g. European Commission 1996, Miettinen et al. 1999).

## 2.3. RESEARCH PROGRAMME IN A RESEARCH – POLICY INTERFACE

Today, science is characterised by interdisciplinary and collaborative research as well as increased interactivity with society (Gibbons et al. 1994, Ruivo 1994). The roles of the institutional partners in science and innovation systems are also in transition (Scheinstock & Hämäläinen 2001). The interactive process of knowledge production and usage emphasises the increased importance of networks. However, there are still many problems in the interaction between science and various groups of stakeholders. In consequence, research results do not always reach those that would need them most. Factors preventing successful communication are related to, for example, research knowledge or the situation where communication takes place (Clarck 1999). For example, interaction between researchers and stakeholders requires the translation of scientific information into an accessible form. On the other hand, decision-making related to environmental problems may be independent of research and depend on, for example, conflicting social, commercial or political interests (Scott 2001).

The role of research programmes can be seen in the interface between science and society. It has been suggested that in order to narrow the gap between scientific research and societal decision-making a boundary organisation may be necessary (Scott 2000). The tasks of this type of organisation would include, for example, the translation of scientific information from scientists to policy-makers, communicating research needs from policy-makers to scientists, and providing a neutral forum for debate. Although the idea behind a boundary organisation concerns permanent organisations, which can build effective procedures for continuous communication, the idea could also be applied in the case of a research programme. It is clear that as

a short-lived entity a research programme cannot fully serve the purpose. In the current context however, it is important to ask, what has the role of FIBRE in aiding communication on biodiversity been? Has FIBRE been able to narrow the gap between science and policy?

#### 2.4. COMPONENTS OF NATIONAL IMPACT

Table 1 summarises the framework used in exploring the programme in terms of national impacts. The framework includes both management and programme level components. The work of the programme management, including the co-ordinating office and the steering committee of the programme, can be examined as a process where various decisions related to national impacts are taken. The solutions reflect the various characteristics of the management practises and actors involved. The programme level components listed in the Table 1 concentrate on networking and dissemination and the use of research benefits and their impacts. First, the research goals of FIBRE were analysed by focusing on their relevance and how well they have been achieved. Second, the scientific benefits and beneficiaries resulting from FIBRE were explored, for example, by investigating the knowledge produced by FIBRE and the time-scale of its application and usage. Third, the dissemination process of FIBRE's results was analysed. This included an examination of networking and dissemination channels, for example, do the various actors working on biodiversity in Finland form a network, have FIBRE researchers networked with each other and how wide are the networks between FIBRE researchers and the various end-users. Furthermore, FIBRE events and their participants were looked at to discover what opportunities for interaction and communication existed between researchers and end-users. Finally, by asking how the results of FIBRE research have been or will be used, the report discusses the economic, social and conservational impacts of FIBRE. The conservation impacts are examined by investigating how the programme has related to the many societal processes connected to biodiversity in Finland during the last few years, and if the programme has dealt with the same questions that are considered important in those processes.

Table 1. A framework for the analysis of the national impact of FIBRE.

<b>Management level</b>	<b>Indications</b>
Administrative structure	<ul style="list-style-type: none"> <li>- societal expectations of biodiversity research</li> <li>- possibilities within the administrative structure</li> </ul>
Organisations involved	<ul style="list-style-type: none"> <li>- different goals and needs</li> <li>- organisational knowledge</li> </ul>
Interaction and action taken	<ul style="list-style-type: none"> <li>- internal and external communication</li> <li>- dissemination activities</li> <li>- effects of action</li> </ul>
<b>Programme level</b>	
Programme goals	<ul style="list-style-type: none"> <li>- relevance of goals in terms of the national impact</li> <li>- achievement of goals</li> </ul>
Research benefits	<ul style="list-style-type: none"> <li>- types of benefit</li> <li>- types of knowledge and time scale for knowledge use</li> <li>- beneficiaries</li> </ul>
Networks	<ul style="list-style-type: none"> <li>- characteristics of networks</li> <li>- researcher networks</li> <li>- networks between researchers and end-users</li> </ul>
Dissemination	<ul style="list-style-type: none"> <li>- aims, target groups and channels</li> <li>- success of dissemination activities</li> <li>- continuation after the programme</li> </ul>
Impacts	<ul style="list-style-type: none"> <li>- impacts within research</li> <li>- economic, social and conservational</li> </ul>

### 3. PROGRAMME MANAGEMENT IN VIEW OF ITS NATIONAL IMPACT

#### 3.1. PROGRAMME'S BACKGROUND

The beginning of the programme was special for the following reasons. The political decision behind the programme and the wide stakeholder involvement in the programme's preparation meant that societal needs were strongly considered in the programme planning. The Rio Convention had already put pressure on various stakeholders to define their responsibilities in the implementation of the agreement. This was reflected in the number and variety of organisations that contributed to programme funding. The nine funding bodies included the largest research financiers in Finland, the Academy of Finland and the National Technology Agency. Four different ministries, the Ministry of Agriculture and Forestry, the Ministry of the Environment, the Ministry of Transport and Communications and the Ministry for Foreign Affairs have also participated. In addition, the Maj and Tor Nessling Foundation, a private foundation supporting environmental research, the Central Union of Agricultural Producers and Forest Owners and the Finnish Forest Industries Federation have contributed to the funding. The financiers have remained the same during the second period.

FIBRE's management structure is special in that the programme was among the first research programmes conducted by the Academy of Finland that had an external co-ordinating office. The co-ordinating office was selected from amongst several competing offers from different universities and research institutes. The co-ordinating office started in January 1997, after the first application round was already in progress. The steering committee was appointed in April 1997 and had its first meeting in September 1997. The official opening of the programme was in May 1997. At the same time, the first projects began.

#### 3.2. COMPOSITION OF THE STEERING GROUP

FIBRE's steering committee consisted of 13 members and the programme director. Except for the Academy of Finland, each financier has had one representative in the steering committee. The Academy of Finland has had five members representing different research councils. In addition, some other members of the Academy of Finland participated in the committee work. The committee members for both programme stages were nominated by the Academy of Finland.

It seems that many members participating in the committee have been personally interested in the subject, in spite of the fact that they were nominated to the committee as representatives of their organisation. Six committee members have participated in the committee work for almost all the six years. Many others have participated both during the first and the second stage. This continuity has been positive: working together for a long time has helped to understand the different views arising in the work of the committee.

#### 3.3 ROLES OF THE CO-ORDINATING OFFICE AND THE STEERING COMMITTEE

The FIBRE co-ordinating office has been situated at the University of Turku and has included both scientific and administrative duties. According to the interviewees, the co-ordinating office was seen as necessary for such a large programme although the

financial input for its co-ordination was considered high. The co-ordinating office has succeeded better than those of many other programmes as it has been active in organising meetings and events, and has done many things beyond its basic duties. The organisation of the mid-term evaluation was successful. The co-ordination also received good marks from end-users outside the steering committee. One important achievement of the co-ordinating office has been its success in pursuing funding for some special projects within FIBRE, such as the Biodiversity awards and BITUMI books. The funding of those projects was not included in the original programme. However, there was a feeling that its pace of action slowed down towards the end of the programme.

According to some committee members, the role of co-ordination should have been different. Some had hoped for a much stronger input to individual research projects. On the other hand, it's been suggested that the co-ordinating office should have been more active in the dissemination of results, and could have included a specialist responsible for communication with end-users. However, the funding for hiring such a person was not allocated to the coordination.

The co-ordinating office has had a strong role in the programme management. It has been active in developing new ideas, and kept the programme going. The steering committee has supported the co-ordinating office, and the working relationships have been generally good. However, some members of the steering committee would have wanted to have a more active role. They have felt that the role of the committee has been mainly administrative, without any real possibility for actual involvement. Although traditionally, the contribution of funding bodies has been seen merely as financial, the large number of organisations involved in FIBRE has also meant that the committee included different types of personal and organisational knowledge. Instead of well-prepared plans and suggestions, it was felt the co-ordinating office could have asked the members what they wanted. And even though the funding periods strongly determined the programme management, there could have been changes in subjects not directly linked to project funding.

The committee members have had many other duties, which restricted their involvement in programme management. It was impossible for the committee members to follow the progress of all research projects in detail. As a consequence, some members lacked the total picture of the programme. The members often closely followed only the projects supported by their own organisation. To be able to have more influence, the members would have needed more frequent reports on projects and future programme activities. In addition, feedback from various activities organised by FIBRE was not systematically collected. This may have hampered the further development and focus of these activities. Some committee members also missed having closer contacts with the funding bodies and the researchers: with the co-ordinating office in one place and the steering committee members and projects scattered around Finland the connection has remained weak.

### 3.4 MID-TERM EVALUATION

The mid-term evaluation was carried out in March 1999. The panel met with all 36 consortia / projects within FIBRE and held discussion with stakeholders as well as with the members of the steering committee. The evaluation group presented 18 recommendations on how to improve the focus of the programme. Many of the recommendations were related to the applicability and dissemination of results and thus reinforced the views of some members in the steering committee on the importance of result dissemination. Although the evaluation was considered expensive, it was necessary because it "legitimated" these views. For the second

programme stage, the recommendations made by the international board were included in the programme memorandum. The evaluation report was seen as important because it encouraged the steering committee to discuss result dissemination. It also emphasised programme goals and that the researchers were a part of a research programme. In consequence, the funding decisions for the second programme stage emphasised the importance of working within the programme goals.

### 3.5. SELECTION OF RESEARCH PROJECTS

Generally, the programme goals were considered very good by the committee members. However, the different interests of the members and their organisations were most obvious during the selection of projects for the second stage. One committee member describes the first stage as follows:

*“In the first stage, the train had already left without us being able to have a say in deciding where it was going. We were disappointed because we could not say what kind of research we needed.”*

In consequence, the application procedure in the second stage of the programme was organised somewhat differently to the first stage. First, experts of the Academy of Finland and the programme committee members evaluated the letters of intent. Second, the international panel evaluated the scientific quality of the research applications. Finally, the steering committee made the final selection of projects from amongst those applications that had rated the highest in the scientific evaluation. In the steering committee, the proposals were discussed and special attention was paid to applicability. Each funding body was allowed to name the projects that it was mainly interested in funding. The final funding decisions were made in each individual funding organisation.

Some funding bodies had difficulties in finding suitable projects. The evaluation performed by the Academy of Finland was considered to be too science-oriented and neglectful of other criteria such as applicability or significance to business. One alternative way of making the funding decisions would have been to allow all organisations to use their own criteria. The result might have been a continuum of projects from highly scientific basic research to various types of applied research to business applications. In addition, the pattern where funding is granted only once during each programme stage was considered too rigid. This type of financing pattern gave very little opportunity to change the programme while running. Alternatively, starting fewer projects each year and having more frequent opportunities to submit applications would have meant a chance to direct research themes towards new questions if necessary.

### 3.6. BITUMI INTEGRATION PROJECT

Already during the first stage there had been some discussions on how the FIBRE results should be compiled and presented in a suitable form for end-users. The mid-term evaluation had confirmed this need. Although there were some initiatives and discussions on dissemination during the first stage, the matter became more significant at the second programme stage.

Among the research proposals submitted for the second programme stage there was one project that particularly aimed at the dissemination of research results. The strong need to disseminate FIBRE results together with the ideas from the proposed project resulted in discussions between the FIBRE management and the researchers

behind the original project. The discussions resulted in the BITUMI project (The Applicability of Biodiversity Research). Although the preliminary idea for BITUMI came from outside the committee, the final project adopted many features discussed earlier in the steering committee. The BITUMI project was financed from the research funding of FIBRE. Later on, BITUMI products such as the books have received extra support from funding bodies.

The BITUMI project was loaded with many expectations, as the aim of the programme was to narrow the gap between researchers and end-users. In this respect it has served as some kind of “a boundary organisation”. It includes four thematic groups: forest ecosystems, aquatic ecosystems, agricultural and cultural environments and developing countries. Many interviewees argued, however, that something like BITUMI should have been developed for the first stage of the programme. In addition, it was pointed out that BITUMI did not include all main societal actors or sectors in need of biodiversity knowledge.

### 3.7. SOME LESSONS LEARNED

The committee work has benefited the participating organisations in several ways. The long involvement in the committee work has helped some end-users to formulate the actual needs of biodiversity knowledge. During the committee work the members have got to know each other. This has made it possible to design new collaborative initiatives between organisations of similar research interests. They have also learned more about the organisation of research funding and how to organise their own research needs. The funding bodies have actively followed the projects that they have financed. In this way they have had a special channel for gaining biodiversity knowledge. However, it is difficult to know how widely the attained knowledge will penetrate into their organisations.

Involvement in FIBRE's management has been a learning process for many committee members. For the scientists representing academic research, it has helped to see what end-users need and how they think. For end-users, the process may have given them an idea of the kind of results that can be expected from a scientific programme. The longer-term research and less immediate applicability of scientific research were not considered useful by end-users. Although the end-users often emphasised this, they also admitted that considering the shortage of knowledge on Finnish biodiversity, FIBRE has been important because it has increased basic knowledge and built the capacity for more applied biodiversity studies in the future.

## 4. RESEARCH PROGRAMME IN VIEW OF ITS NATIONAL IMPACT

### 4.1. GOALS OF FIBRE

FIBRE has been a typical research programme lead by the Academy of Finland in many respects. However, the multidisciplinary approach of the programme and the wide societal participation in the programme management have been novel. The programme has been challenging in that it has tried to link several funding bodies with different interests and make several disciplines with different research traditions work together. However, it was not possible to cover all aspects of such a wide concept like biodiversity in one programme. In this respect the programme plan may have been even too ambitious. Besides, in the subject itself, the importance of the programme is found, in its goal of increasing interaction between different actors that produce or need biodiversity knowledge.

The main programme goals are explained in the programme memorandum. The text highlights applicability, the simultaneous protection and use of diversity, the training of biodiversity specialists and a multidisciplinary approach to better understand the societal connections of biodiversity. Although these goals have been the relevant ones, they are contradictory to some extent. In particular this concerns the combination of high quality research with applicability, plus high quality research with a multidisciplinary approach.

#### 4.1.1. Applicability

*"I am sure that lots of work has been done in FIBRE to attain applicability. Applicability in the research community is, however, different from that for end-users. What has been considered applicable here is still a long way from applicability in operative environmental work."*

One general problem when assessing the applicability of the research is due to the different meaning of the word to different stakeholders. The general impression was that applicability for FIBRE was not the kind of applicability that the end-users had been expecting, although during the second period FIBRE's results became more applicable. However, there are also examples of immediate applications among the project results. The applicability of FIBRE projects seems to have been best achieved in the ones where it had been thoroughly planned in the beginning.

#### 4.1.2. Multidisciplinary approaches

A multidisciplinary approach to biodiversity research is considered important because decision-making cannot be based on just one type of data. Instead, decision-making is best supported by a combination of knowledge attained from social, economic and biological studies. Irrespective of how the multidisciplinary approach has been reached, FIBRE was praised for including it among the major goals.

In FIBRE, there are many projects that include researchers from several disciplines. In particular, crossing the divide between the natural and social sciences has turned out to be very laborious. A multidisciplinary approach within the natural or social sciences seems to have succeeded better. Although getting these multidisciplinary research groups to collaborate has been a real challenge, the experiences have

been rewarding. The success has been due to the strong personal wishes and determination of the researchers. It is likely that the collaboration will continue after FIBRE.

Many researchers feel that they are facing contradictory expectations. The evaluation and funding based on the requirement of high scientific quality and a large number of publications often meant that the researchers have had to specialise. In addition, doctoral theses are submitted to one discipline only. In summary, *ad hoc* multidisciplinary working can, at its best, result in effective but separate work by researchers in different disciplines.

#### 4.1.3. Training of biodiversity specialists

A biodiversity specialist is expected to have a wide understanding of biodiversity issues. The specialist training in FIBRE has included some courses on general themes such as the Convention of Biological Diversity, and some specific themes on communication skills, e.g. how to write popular articles or represent scientific data. It seems, however, that all the possibilities for specialist training have not been explored.

The projects have not produced biodiversity specialists with a wider disciplinary orientation. Even in projects with a multidisciplinary approach the doctoral students have concentrated their research in their own disciplines. Doctoral students, constrained by a short funding period, were not given much chance to explore the different dimensions of biodiversity. This is not to say that there would not be biodiversity specialists among the doctoral students of FIBRE. According to a short survey of the doctoral students, many of them have concentrated on their own thesis (Table 1).

The questionnaire was sent to 116 research students working in FIBRE with a known e-mail address. 29 students (25 %), belonged to 21 different project/consortia answered. All students, except one, received funding from FIBRE; the funding period varied from 3.5 months to six years. 57% of the students had received funding for three years or more. Three of the 29 students had already completed their doctoral thesis, and continued research in the same project. For most students, the expected year of dissertation was either 2002 (34 % of students) or 2003 (41 %). Half of the students in this group would not complete their thesis before the end of FIBRE.

The students were asked to rate the programme activities that had supported them in their scientific research and in becoming a biodiversity specialist. They were also asked to rate their own participation in these activities.

**Table 1.** The results of a short survey of FIBRE research students. The table shows the average scores given for the FIBRE activities and the students' own participation in them.

The FIBRE activities have supported	FIBRE	Own activity	N
Scientific research	3.5 ± 0.8	2.4 ± 0.9	23
Specialist training	3.6 ± 0.8	2.4 ± 0.9	21

Scale: 1= poor, 2=moderate, 3=good, 4= very good, 5=outstanding

The average score for both types of FIBRE activities were very similar, being between good and very good. However, the students had not used these activities very effectively. The average score for own participation was only slightly better than moderate. Two thirds of the students (18 out of 28) stated that FIBRE had helped them in their scientific research. Eight students mentioned seminars, and three students mentioned courses organised for doctoral students. One third did not see that FIBRE activities per se had helped them in their scientific research. Many of them commented that the help for their research education had mainly come from their own project/consortia (7) and that the benefits from FIBRE were mainly financial (5). Of the 26 respondents, 12 did not either know of activities supporting specialist training or stated that the topics had not been relevant to them. The most commonly mentioned activity in this respect was seminars (7 respondents); being a part of a large research programme had helped some to see their own research in a wider context (3); some emphasised their own activity in becoming a specialist. Not a single respondent mentioned the FIBRE training courses organised for research students. 15 students also commented on what more they had wished from FIBRE. At the top of the list were courses (6 respondents), in particular, on research methodology. 21 students also added some further comments about FIBRE. The critical comments concerned too small a research fund or too short a funding period and problems in their own project/consortia. Doubts about their interdisciplinary collaboration were also expressed. The projects selected for the programme were criticised for being old projects with new titles. Also the annual project reporting demanded by FIBRE was considered too laborious. However, most students thought that FIBRE had been a good research programme.

## 4.2. KNOWLEDGE PRODUCED BY FIBRE

### 4.2.1. Types of knowledge produced by FIBRE

The amount of knowledge produced by FIBRE can be described by counting the number of publications and academic theses written. However, this is not all the knowledge produced during the scientific research. As one interviewee put it: "*there is a strong feeling that something important cannot be measured in this way*". This is why the interviewees were asked to estimate the proportion of documented versus tacit knowledge produced by FIBRE. This figure is of course very personal and vague. Most interviewees estimated the proportion of tacit knowledge to be about 50 – 70 %, although the estimates varied a lot (range 10 – 70 %). FIBRE was considered to have produced lots of tacit knowledge, perhaps more than other research programmes in general. Another division of knowledge into conceptual knowledge versus instrumental information, describes the way knowledge can be applied, and how widely and how long it is expected to be useful. The estimated proportion of conceptual knowledge, describing the production of ideas and concept, was about 50 – 60 % (range 10 - 60%). Thus, FIBRE has produced a fairly even mixture of these two types of knowledge. In addition, much of the knowledge produced by FIBRE is likely to be useful for a long time.

### 4.2.2. Who has benefited from the knowledge

Knowledge produced by FIBRE has many potential beneficiaries. The most frequently mentioned beneficiaries of FIBRE's research included the government administration, in particular, the environmental, agricultural and forest administrations. Actors at regional and local levels such as regional environment

centres and forest centres were also seen as beneficiaries. In addition, various organizations, which do not have research activities of their own, need up to date knowledge. These organisations included, for example, various interest organisations or conservation organisations. However, although basically major users of biodiversity knowledge, conservation organisations may not benefit much from FIBRE due to the tailored knowledge often required for practical conservation plans.

Of the individual sectors covered by FIBRE, the forest sector has been one of the main beneficiaries. Environmental management in the forest industry and regional and local actors in fields such as foresters and forest owners need biodiversity knowledge. For instance the Forest and Park Service, manages state-owned forests in Finland and will need knowledge on how to take the natural values of these forests into account. Private forest owners may be interested in alternative ways of using their forests. In agriculture, landowners and farmers also need knowledge on how to manage their land in order to maintain biodiversity. In addition, other groups of beneficiaries may include educational programmes at various schools and institutes. In studies on developing countries, the main stakeholders could include foreign affairs administrations, consulting companies and other Finnish and foreign actors working in developing countries. Last but not least, FIBRE researchers form a large group of beneficiaries. Besides funding, they have gained new knowledge, new contacts and degrees. FIBRE researchers are also the most immediate beneficiaries.

### 4.3. NETWORKS WITHIN FIBRE

#### 4.3.1. Networks between scientists

*"Although it is nothing permanent and profound, we know each other thanks to FIBRE. We would not be networking otherwise. Biodiversity researchers network more than many other research communities. If I have a question, I know whom to contact."*

A typical situation that has helped networking between researchers beyond their own research group has been a small meeting or a seminar that FIBRE has organised. However, the interdisciplinary networking has not generally progressed as much as hoped. Opinions among interviewees also differed on whether FIBRE had promoted any networking at all, in particular, during the second stage. The meetings involving all FIBRE researchers organised during the first stage had served networking well. During the second stage, these events were missing.

The project reports gave an opportunity to examine researchers' networks within FIBRE in more detail. The FIBRE projects have had participants from 31 Finnish organisations. The number of organisations participating in one project / consortium varied between one and seven, the average number being  $2.7 \pm 1.7$  (mean  $\pm$  s.d.). Most of the researchers in the projects came from the universities. The number of FIBRE researchers was largest at the University of Helsinki (30 % of FIBRE researchers), followed by The Finnish Forest Research Institute with 10 % and the Universities of Joensuu and Turku with over 9 % of the researchers.

Figure 1 summarises the network patterns of FIBRE projects. A network is defined as co-occurrences of organisations in projects. The distances between organisations indicate the similarity in networking (the similarity of contacts). The circle size indicates the total number of FIBRE projects at each organisation. The connecting line between two organisations indicates collaboration, and the thickness of the line

shows contact frequency between the two organisations (how many joint projects / consortia). The networks have been analysed by the Alscal procedure in SPSS. Of the thematic groups, the aquatic group included 17 different Finnish organisations. Of these organisations, the University of Turku and the Finnish Environment Institute were the most common partners both having research projects with eight organisations, followed by the University of Helsinki and the Ministry of Forestry and Agriculture both with seven partner organisations.

The second thematic group, the forest group, included 16 Finnish organisations. The most frequent partner in these projects / consortia was the Finnish Forest Research Institute which had joint projects with 14 organisations, followed by the University of Helsinki (13 organisations) and the University of Joensuu (nine organisations). If the frequency of collaboration between two organisations is considered, the most frequent contacts occurred between the Finnish Forest Research Institute and the University of Helsinki (nine contacts).

The third thematic group, the agricultural and cultural group, included 15 organisations. In this group the University of Helsinki had research projects with seven organisations, followed by Agrifood Research Finland and the Finnish Environment Institute with five organisational contacts.

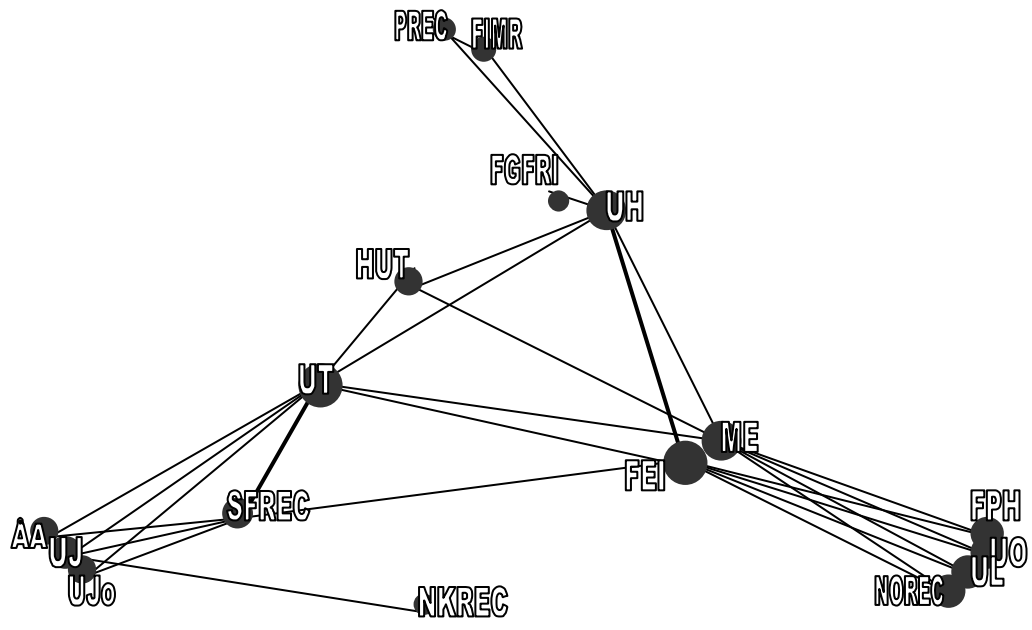
The fourth group analysed developing countries and included only four projects and involved five Finnish organisations.

Looking at project participation from the end-users point of view, the most common project participants were the Finnish Environment Institute and the Finnish Forest Research Institute, which are also parts of the government administration. The Finnish Environment Institute is the national environmental research and development centre of the environmental administration within Finland. The Finnish Forest Research Institute, on the other hand, is a large organisation with research centres and research stations in different parts of Finland. Its duties include, for example, research, information services for end-users and the management of some research forests and nature conservations areas.

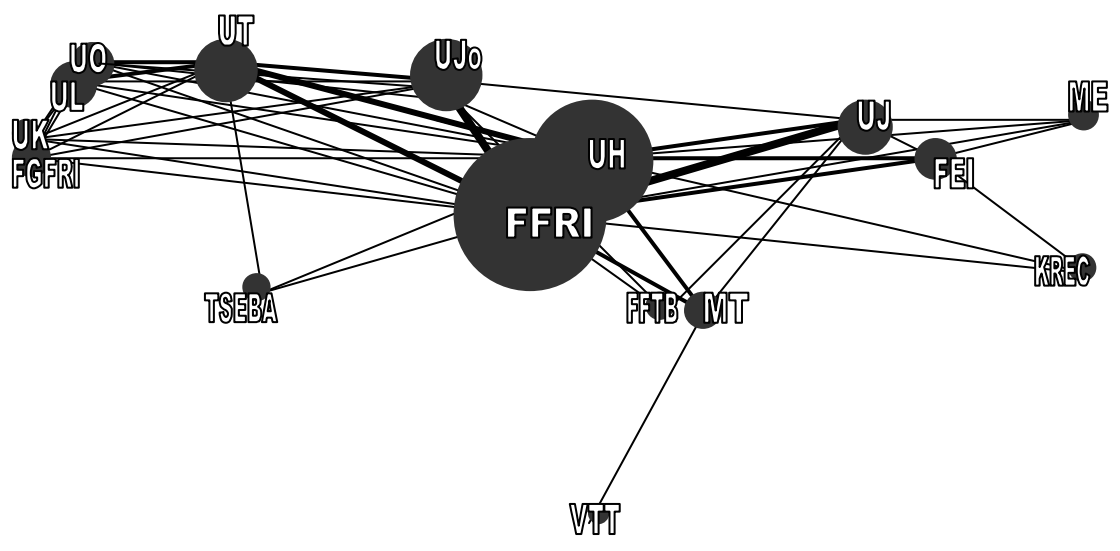
**Figure 1.** The networks of the FIBRE projects. The projects have been divided into four thematic groups. See text for further explanation of the figures.

The organisation's abbreviations. **ARF**, Agrifood Research Finland; **CH**, City of Helsinki; **EC**, EmbryoCenter Ltd.; **FEI**, Finnish Environment Institute; **FFRI**, Finnish Forest Research Institute; **FGFRI**, Finnish Game and Fisheries Institute; **FIMR**, Finnish Institute of Marine Research; **FPH**, Fortum Power and Heat; **FTTB**, Foundation for Forest Tree Breeding; **HUT**, Helsinki University of Technology; **KREC**, Kainuu Regional Environment Centre; **MAF**, Ministry of Agriculture and Forestry; **ME**, Ministry of Environment; **MT**, Metsäteho; **NKREC**, North Karelia Regional Environment Centre; **NOREC**, North Ostrobothnia Regional Environment Centre; **PREC**, Pirkanmaa Regional Environment Centre; **SFREC**, Southwest Finland Regional Environment Centre; **SE**, Stora Enso Forest Consulting Ltd.; **TRCF**, Technical Research Centre of Finland; **TSEBA**, Turku School of Economics and Business Administration; **UH**, University of Helsinki; **UJo**, University of Joensuu; **UJ**, University of Jyväskylä; **UK**, University of Kuopio; **UL**, University of Lapland; **UO**, University of Oulu; **UTa**, University of Tampere; **UT**, University of Turku; **WWF**, WWF Finland; **ÅA**, Åbo Akademi.

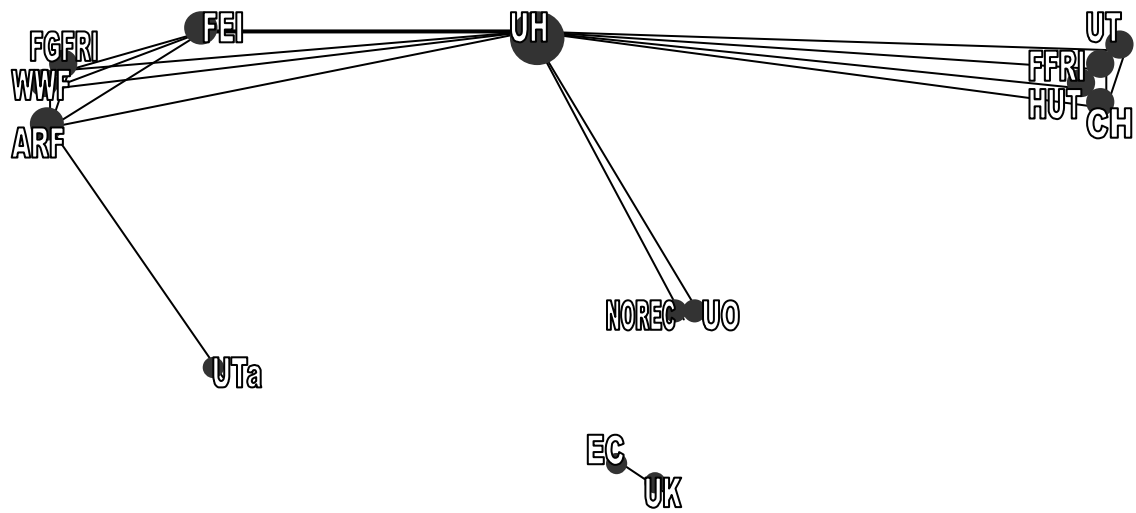
Projects on aquatic ecosystems



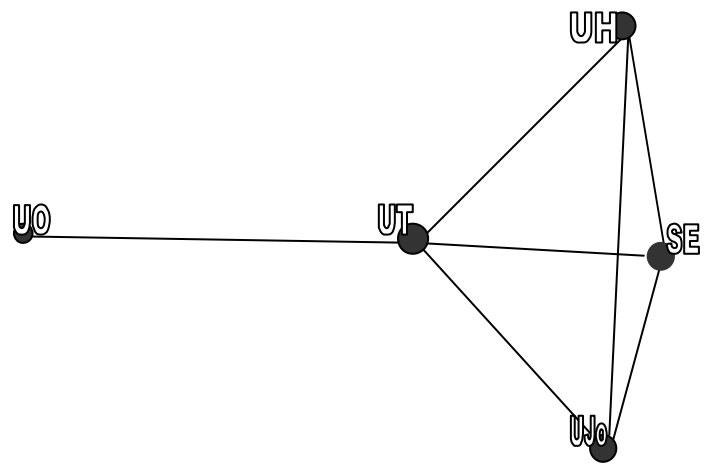
Projects on forest ecosystems



Projects on agricultural and cultural ecosystems



Projects on developing countries



#### 4.3.2. Networks between researchers and end-users

*"One thing that has been neglected in managing research programmes in general is that the programme should master networking with stakeholders and it should continuously look for new ways of interaction. Research programmes should be better integrated into the whole of society and to the national innovation system."*

Some interviewees were very satisfied with their own personal networking between researchers and end-users. The networks included national and local administrations, the business world, different organisations and universities. End-users, like researchers, also had their own networks. Contacts between end-users could be extensive and sometimes they were considered more important than direct contacts with researchers. The contacts between end-users had been created, for example, while working in the many committees of the various national processes related to biodiversity. Many committees often included the same people, which facilitated the building of the networks.

Besides that, some end-users have been directly involved in FIBRE projects, FIBRE and BITUMI have also had other activities that have supported the contacts between researchers and end-users. Networking was facilitated by joint events. For example, BITUMI brought together end-users from forestry and ecologists studying forest ecosystems, two groups that did not have many contacts before FIBRE. However, although some end-users had benefited from FIBRE events in terms of networking, some others did not see that FIBRE has helped in any special way.

#### 4.4. DISSEMINATION OF FIBRE RESULTS

##### 4.4.1. Channels of dissemination

In relation to FIBRE the following channels were mentioned:

1. **Research collaboration between end-users and researchers** is considered to be one of the most effective ways of disseminating results.
2. **FIBRE researchers** can act as a channel. Many researchers have been working as experts in various national processes concerning biodiversity.
3. **The funding bodies** have a special access to research knowledge produced in the programme, in particular, by closely following the projects that they finance.
4. **Events organised by FIBRE and BITUMI** have gathered together researchers and end-users and thus provided the possibility for direct contact.
5. **Specialist training** will also be an important channel in the future provided FIBRE specialists find jobs outside research, for example, in administration.
6. **Networking** is considered a very important channel for dissemination. It especially involves many future opportunities for collaboration.
7. **Publications** are the traditional channel of dissemination. It is considered a good channel because they are available to all.

8. The **Internet** is a channel for people worldwide to read about FIBRE. It can also offer the most recent information.

9. **Teaching programmes in universities and schools** will be able to use the material produced by some projects.

10. The **media and newspapers** are generally considered as having a very diffuse impact.

#### 4.4.2. FIBRE events

FIBRE co-ordination has organised many events during its six years. There have been several meetings and seminars aimed at various end-users, researchers, doctoral students and also the general public.

Events aimed at all FIBRE researchers were generally considered useful because, besides giving researchers an opportunity to meet each other, they also encouraged researchers to develop multidisciplinary thinking. The possible failures were related, for example, to the fact that researchers had not made their presentation understandable for colleagues from other disciplines. In addition, some FIBRE researchers had not participated in meetings due to a lack of time and interest.

Events for research students organised by FIBRE have included courses on the Convention of Biological Diversity and on the oral and written presentation of scientific results. Besides the actual subject of the course, the courses have contributed to the networking between young researchers. However, only about half of the students on these courses have been FIBRE doctoral students.

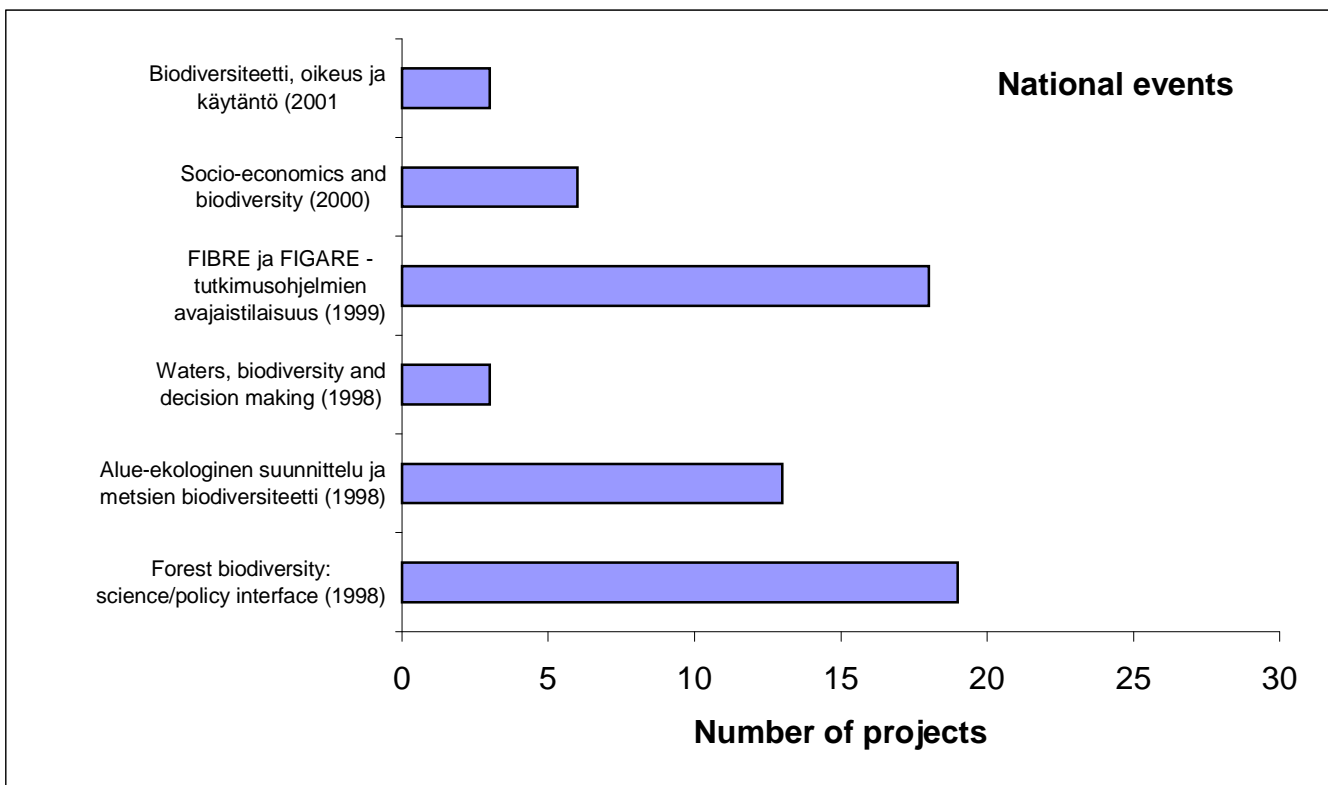
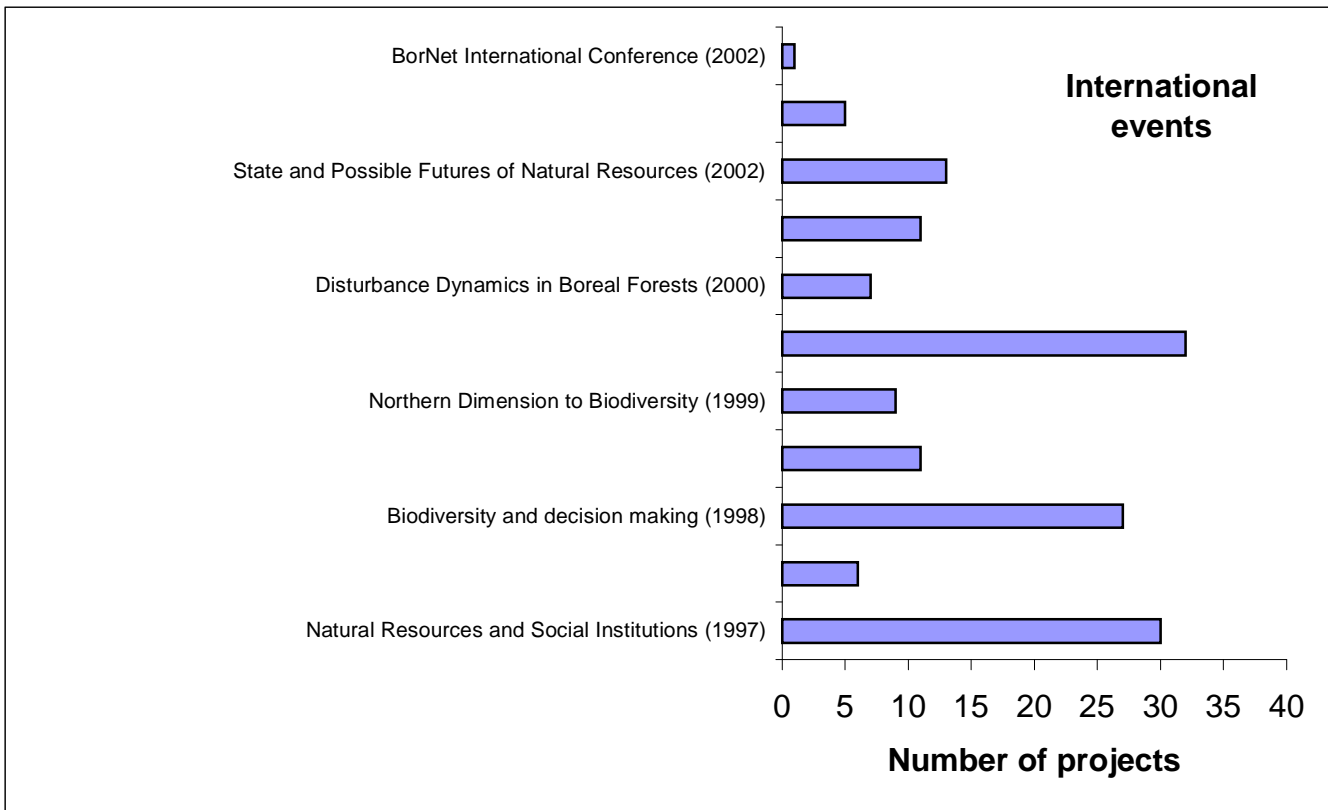
Events organised for end-users have had variable success. It seems that many FIBRE events have been too wide ranging in trying to provide “something for everybody”. Events usually organised for a specific group of end-users have been more successful. In those meetings the subjects have been closer to the needs of end-users and the discussions have been more useful. The FIBRE events where researchers have explained their own work to end-users received mixed ratings from the interviewees. Some events had worked well, some others not. The failures were perceived as resulting from researchers concentrating too much on specific information and the lack of senior researchers who could have provided the end-users with a more general picture. On the other hand, in some cases there had been only a few end-users present. Another reason why the events may not have reached their audience is that biodiversity research, even when discussed in ordinary language, may require much basic knowledge to be understood. People working in the field may not have understood because they were not able to integrate the new knowledge into the existing one.

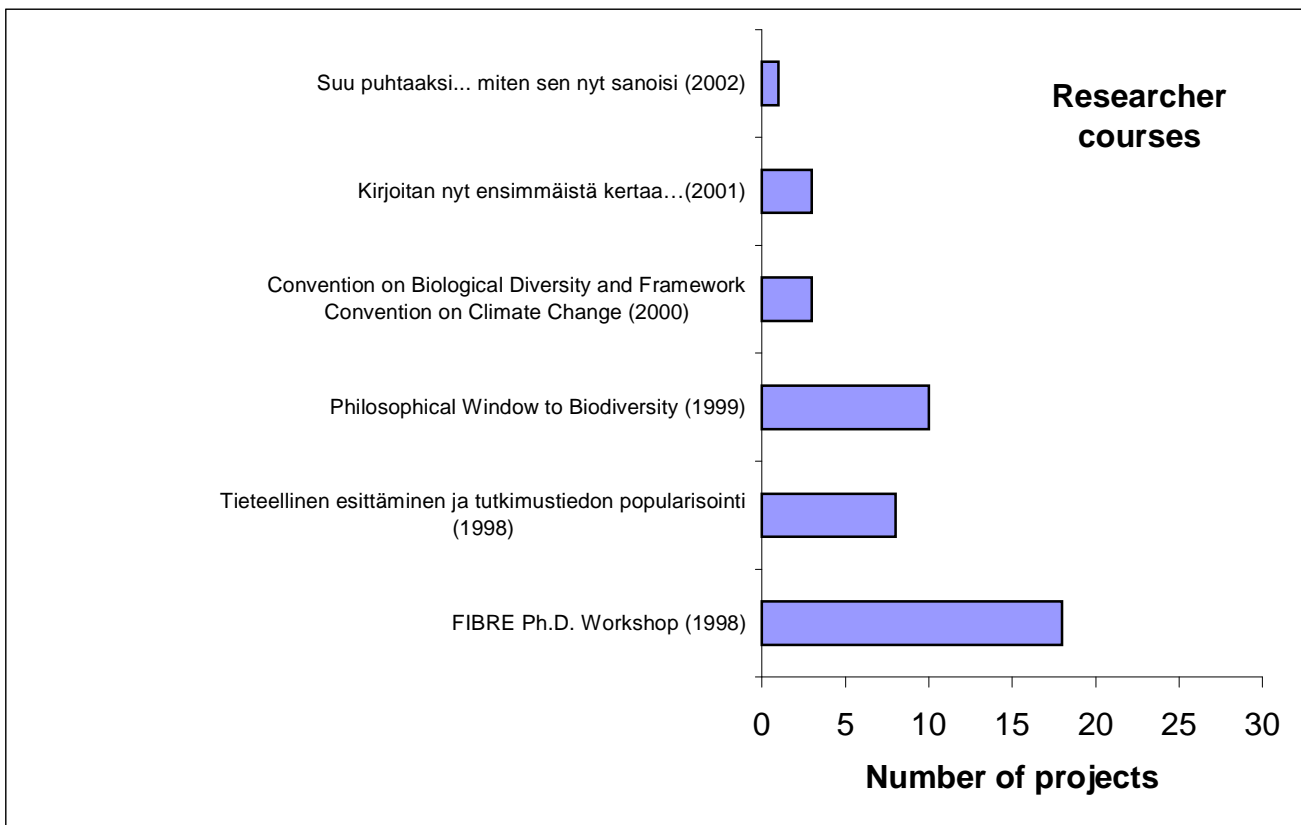
Finally, events for the public were regarded as having been too focused around the Biodiversity Awards given to organisations or persons who have promoted public awareness of biodiversity. FIBRE's co-ordinating office has also twice participated in science fairs where, for example, panel discussions and biodiversity contests for the general public have been arranged. These types of events are not typical for a research programme.

#### 4.4.3. Project participation in FIBRE events

The lists of participants at FIBRE events allow a closer examination of how attractive the events were to FIBRE researchers (Figure 2). In international events organised by FIBRE, about one third of the participants were FIBRE researchers. In national events, the corresponding figure has been about the same. In FIBRE researcher courses, less than half of the students were from FIBRE projects. The proportion of FIBRE researchers from different research organisations participating in FIBRE events was very similar to their proportion among FIBRE researchers. The only clear exception was the University of Turku, where the proportional representation, in particular, in national events and researcher courses was clearly higher than the proportion of the FIBRE researchers.

Figure 2 shows the number of projects that participated in the international FIBRE events (11 events were analysed). The most popular events in terms of the number of projects were “FIBRE’s 3<sup>rd</sup> International Symposium” in 1999, “Natural Resources and Social Institutions” in 1997 and “Biodiversity and Decision Making” in 1998. The lowest numbers of FIBRE projects were found in events such as the “Bornet International Conference” in 2002 and “Capital C – A seminar on Carbon Cycling” in 2002. Of the national events analysed (six events were analysed), the joint opening of the programmes FIBRE and FIGARE in 2000 and the event “Forest biodiversity: the usage of research results” in 1998 were the most attractive ones for the FIBRE projects (Figure 2). Of the researcher courses (six events were analysed), the most popular amongst the FIBRE researchers was the “FIBRE PhD workshop” in 1998 (Figure 2). In addition, the course “A Philosophical Window on Biodiversity” in 1999 and “Scientific presentation and the popularisation of scientific results” in 1998 were popular among FIBRE projects. The least popular was the course “Suu puhtaaksi-miten sen nyt sanoisi”, a course on oral presentation in 2002. The number of projects participating in different events partly reflects the subject of the event. Some with a narrower focus had fewer projects. However, compared to the events with a wider focus, it seems that project participation may have been more active for events organised during the first stage.





**Figure 2.** The number of participating projects / consortia at international events, national events and researcher courses organised by FIBRE. See Appendix 2 for the whole names and dates of the events.

#### 4.4.4. Stakeholder participation in FIBRE events

The list of participants at different FIBRE events also gives an opportunity to see how FIBRE events have attracted various groups of stakeholders. Altogether 97 organisations participated in the analysed events (see Appendix 2). The largest group of stakeholders came from the universities and research institutes. Of the individual universities, The University of Turku and The University of Helsinki had the highest proportion of participants. Of the research institutes, The Finnish Environment Institute and The Finnish Forest Research Institute had the highest number of participants.

Altogether six different ministries participated in the events comprising over ten percent of the participants. The most frequent participant was the Ministry of the Environment. Ten different regional centres made four percent of the audience. Although the number of participants coming from companies was small, the group nevertheless included 15 companies. Other participants included, for example, various development centres. The individual end-user with the highest number of participations at FIBRE events was the Forest and Park Service, with over ten percent of participants. The Forest and Park Service is a state enterprise responsible

for the greater part of Finland' s protected areas. It operate within the administrative sectors of the Ministry of Agriculture and Forestry and the Ministry of the Environment. However, looking at the stakeholders in general, it is difficult to identify many that would have participated in FIBRE events on a regular basis.

#### 4.4.5. Role of BITUMI in dissemination

The BITUMI organisation consists of a steering group plus three BITUMI researchers. The three actively functioning BITUMI groups include forest, aquatic and agricultural and cultural groups. The fourth group examining developing countries is in a more initial stage. Although BITUMI is best known due to its book projects, its main idea has been to seek new ways for aiding communication between researchers and end-users. In general, it has increased interest on both sides, and it is likely that these types of contacts would not have happened otherwise. The most visible products, the three books, are to be published in 2003. Other activities have included meetings, excursions, questionnaires and various other developments related to the communication between researchers and end-users. The aim of the activities has been to clarify the needs of end-users in terms of research knowledge and to see what knowledge the researchers have for end-users. BITUMI researchers have participated in many national and international meetings. In addition, together with officials from the Finnish Environment Institute, the BITUMI researchers have been developing a solution for communicating FIBRE results in the Finnish Clearing-House Mechanism for Biological Diversity, LUMONET.

Aquatic BITUMI, including of 12 projects / consortia, has arranged two large seminars. The first seminar included the presentation of projects belonging to aquatic BITUMI. The second one concentrated on the EU water framework Directive. The BITUMI researcher has also interviewed both researchers and end-users. She has also actively presented aquatic BITUMI in various, mainly national meetings and events. In aquatic BITUMI, the two seminars were attended by 12 research projects /consortia and 13 organisations of end-users. Four organisations of end-users and nine projects participated in both seminars. At the individual level, two end-users and four researchers have participated in both seminars.

Forest BITUMI, including 19 projects / consortia, has organised four seminars with researchers and end-users and made one field trip. The researcher also visited various forestry events to disseminate information about BITUMI. Forest BITUMI has also had contacts with BorNet, an international initiative aimed at collecting information on boreal forests. One "experiment" in forest BITUMI has been the series of three seminars on biodiversity indicators in forestry, which aimed at closer interaction between researchers and end-users. In Forest BITUMI 35 organisations of end-users and 17 projects have participated. The first seminar and the field trip were attended by 20 organisations of end-users and 15 projects. Looking at the series of three special seminars on indicators in more detail, it was attended by 18 organisations of end-users and 10 projects. Of the end-users, four organisations and three persons attended all three seminars. Of the projects, three projects and one researcher attended all three seminars.

The agricultural and cultural BITUMI, consisting of nine projects / consortia, has included a very wide range of research topics. After it started, it was been divided into agricultural and cultural parts because the questions the end-users were interested in were very different. It has arranged two seminars. The first one concerned the same topic as in the other BITUMI groups, i.e. the presentation of research projects belonging to the agricultural and cultural BITUMI. In the second

seminar, the participants discussed ways to proceed in the future with regard to collaboration and knowledge integration. Agricultural and cultural BITUMI has suffered somewhat from a lack of end-user participation. The end-users participating in the two seminars came from six different organisations; two organisations and three individuals participated in both of the seminars. Research participants came from eight different projects. Of the projects, five had a representative in both seminars; four researchers participated in both seminars.

Taking the three BITUMI groups together, there seems to be a general problem of not having had the same end-user organisations and projects, or the same people regularly participating in the events. This made it difficult to establish personal networks.

The most important factor determining the success of the BITUMI groups has, nevertheless, been the interest of actors to participate in them. It seems that it has been easiest in Forest BITUMI. In this group, the number of possible stakeholders has been large enough to support group discussions and other activities. In the other two groups, the active groups have been much smaller. Another success factor for the BITUMI groups has been that the process has taken place on a neutral ground. The importance of this is seen, for example, in discussions related to forest biodiversity. However, one drawback in participation has been the lack of incentives for working closer and for more active collaboration.

All FIBRE projects may not have found the BITUMI project useful. Although BITUMI was meant to be an integration project, several FIBRE researchers have not been specifically integrated into its activities. For example, all projects have not been involved in writing the three BITUMI books.

#### 4.5. ECONOMIC, SOCIAL AND CONSERVATIONAL IMPACTS OF FIBRE

##### 4.5.1. Economic impacts

Most projects in FIBRE deal with conservation and examining how to safeguard or restore biodiversity or how to get information on the state of biodiversity. Projects examining the use of biodiversity consist of some heterogeneous examples. The relationship between conservation and the sustainable use of biodiversity may not have been fully explored in FIBRE.

In forest and aquatic projects, the economic impacts arise from new managements practises examined in the many projects. Some of this work, such as the microbiological factors affecting forest regeneration, has been carried out in collaboration with private companies. The systematic selection of conservation areas and cost-efficient landscape design methods has been developed in a few projects. Applying biotechnology for environmental work such as testing environmental samples or developing genetically modified plants or *ex-situ* reproduction techniques for endangered species has the potential to result in commercial products. Furthermore, examining agri-environmental policy can have direct impacts via the implementation of agricultural policy. The slightly less direct economic impacts of biodiversity research could include the development of new legal instruments to safeguard biodiversity. Environmental legislation via various regulations, for example, concerning the rights to genetic material or patents, can have both positive and negative economic effects on business. The indirect economic impacts of biodiversity research are often related to its public image. By adopting environmentally friendly practices, companies and organisations can create a positive image for themselves

in the community. These types of impacts could result, for example, from projects examining how to safeguard biodiversity in energy production or forest management. In FIBRE, the economic impacts of research came via an improved public image and this is likely to be larger than any other economic impact.

#### 4.5.2. Social and regional impacts

The direct social impacts of FIBRE are difficult to find. Studies from developing countries show that safeguarding forest biodiversity means a better life for people in terms of a more diverse and a more secure food production source. Whether the research results can affect local decision-making in the respective countries is another matter. In Finland, similar positive social impacts could be identified in agricultural projects supporting the future vitality of farms and the countryside. A more general social impact of biodiversity research conducted by FIBRE could come via a change in public attitudes and lifestyles towards more a sustainable use of natural resources. These types of impacts resulting from FIBRE could come via access to science-based information concerning the environment.

The regional social impacts of FIBRE are similarly scarce, although regional aspects are present, in many FIBRE projects. The environmental administration in Finland has been divided into regional centres, which often means that regions are also seen as operational units in environmental research. This is practical because different parts of Finland often have very different needs in terms of research. Biodiversity could contribute positively to regional development in rural areas by creating jobs in ecotourism or in recreation-related business. However, opinions on the size of this effect vary amongst experts.

#### 4.5.3. Impacts of FIBRE on biodiversity research

The impacts of FIBRE on biodiversity research in Finland will come via both research results and researchers. The existence of a large research programme has had a strong stimulating effect on the research community. However, this impact depends on the discipline. In some biological sciences biodiversity-related research has been in existence for a long time. In some other disciplines, research into biodiversity is still a rather new topic that has to be further encouraged. For example, the small number of economic studies among FIBRE projects was seen as problematic. The social effect of biodiversity has also been a neglected subject even though FIBRE included projects examining the social aspects of, subjects like plant cultivation or forest management.

Looking at the three levels of biodiversity, there are many projects dealing with species diversity. Project/consortia concentrating on this level have examined factors affecting the survival and viability of populations. More research though could have been expected, for example, on endangered species. Some projects in FIBRE have promoted taxonomic skills. However, the lack of experts in this field was seen as problematic for the future safeguarding of biodiversity. Ecosystemic diversity is well represented among FIBRE studies. Research at the ecosystem level can be considered important for practical reasons. When appropriate, an ecosystemic approach in nature conservation is often easier to apply compared with species or genetic diversity. Genetic diversity has received less attention in FIBRE than the other two levels. Genetic diversity is examined in connection with some economically important species such as forest trees or fish but also with some less well known groups such as bacteria or phytoplankton. Some projects have left genetic diversity

out because it is expensive and they would have had to do it at the expense of the other parts of the project.

#### 4.5.4. Conservational impacts of FIBRE

The general role of FIBRE in society can be seen as a reminder of the importance of biodiversity, for example, to administrators and politicians. In this respect, it may have contributed to the change of attitude towards research. Simultaneously with FIBRE, there have been many national processes related to biodiversity taking place in 1990's. It seems however, that many conservation processes in Finland have followed their own path, and FIBRE has affected them only on some individual questions. For example, Natura 2000 and FIBRE have had little in common. Some interviewees thought that even if FIBRE had been planned to serve decision-making, it would not have succeeded any better than it has. Decision-making is a political process, where scientific data is only one factor that decisions are based on. Difficulties in connecting it to political processes are also due to the different logic of research versus decision-making, and practical problems such as differences in time scales.

The National Biodiversity Action Plan and FIBRE were started with the same decision-in-principle in 1995 (Ministry of the Environment 1997). The Convention of Biological Diversity required, besides national conservation action, measures to improve Finnish knowledge about biodiversity. FIBRE was designed to serve this goal. The interviewees considered this connection closer than perhaps thought at the beginning. FIBRE began earlier than the National Biodiversity Action Plan, and the connection between the research needs of the action plan and the research made by FIBRE seems therefore weak. The nature and time scales of these processes have also been quite different. The National Biodiversity Action Plan has benefited from its connection to FIBRE at a general level. FIBRE has also contributed to the action plan by increasing biodiversity knowledge. And, more concretely by suggesting alternative practises. How much FIBRE results have affected the plan is unclear. Many persons involved in FIBRE have, however, been active in the two specialist committees of the National Biodiversity Action Plan. In connection with the action plan, BITUMI researchers have participated in the development of the National Clearing-House Mechanism of the Convention on Biological Diversity, LUMONET.

The impacts on the conservation of forest biodiversity consist of various results used in forest management and landscape ecological planning. Further FIBRE related conservation impacts come from studies on the selection of areas for forest reserve networks or the management practises of nature reserves, for example, the use of fire. Results on the cost and benefits of the forest conservation programme have been used to evaluate, for example, the Finnish EU Natura 2000 conservation programme. In the future, genetic aspects related to forestry are likely to become more important in the conservation of forests.

The results of FIBRE related to forest biodiversity have mainly been discussed in connection with the Finnish Government Commission on Forest Protection in Southern Finland, known as the Metso commission, which started its work in 2000. The commission consisting of several working groups, gave its recommendations to the Finnish government in the summer of 2002. Even before the Metso commission, a working group on the need for the protection of forests in Southern Finland (known as ESSU, 1997-2000) examined the conservation status of the forests. Several FIBRE researchers have actively been involved in these processes either as a member of a working group or as an invited speaker to describe their research

findings. The working group for the restoration of forest and mire habitats has also heard invited FIBRE researchers.

Some of the interviewees were disappointed at the contribution FIBRE has given to the Metso process. The commission has, for example, listed the needs for research regarding ecological, social and economic factors in safeguarding forest biodiversity. It was argued that FIBRE should have produced this knowledge. FIBRE may have been contributed the ecological research questions, but the other research needs, viz. economic and social questions, were not fully covered by FIBRE. On the other hand, it was noted that some of the listed questions were more applied than expected from FIBRE research.

Aquatic and agricultural processes related to biodiversity have also used or will use FIBRE results. Aquatic projects in FIBRE include many that can have practical impacts, for example, when specific needs for under water nature conservation is considered. Some other studies have already affected discussions and decision-making, for example, on the national network of marine and coastal protected areas. However, it is unclear if FIBRE will give many direct answers to the conservation needs, for example, in Finland's Baltic Sea Protection Programme. On the other hand, studies on the best practises in many aquatic projects are likely to have concrete impacts. For example, the projects have examined methods for the restoration, transplantation and erosion protection of rivers. These studies connect to the EU water framework Directive that defines a good ecological water state and considers a wide range of quality criteria that require measures to monitor aquatic environments and their biodiversity.

Research conducted in FIBRE is also likely to contribute to the national agri-environmental programme and its implementation. There is a need to renew the policy and bring new elements into it. So far, conservation elements in the agri-environmental programme have concentrated on the protection of waters. The new programme will include many other elements, such as safeguarding biodiversity and adapting to climate change.

## 5. CONCLUDING REMARKS

This part of the report has closely examined the national impact of the FIBRE research programme, within the programme and amongst some end-users. The material has consisted of interviews, surveys and various documents. One general problem when considering FIBRE in relation to the factors reported here has been the role of FIBRE as a research programme. On the one hand, FIBRE has been a programme that aimed at financing high quality scientific research and set this as its most important goal. On the other hand, the nature of biodiversity research and the wide participation in programme financing have emphasised the importance of using its knowledge for decision making and biodiversity conservation in the field. These diverse expectations also characterise the expert opinions on the national impact presented in this report.

The three major objectives of the programme, viz., applicability, a multidisciplinary approach and specialist training provide examples of the challenges derived from the different expectations. For example, applicability has been present in many projects, although this may not have often the kind of applicability expected by end-users. A multidisciplinary approach has also been promoted during the programme and it may have succeeded well in some projects. The specialist training may not have succeeded in producing biodiversity specialists in the sense planned at the beginning

of the programme. These outcomes can usually be explained by factors not under the control of FIBRE. For example, the generally tight time schedules for doctoral students has forced them to concentrate only on their own research.

There are some very general societal impacts of FIBRE that can be named at the programme level. These are, for example, the stimulation of biodiversity research or the increasing awareness of biodiversity and sustainable development issues in Finnish society. The more concrete economic, social or conservational impacts of FIBRE can be found at the project level. There are some studies that will result in direct or more often indirect economic impacts. Some social impacts could also be named. Most of the impacts of FIBRE are of a conservation nature, which of course will also result in some economic or social consequences. The conservational impacts seem to be derived from FIBRE researchers participating in various national processes related to biodiversity. Some research results have also been applied in these processes. It should be remembered that while this report was being written, many FIBRE projects were still processing their results. Furthermore, it will also take time to take these results to the decision-making processes and/or practical biodiversity work. On the other hand, the large amount of tacit knowledge generated by FIBRE suggests that in the future FIBRE researchers will be an important source of biodiversity knowledge in Finland.

The dissemination of the research results has arisen as one of the main issues of FIBRE during the second stage of the programme. The question remains, however, how well has FIBRE managed to penetrate the awareness of all societal actors? For example, the number and activity of stakeholder organisations regularly participating in FIBRE events has been highly variable, although as a whole the audience has included very different organisations. In addition, there were signs that suggested a lower interest among FIBRE researchers in the participation of certain meetings organised by FIBRE. Yet, these events can be seen as important in terms of networking and making personal contacts between researchers and end-users. One explanation for the irregular participation may be the wide variety of topics in the different FIBRE events.

The most innovative component of the programme in terms of dissemination and synthesis has been the integration project BITUMI. The project started during the second stage of the programme in order to enhance discussion and communication between researchers and end-users and to develop new methods for communicating. The final analysis of its success will have to wait until it is completed at the end of 2002. However, it already appears that the BITUMI project has collected a lot of valuable experience on factors related to successful dissemination. Most importantly, the project has initiated discussion between researchers and end-users.

FIBRE as an actor will disappear at the beginning of 2003. Therefore, it is important to consider the legacy of FIBRE. The most important thing in this respect is the work of over 450 researchers who have participated in FIBRE projects and contributed to the increase of our knowledge on biodiversity. At the programme level FIBRE has promoted many important issues. In this context it is important to emphasise three factors. These are the multidisciplinary approach promoted by the programme, the emphasis on societal applications and the benefits of biodiversity research and lastly the attempt to find new methods of communication and dissemination between researchers and end-users.

## 6. SUMMARY

This survey on the national impact of FIBRE is mainly based on the interviews conducted amongst some members of the steering committee of FIBRE and the co-ordinating office, some FIBRE researchers and some external end-users. In addition, a survey of doctoral students was made, and the minutes of the steering committee meetings as well as the annual project reports were used. The national impact is discussed in terms of the activities of the management (the steering committee and the co-ordinating office) and the programme. The wide representation of different interests involved in the management of FIBRE emphasises the wide spectrum of biodiversity knowledge needed in the society. The working committee has helped the participants to understand each other's views and define their own position and needs in biodiversity issues. The active co-ordinating office has meant the continual forward progress of the programme. The presence of end-users in the steering committee has emphasised the importance of result dissemination resulting in the BITUMI project. However, the very different expectations held by the funding bodies, e.g. their different research needs and project selection criteria could have been better integrated into the management practices.

According to the interviewees, the goals of the research programme have been challenging and stimulating. Though the applicability of FIBRE may not have been the applicability expected by many end-users. Some also considered that the multidisciplinary research succeeded best when it was restricted to the natural or social sciences. The doctoral students within FIBRE have mainly received typical research training. In addition to documented knowledge, FIBRE has been a large producer of tacit knowledge, for example, by educating new researchers. In general, the knowledge produced by FIBRE is a mixture of conceptual knowledge and instrumental information. The beneficiaries of FIBRE knowledge include environmental, agricultural and forestry administrations, regional and local environment and forestry authorities. The channels for the dissemination of FIBRE results include research collaboration, funding bodies, networks, individual researchers and research students, events, publications, the internet, teaching programmes in universities and schools and the media. FIBRE has arranged events for FIBRE researchers, research students, end-users and the general public. Events tailored for a specific group of researchers or end-users have succeeded better than events for a wide audience. FIBRE has promoted networking between researchers. The networking between researchers and end-users was particularly well promoted in the BITUMI project, which has been the main tool in promoting the synthesis and dissemination of FIBRE results. Some FIBRE projects have or are likely to have economic impacts. However, fewer societal impacts are expected. Impacts on the conservation of biodiversity can be examined through the various national processes on biodiversity, which have involved many FIBRE researchers.

## II: BIODIVERSITY IN FINNISH SOCIETY

Juhani Tirkkonen & Susanna Vehmas & Reetta Koskenranta

### 1. INTRODUCTION AND DATA

Part II of this report consists of concluding remarks about biodiversity as social issue in the Finnish society, FIBRE in the view of stakeholders and the visibility of FIBRE in the Finnish newspapers. The stakeholder view and issue concerning biodiversity as a social view are based on data from two projects: Sovella I and Sovella II. The issue of visibility is based on a media-analysis, which will be introduced in chapter 4.

The data from the two research projects, Sovella I and Sovella II, makes it possible to analyse biodiversity as a social issue in Finnish society in 1998 and in 2002 from the point of view of researchers and other stakeholders, including the different end-users of biodiversity knowledge. It also gives some ideas about the changes that have taken place during the FIBRE programme concerning the biodiversity issue. Sovella II also includes data about stakeholders' familiarity with the FIBRE programme, FIBRE' s importance as an actor in biodiversity conservation and the usefulness of the different activities of FIBRE for the end-users.

During the summer 1997 the co-ordinating office of FIBRE decided to collect material on the views of different actors regarding their familiarity with biodiversity questions. It did this by means of questionnaire study called *Sovella I*. This project was firstly an inquiry into the present state and future visions of biodiversity conservation. Secondly it was a project to shed light on the problems of interaction between researchers and decision-makers, in order to facilitate the use of research knowledge in decision making. Methodologically, the Sovella I project consisted of a survey and some panel discussions. The project started in 1998 with a survey conducted amongst researchers, other experts and decision-makers. The focus of the questionnaire was on open-ended questions, supplemented by a series of graded statements. In the survey a total of 522 questionnaires were posted, of which 187 (36 %) were returned. The returned questionnaires came from 49 researchers, 74 experts and 64 decision-makers. The Sovella I survey was followed by three panel discussions.

*Sovella II* was carried out in summer 2002. The reason for starting Sovella II was to collect material for the national impact analysis of the FIBRE programme and at the same time to further study biodiversity as a social issue. The aim of the survey was to collect empirical data that might not come up in interviews, media-analysis or in any material collected by the co-ordinating office during the programme. It would help to understand the views of different stakeholders in biodiversity issues.

The data in Sovella II was collected by posting 200 questionnaires, 80 (40%) of which were returned. The survey contained both graded statements and open-ended questions. As in Sovella I, the purpose was to cover all the most important actors in biodiversity research and policy. The questionnaires sent to FIBRE researchers were different slightly from those sent to other stakeholders. The group of researchers consisted of FIBRE project leaders. Other stakeholder groups consisted of representatives from corporations, expert institutions, non-governmental organisations, politicians and authorities from ministries, regional administration and municipalities. The Sovella II research team chose the participants with the help of the FIBRE coordination office.

Direct comparative analysis between Sovella I and Sovella II is restricted due to the fact that the questions and the respondents differ. The questionnaires were not alike because Sovella II had other aims than its precursor. However questions from Sovella I were used as a base for Sovella II questions that dealt with the social connections of biodiversity.

## 2. BIODIVERSITY AS A SOCIAL ISSUE IN FINNISH SOCIETY

During the FIBRE programme period biodiversity issues have become very complex and have implications for and are influenced by a wide range of operations in society. So from the political view, the timing of FIBRE as a research programme has been excellent. Respondents to Sovella II identified various and extensive ways in which biodiversity has been taken into consideration in their organisations during the past five years. According to the answers, biodiversity has become a component of decision-making at every level of environmental administration.

At the international level, negotiations on different biodiversity related conventions and conferences of the parties (COPs) are ongoing. Being an active participant in these conferences requires considerable effort at national level. The European Union has also increased the duties at national level. The NATURA 2000 network is a good example of this. The diffusion of the idea of biodiversity protection throughout society has led to a situation where various organisations have programmes specifically on biodiversity conservation and/or have to take it into consideration in other preparatory work. At regional level, biodiversity questions have in the past five years become central in land use planning and the implementation of administrative regulations. NATURA 2000 can again be mentioned here as a good example.

The results from the Sovellas strengthen the view that biodiversity can be seen as a complex issue and biodiversity loss as a risk of society. In biodiversity the most difficult social issues seem to be the relationship between biodiversity and the economy and on the other side the question about values (Hiedanpää & Haila 1995; EC 1998). The question of the *economy* was raised in almost every context where biodiversity was handled as a social issue. Questions related to the economy were identified both as the most difficult social issues connected to biodiversity in the form of profit maximisation, and as the biggest obstacle to prevent biodiversity loss (table 1)

**Table 1:** The biggest obstacles to preventing biodiversity loss in Finland in order of superiority. The first choice is weighted with 3 points, the second with 2 points and the third with 1 point. The first column shows the amount of first choices. (Sovella II, n=74).

	First choice	Points
Maximisation of economic profit	36	145
Lack of political will	14	104
Lack of knowledge	14	94
Negative attitudes towards biodiversity conservation	4	58
Administrative inefficiencies	4	30
Something else	2	10

The respondents to Sovella II set the given alternatives on the worst obstacles to a clearly ranked order. The maximisation of economic profit was seen as the most

remarkable obstacle. Up to 49 % of respondents ranked it that way. This was followed by: a lack of political will, and a lack of knowledge. Specifically municipal and regional authorities emphasised profit maximisation: 13 out of 18 (72%) of the respondents in this group graded it as the biggest obstacle. This can be compared with 40% of corporate representatives or 42 % of researchers. Lack of knowledge was also ranked high in these groups. 30% of the respondents from corporations and 32% of researchers graded lack of knowledge as the worst obstacle. At the same time none at the authorities on municipal and regional levels saw this as the worst obstacle. Profit maximisation was most often chosen as the biggest obstacle in every respondent group.

The question of *values* seems to be another focal issue for biodiversity as social phenomenon. It was firstly identified as one of the most difficult social issues connected to biodiversity. A number of respondents also mentioned it as the most difficult socio-economic question of biodiversity. As expected forests/forestry were articulated as the most important ecological/conservation issue regarding to biodiversity in Finland. The main question seemed to be; what is the optimal ratio between protected areas and commercial forests? Both values and the economy focus on this.

Values play a key role, when biodiversity loss is examined as a possible problem for conservation. Sovella II indicated that the respondents clearly felt that the loss of biodiversity is a global conservation problem. But the picture is more complicated for questions about the loss of biodiversity being a conservation problem in Finland (table 2)

**Table 2.** Statement: The loss of biodiversity is a conservation problem in Finland. Answers from the respondent's reference group (Sovella II, n=77).

Reference group:	No	Yes	Total
Expert institutions	1	7	8
Municipalities & Regional level	-	18	18
Ministries	4	8	12
Corporations	8	4	12
Reseracher	4	17	21
Other	1	5	6
<b>Total</b>	<b>18</b>	<b>59</b>	<b>77</b>

Two thirds of the respondents agreed with the statement that biodiversity loss is a conservation problem in Finland. However, a many as two thirds of the corporate representatives did not recognise the loss of biodiversity as a conservation problem in Finland. On the other hand, every respondent from the municipal and regional authorities noted biodiversity loss as a conservation problem in Finland. This kind of clear difference in the views of different stakeholder groups is most probably one reason for the conflicts and problems in biodiversity policy.

Recently, the variety of environmental policy instruments has increased. The use of these instruments influences the environmental governance system and their impacts on society can be far reaching. Sairinen (2000) states that environmental policy instruments generate social norms, which alter the behaviour of different actors in society. So discourse on policy instruments is also a discourse about political power and domination.

In Sovella I, the stakeholders were asked to mention the best practices for preventing biodiversity loss nationally. On the basis of the classes identified in Sovella I the respondents to Sovella II were asked to choose from the different alternatives the three best practices for preventing biodiversity loss in Finland (table 3).

**Table 3:** The best practices for preventing biodiversity loss in Finland ranked in order of superiority. The column shows the amount of first choices. (Sovella II, n=75).

<b>The best practices to prevent BD loss in Finland</b>	First choice
Developing sustainable ways of using natural resources	20
Influencing attitudes e.g. through environmental education	18
Enhancing research efforts and efficient use of research results	11
Efficient use of environmental policy instruments	11
Creating nature reserves	10
International co-operation and conventions	4
Something else	-

The answers indicate that opinions on the best practice vary greatly. The spread of opinions can on the other hand be interpreted as an expression of the complexity of the biodiversity issue, but then again they also indicates that the respondents feel that there are many different possible practices for protecting biodiversity. The consequence of this is a need for continual discussion on the best practices for preventing biodiversity loss. Municipal and regional authorities formed a group that, on some questions had their own profile. This group deserve specific attention, because they work in key positions when the administrative decisions of biodiversity are fulfilled in practice at an operative level. They were the only group of respondents that agreed complete with the statement that the loss of biodiversity is also a conservation problem in Finland.

### 3. FIBRE FROM THE VIEWPOINT OF THE STAKEHOLDERS

In Sovella II the stakeholders were asked about their familiarity with the biodiversity program FIBRE. The results indicated that familiarity with FIBRE varies between different stakeholders. The representatives from expert groups knew FIBRE best but to the representatives from municipal and regional authorities and corporations FIBRE was more or less unknown. Familiarity with FIBRE seems to be closely connected to the individual's intensity of work on biodiversity issues. One reason for the result that everyone working on biodiversity questions wasn't familiar with FIBRE can be attributed to the fact that individual projects, research results and researchers are not specially connected to FIBRE. In fact, research organisations, university departments etc. were their primary reference group (see the media analysis in this report). The visibility of a specific research programme may be secondary to the media and researchers. Visibility is also a question of time. Municipal and regional authorities need applied knowledge and the processes for producing this kind of material normally takes place at the end of research programmes. In FIBRE the Bitumi-projects have served this need. So it can be assumed that the Bitumi books will improve the situation regard knowledge on FIBRE and especially the key results of the programme at municipal and regional level.

During the programme period, FIBRE has been an actor in many different ways. In Sovella II, the role of FIBRE as an actor was examined through various statements (table 4). The respondents were most satisfied with the general statements that FIBRE has been useful when working on biodiversity questions. Based on this it seems that the stakeholders are most satisfied with the primary aim of FIBRE, which is research. The respondents realise

that without FIBRE knowledge about biodiversity issues in Finland would not be at the level it is now. With FIBRE the importance of biodiversity has been continually emphasised remained in research, administration and decision-making.

**Table 4.** Answers to some statements about FIBRE. (1= disagree → 5= agree strongly) (Sovella II, n= 50).

FIBRE has/is...	Experts	Municipal & regional authorities	State officials	Corporations	Researchers	Other	Total
significant role in producing applicable knowledge	2,67	<b>3,22</b>	3,14	2,60	<b>3,58</b>	2,67	3,18
affected conservation of BD & Finnish environmental policy	3,00	3,00	3,71	2,80	3,42	2,33	3,20
useful when working with BD questions	3,00	2,87	2,71	2,60	3,95	3,00	3,28
helped in establishing connections with researchers	3,40	2,00	2,17	3,20	<b>4,05</b>	3,33	3,21
helped in establishing connections with users of BD information	2,20	1,56	2,57	2,20	3,11	3,00	2,54
helped in establishing connections with political decision makers	2,00	<b>1,22</b>	2,43	2,20	2,89	3,33	2,38

Researchers and municipal and regional authorities graded FIBRE as a producer of applicable knowledge higher than other stakeholders. Instead as an environmental policy actor the state officials gave FIBRE higher grades in comparison to other stakeholder groups. It would also seem that those groups that had most to do with certain special issue of FIBRE were also most satisfied with this special activity. As a networking actor the respondents were most satisfied with the role of FIBRE in helping establish connections between researchers. Instead the satisfaction of networking between political decision-makers and end-users were less successful.

During the programme period FIBRE has had many activities. Some of those like email communication and arranging seminars have been running since the start of the program, while others like the integration project Bitumi started later on. The respondents to Sovella II were asked to give points from one to five on different events, activities and features of FIBRE according to how useful they personally had found them (table 5). The respondents were additionally asked in an open question to name the most useful activity/event of FIBRE

**Table 5.** Answers to the question about the usefulness of some FIBRE events. (1= disagree → 5= agree strongly) (Sovella II, n=49).

	Experts	Municipal & regional authorities	State officials	Corporations	Researchers	Other	Total
International seminars	2,80	2,00	1,88	2,25	2,44	2,00	2,25
National seminars	3,40	2,50	2,38	2,50	2,94	3,67	2,81
Post-graduate /seminars	2,60	1,89	1,63	2,50	2,11	1,33	2,02
National publicity	3,67	2,40	3,25	2,25	3,17	2,33	2,96
International publicity	3,83	1,60	2,86	2,50	2,28	1,00	2,35
Bitumi	2,60	1,70	3,00	2,25	2,72	2,67	2,50
Reference library	2,00	1,80	1,50	1,75	1,56	1,33	1,65
www-pages	3,40	2,50	2,75	2,75	2,56	1,33	2,60
FIBRE newsletter	3,00	1,50	2,38	2,00	2,28	1,33	2,14
Email communication	2,60	1,90	2,63	1,50	3,44	2,00	2,65

The national publicity gained by the programme got the highest points, 2.96, and national seminars came in second with 2.81 points. These were followed by email communications, www pages, and Bitumi activities. International publicity and international seminars were ranked only sixth and seventh. Bitumi was ranked fifth most useful by the respondents. But when reading the responses to the open question on the most useful events or other activities of FIBRE, Bitumi seminars and other activities were often mentioned. Also when describing what the respondents thought would be the most important elements for the programmes co-ordination in the future, many respondents emphasised activities that were dealt with by BITUMI' s field. Thus, it seems that for those that were somehow involved in the Bitumi process it was a very useful experience. This seems to be the case also when looking at the grading given by different groups: State officials and researchers gave Bitumi a good grading, whereas municipal and regional authorities ranked it low.

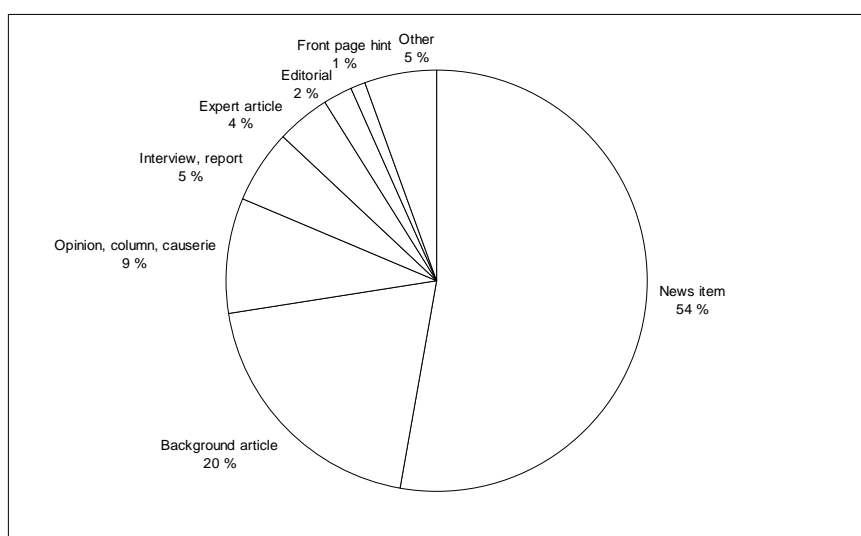
The preference for national publicity and seminars over international ones is interesting. It may have to do with many things, like the fact that most of the respondents work primarily with the national dimensions of biodiversity protection, or that most of FIBRE' s activities have been concentrated on the national level. Nevertheless, regardless of the reasoning underneath, the fact remains that FIBRE is conceived primarily as an important national actor in the field of biodiversity. One of the most remarkable impacts of FIBRE has been the publicity that the programme has gained for stakeholders. One element of the research programmes has been to raise certain issues into public debate. Scientifically oriented publicity gives stakeholders a good basis in their work with biodiversity issues both in their organisation and outside. As FIBRE was running at the same time as many political processes related to biodiversity were being discussed in Finland, only strengthened the impact. From this standpoint, it seems that as a boundary organisation FIBRE has been successful.

#### 4. VISIBILITY OF FIBRE IN FINNISH NEWSPAPERS

As a part of the national impact analyses processes the visibility of FIBRE in the Finnish newspapers was analysed via quantitative media analysis. "Visibility" meant primarily the frequency of newspaper articles where the FIBRE was explicitly mentioned. Several characteristics of the newspaper articles were analysed. The empirical material for the media analysis was collected by FIBRE co-ordination. The

articles were collected from a press follow-up by the Academy of Finland. The FIBRE co-ordination had also collected some supplementary material. The press follow-up by the Academy of Finland consisted of articles describing the following activities where the Academy of Finland was involved: a general science policy, centres of excellence, Academy professors, research programmes, research training and scientific competitions.

The number of articles in the research material (91) was quite small in relation to the fact that the length of the research period was five years (from April 1997 to March 2002). More than a half of all biodiversity articles in the research material were news items (Fig. 1)<sup>1</sup>.



**Figure 1.** The share of the different types of biodiversity articles in the research material.

News-type articles included news items, background articles, interviews or reports. Background articles covered one fifth of the total amount of articles. The research material included 14 opinion articles such as editorials, expert articles, columns and opinions (letters to the editor). At the beginning of the research period, the share of news items was large in the research material, but later their amount diminished.

Most of the 91 articles in the continuous and systematic collection were published in the largest Finnish daily newspaper Helsingin Sanomat (40 articles). Helsingin Sanomat is considered the only national newspaper in Finland. There was large annual variation in the amount of articles in the research material. For example, 23 articles were dated in the year 2000 but there were only nine articles in 1998. At the beginning of the period, most articles were news items, later on, the number of other type of articles, in particular, background articles, interviews and other opinion

<sup>1</sup> For a classification of the articles in the media analysis, see for example Raittila, P. (ed.): "Media burying nuclear waste". University of Tampere, Department of Journalism and Mass Communication. Publications C 34, 2001 (available only in Finnish).

articles increased. The articles in the research material were typically large, 53 % of all articles covered at least five columns.

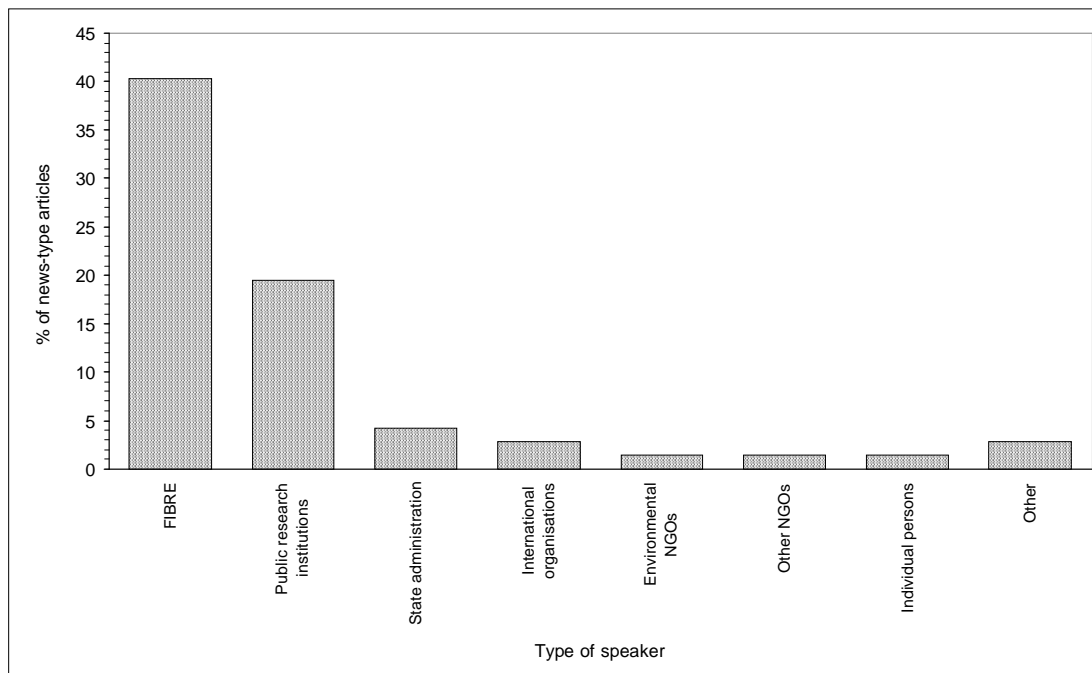
In 39 % of the articles, the main subject was biodiversity conservation in general. The results of biodiversity research were the main subject in 21 % of all articles in the research material. The biodiversity competition arranged by the FIBRE programme was the main subject in even 11 % of all articles. Phases of the FIBRE research programme were the main subject in 10 % and a seminar or a congress on biodiversity in 9 % of articles.

In most articles where FIBRE was mentioned it clearly had a major role. The main role of the FIBRE biodiversity research programme in the research material was most often described as a body of supporting research (in 55 % of all articles). In relation to the biodiversity competition, the role of FIBRE was identified as an award-giving body in 10 % of articles. In one third of articles FIBRE was not explicitly mentioned.

During the research period the FIBRE biodiversity research programme and its financiers organized two biodiversity competitions, in order to popularise biodiversity research and promote the aims of the FIBRE programme. The biodiversity competition by FIBRE was the main subject in 11 % of all articles in the research material and the FIBRE programme was mentioned in all of them. The phases of the FIBRE research programme, like the beginning of the programme and beginning of the second stage of the research programme, were the main subject in 10 % of all articles in the research material. In seven of the eight articles, where the main subject was a seminar or a congress, the FIBRE programme was also mentioned.

In analysis, a speaker can appear only in news-type articles, i.e. in news items, interviews or background articles. Editorials, opinions, expert articles etc. are not news-type articles. In a news type articles speaker is typically cited directly or indirectly. However, all news-type articles do not necessarily include speakers. On the other hand, a news-type article may include several speakers. However, a news-type article can include only one *speech act* of each speaker category. Thus, a large interview and a short citation are equal speech acts in the research material.

In this study, speakers are divided into eight categories: FIBRE, public research institutions, international organisations, environmental NGOs, other NGOs, individuals and other speakers. The category FIBRE includes the FIBRE coordination and researchers from projects belonging to the FIBRE programme. Fig. 2 shows the share of news-type articles where speakers have appeared by speaker category. 72 articles of 91 in the research material were news-type articles, and 53 of them included speakers. Thus, 26 % of news-type articles did not have speakers.



**Fig. 2.** The share of news-type articles in the research material including speakers.

Most speech acts appeared in news items. The most cited speaker category during the research period was FIBRE. FIBRE co-ordination or researchers were cited most when the research programme began, a seminar organised by FIBRE was held or when the results of biodiversity research were presented. Public research institutes were normally cited when research results were presented without any explicit connection to the FIBRE programme. FIBRE and public research institutions had speech acts in articles under a variety of headings. International organisations, environmental and other NGOs, as well as individuals were cited only in news-type articles that had biodiversity conservation as the main subject.

The visibility of the FIBRE biodiversity research programme varied a lot in the research material. In the 68 % of articles the FIBRE programme was mentioned. In the remaining 32 per cent (29 articles) reported biodiversity issues in general. Of those, in 25 articles the main subject was biodiversity research, but the research was not explicitly connected to the FIBRE programme. In these articles, the research project may have been part of the programme but the connection was not made explicit. Alternatively, the research did not belong to FIBRE.

In cases where a connection was lacking the possible reasons could have been, for example, that the editor of the article does not mention the connection although the interviewed did. The research also may have been funded by several sources, and only partly by FIBRE or the research project may have begun before the start of FIBRE programme. Instead of the funding research programme, the interviewed researcher was profiled by their organisation. Typical examples are universities and administrative research institutes such as the Finnish Forest Research Institute (METLA).

In summary, it is not surprising that only a few articles specifying the FIBRE biodiversity research programme were found in the research material. Generally, the news threshold will only be reached when something new and interesting is

presented to the press. In the FIBRE programme, new items of this type were the beginning of the programme in 1997, organised seminars or congresses and the Biodiversity Awards, and also new research results. All these were visible in the research material. In the context of disseminating new research results, essential for the FIBRE visibility is if media connect the central researchers to the research programme or only to their background research organisations. In articles dealing with research results, the explicit connection to FIBRE was not often present. This implies that the funding organisation or research programme may not have important status in media reporting. Instead, the researchers are primarily profiled via their background research organisation. In this respect, the publicity that can be attained by any research programme such as FIBRE may remain quite limited.

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**Appendix 1.** List of people interviewed. The steering committee members (marked with \*) were also interviewed about the committee work.

Kielo Haahtela, University of Helsinki

Juha Hakkarainen, Central Union of Agricultural Producers and Forest Owners (\*)

Matti Heikurainen, Ministry of Agriculture and Forestry (\*)

Mikael Hildén, Finnish Environment Institute

Pekka Kangas, Ministry of Environment

Kari Kuusiniemi, University of Turku

Ilkka Laurila, Agrifood Research Finland

Erkki Leppäkoski, Åbo Akademi

Jari Luukkonen, WWW

Helena Manninen, National Technology Agency (\*)

Helena Merisaari, Ministry of Agriculture and Forestry

Eila Metsäpelto, Employment and Economic Development Centre of Häme

Antti Otsamo, Stora Enso Consulting Ltd

Pasi Puttonen, University of Helsinki (\*)

Suvi Raivio, Finnish Forest Industries Federation (\*)

Heikki Simola, Finnish Association for Nature Conservation

Olli Tahvonen, Finnish Forest Research Institute

Rauno Väisänen, Forest and Park Service

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Mari Walls, University of Turku (\*)

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**Appendix 2.** Home organisations of participants of FIBRE events. The table does not include FIBRE researchers.

Organization	International Events		National Events		Total participation	
	No	%	No	%	No	%
<b>Universities</b>						
Helsinki School of Economics	2	0,4	0	0,0	2	0,3
Helsinki University of Technology	4	0,8	1	0,3	5	0,6
Turku School of Economics and Business Administration	10	2,0	1	0,3	11	1,4
University of Helsinki	52	10,6	17	5,9	69	8,9
University of Joensuu	30	6,1	18	6,3	48	6,2
University of Jyväskylä	6	1,2	0	0,0	6	0,8
University of Kuopio	3	0,6	1	0,3	4	0,5
University of Lapland	2	0,4	1	0,3	3	0,4
University of Oulu	9	1,8	2	0,7	11	1,4
University of Tampere	11	2,2	4	1,4	15	1,9
University of Turku	68	13,9	32	11,1	100	12,9
University of Vaasa	1	0,2	1	0,3	2	0,3
Åbo Akademi	2	0,4	1	0,3	3	0,4
<b>Total</b>	<b>200</b>	<b>40,8</b>	<b>79</b>	<b>27,5</b>	<b>279</b>	<b>35,9</b>
<b>Research institutes</b>						
Agrifood Research Finland	9	1,8	4	1,4	13	1,7
European Forest Institute	1	0,2	0	0,0	1	0,1
Finnish Environment Institute	43	8,8	19	6,6	62	8,0
Finnish Forest Research Institute	38	7,8	2	0,7	40	5,1
Finnish Game and Fisheries Research Institute	8	1,6	3	1,0	11	1,4
Finnish Meteorological Institute	6	1,2	8	2,8	14	1,8
Geological Survey of Finland	0	0,0	1	0,3	1	0,1
Government Institute for Economic Research	1	0,2	1	0,3	2	0,3
Research Institute of Finnish Economy	0	0,0	1	0,3	1	0,1
Technical Research Centre of Finland	6	1,2	1	0,3	7	0,9
<b>Total</b>	<b>112</b>	<b>22,9</b>	<b>40</b>	<b>13,9</b>	<b>152</b>	<b>19,6</b>
<b>Polytechnics</b>						
Häme polytechnic	2	0,4	0	0,0	2	0,3
Rovaniemi polytechnic	8	1,6	0	0,0	8	1,0
Tampere polytechnic	3	0,6	0	0,0	3	0,4
<b>Total</b>	<b>13</b>	<b>2,7</b>	<b>0</b>	<b>0,0</b>	<b>13</b>	<b>1,7</b>
<b>Ministeries</b>						
Ministry of Agriculture and Forestry	9	1,8	13	4,5	22	2,8
Ministry of Education	0	0,0	1	0,3	1	0,1
Ministry of Environment	11	2,2	26	9,1	37	4,8
Ministry of Foreign Affairs	5	1,0	8	2,8	13	1,7
Ministry of Trade and Industry	2	0,4	4	1,4	6	0,8
Ministry of Transport and Communications	3	0,6	5	1,7	8	1,0
<b>Total</b>	<b>30</b>	<b>6,1</b>	<b>57</b>	<b>19,9</b>	<b>87</b>	<b>11,2</b>
<b>Regional Environment Centres</b>						
Central Finland Regional Environment Centre	0	0,0	1	0,3	1	0,1
Häme Regional Environment Centre	2	0,4	0	0,0	2	0,3
Kainuu Regional Environment Centre	7	1,4	0	0,0	7	0,9
Lapland Regional Environment Centre	3	0,6	1	0,3	4	0,5
North Karelia Regional Environment Centre	5	1,0	0	0,0	5	0,6
North Ostrobothnia Regional Environment Centre	2	0,4	1	0,3	3	0,4
North Savo Regional Environment Centre	0	0,0	3	1,0	3	0,4
Southwest Finland Regional Environment Centre	3	0,6	1	0,3	4	0,5
Uusimaa Regional Environment Centre	0	0,0	1	0,3	1	0,1
West Finland Regional Environment Centre	0	0,0	1	0,3	1	0,1
<b>Total</b>	<b>22</b>	<b>4,5</b>	<b>9</b>	<b>3,1</b>	<b>31</b>	<b>4,0</b>

<b>Cities</b>						
City of Espoo	0	0,0	1	0,3	1	0,1
City of Helsinki	1	0,2	1	0,3	2	0,3
City of Naantali	0	0,0	1	0,3	1	0,1
City of Tammisaari	1	0,2	0	0,0	1	0,1
City of Turku	1	0,2	0	0,0	1	0,1
<b>Total</b>	<b>3</b>	<b>0,6</b>	<b>3</b>	<b>1,0</b>	<b>6</b>	<b>0,8</b>
<b>Companies</b>						
Agropolis Ltd.	0	0,0	1	0,3	1	0,1
Biota Ltd.	0	0,0	1	0,3	1	0,1
Envidata L.P.	1	0,2	0	0,0	1	0,1
Fingrid Ltd	0	0,0	1	0,3	1	0,1
Finland Post Corporation	1	0,2	0	0,0	1	0,1
Finnagro Ltd.	1	0,2	0	0,0	1	0,1
Forest and Park Service	41	8,4	49	17,1	90	11,6
Helsinki Consulting Group Ltd.	2	0,4	0	0,0	2	0,3
Indufor Ltd.	1	0,2	1	0,3	2	0,3
Metsämännut Ltd.	1	0,2	0	0,0	1	0,1
Metsäteho	0	0,0	1	0,3	1	0,1
Nokia	0	0,0	1	0,3	1	0,1
Stora Enso	3	0,6	2	0,7	5	0,6
UPM-Kymmene Group	2	0,4	1	0,3	3	0,4
YS-Engineering Ltd.	1	0,2	0	0,0	1	0,1
YTL Kehityspalvelu Ltd.	0	0,0	0	0,0	0	0,0
<b>Total</b>	<b>54</b>	<b>10,1</b>	<b>58</b>	<b>20,2</b>	<b>112</b>	<b>14,4</b>
<b>Funding bodies</b>						
Academy of Finland	12	2,4	10	3,5	22	2,8
Maj and Tor Nessling Foundation	3	0,6	1	0,3	4	0,5
National Technology Agency, Tekes	1	0,2	3	1,0	4	0,5
<b>Total</b>	<b>16</b>	<b>3,3</b>	<b>14</b>	<b>4,9</b>	<b>30</b>	<b>3,9</b>
<b>Environmental organizations/associations</b>						
Dodo	1	0,2	0	0,0	1	0,1
Espoo Association for Nature Conservation	0	0,0	1	0,3	1	0,1
Finnish Association for Nature Conservation	3	0,6	4	1,4	7	0,9
Natur och miljö	1	0,2	0	0,0	1	0,1
Taiga Rescue Network	0	0,0	2	0,7	2	0,3
WWF	1	0,2	0	0,0	1	0,1
<b>Total</b>	<b>6</b>	<b>1,2</b>	<b>7</b>	<b>2,4</b>	<b>13</b>	<b>1,7</b>
<b>Interest organisations</b>						
The Central Union of Agricultural Producers and Forest Owners	2	0,4	4	1,4	6	0,8
Finnish Consumers' Association	1	0,2	0	0,0	1	0,1
Finnish Forest Industries Federation	7	1,4	2	0,7	9	1,2
International Forestry Students Association	1	0,2	0	0,0	1	0,1
Metallinjalostajat	0	0,0	1	0,3	1	0,1
<b>Total</b>	<b>11</b>	<b>2,2</b>	<b>7</b>	<b>2,4</b>	<b>18</b>	<b>2,3</b>
<b>Other organisations</b>						
Archipelago Sea Environmental Centre "Kompassen"	2	0,4	0	0,0	2	0,3
Centre for Scientific Computing	1	0,2	1	0,3	2	0,3
Employment and Economic Development Centre for Varsinais-Suomi	0	0,0	1	0,3	1	0,1
Finnish Forest Cluster Research Programme WOOD WISDOM	0	0,0	1	0,3	1	0,1
Finpro	0	0,0	1	0,3	1	0,1
Forestry Development Centre Tapio	4	0,8	2	0,7	6	0,8
Forest Forum for Decision-Makers	0	0,0	1	0,3	1	0,1
Forestry Centre Pohjois-Pohjanmaa	1	0,2	0	0,0	1	0,1
Foundation for Forest Tree Breeding	2	0,4	0	0,0	2	0,3
Green Know-How Turku	1	0,2	0	0,0	1	0,1

Hunters' Central Organisation	0	0,0	1	0,3	1	0,1
Kansanvalistusseura, KVS Foundation	9	1,8	0	0,0	9	1,2
National Board of Education	1	0,2	0	0,0	1	0,1
National Land Survey of Finland	0	0,0	1	0,3	1	0,1
Radio Nova	0	0,0	1	0,3	1	0,1
Service Centre for Development Cooperation	1	0,2	0	0,0	1	0,1
Supreme Administrative Court	0	0,0	1	0,3	1	0,1
Vaasa Administrative Court	0	0,0	1	0,3	1	0,1
Water Court of Appeal	0	0,0	1	0,3	1	0,1
Water Protection Association of Southwest Finland	1	0,2	0	0,0	1	0,1
<b>Total</b>	<b>23</b>	<b>4.7</b>	<b>13</b>	<b>4.5</b>	<b>36</b>	<b>4.6</b>
<b>TOTAL</b>	<b>490</b>	<b>100</b>	<b>287</b>	<b>100</b>	<b>777</b>	<b>100</b>

List of events analysed. International events: Natural Resources and Social Institutions: Cultural Management of Biodiversity, 1997; FIBRE workshop on Biodiversity research in aquatic systems, 1998; International FIBRE symposium on Biodiversity and decision making: biological and socio-economic perspectives, 1998; International symposium on Landscape ecology in forest planning, 1998; Northern Dimension to Biodiversity - From Arctic to Boreal Ecosystems, 1999; FIBRE 3rd International Symposium, 1999; Third workshop on Disturbance Dynamics in Boreal Forests - Restoration and management of biodiversity, 2000; Ecosystem Management in Boreal Forest Landscapes, 2001; State and Possible Futures of Natural Resources, 2002; "Capital C" – Seminar on Carbon Cycling, 2002; BorNet International Conference, 2002. National events: Metsien biodiversiteetti: tutkimustiedon käyttö päätöksenteossa, 1998; FIBRE workshop on landscape ecology: Alue-ekologinen suunnittelu ja metsien biodiversiteetti, 1998; FIBRE workshop on Waters, biodiversity and decision making, 1998; FIBRE ja FIGARE -tutkimusohjelmien avajaistilaisuus, 1999; FIBRE & FIGARE Targeted workshop: Socio-economics and biodiversity, 2000; Biodiversiteetti, oikeus ja käytäntö –seminaari, 2001; Researcher courses: FIBRE Ph.D. Workshop, 1998; Tieteellinen esittäminen ja tutkimustiedon popularisointi, 1998; FIBRE Mini-Course on Philosophical Window to Biodiversity, 1999; FIBRE & FIGARE Course: Convention on Biological Diversity and Framework Convention on Climate Change, 1999; Kirjoitan nyt ensimmäistä kertaa...- kirjoittamisen intensiivikurssi, 2002;