

PUBLICATIONS OF THE ACADEMY OF FINLAND 3/03

Finnish Biodiversity  
Research Programme  
FIBRE 1997-2002  
EVALUATION REPORT



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Layout: PixPoint ky

Photo Layout: Antti Kamppinen

Photos: Mia Rönkä & Eeva Ennola

ISBN 951-715-438-0 (print)

ISBN 951-715-439-9 (pdf)

ISSN 0358-9153

Painopörssi Oy, Helsinki, Finland 2003

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## Preface

The Finnish Biodiversity Research Programme FIBRE (1997-2002) has aimed at producing internationally competitive and innovative research on biological diversity. FIBRE has had an interdisciplinary research agenda tackling a broad scope of biodiversity issues and a practical goal to generate principles and tools for biodiversity management and decision-making.

FIBRE has had two phases, the first during 1997-1999 and the second during 2000 - 2002. The projects funded through the programme represent a broad range of disciplines from biological sciences, forestry, and biotechnology to social sciences, economics, humanities, and environmental law. The budget for the whole financing period of FIBRE has been approximately 20 million euros.

The Academy of Finland appointed an international evaluation panel in January 2003 to review the programme. Members of this panel were: Dr Richard Bradshaw, GEUS, Denmark, Dr Dan McKenney, Canadian Forest Service, Canada, Prof. José Sarukhán, UNAM, Mexico, Prof. Kirsten Christoffersen, University of Copenhagen, Denmark, Dr Felix Schläpfer, University of Zurich, Switzerland, and Prof. Thomas Elmqvist, Stockholm University, Sweden (chair of the evaluation). MSc Marlene Lingard acted as panel secretary.

The evaluation panel was asked to address the following set of questions:

1. Scientific quality of FIBRE
2. Functioning of the programme, co-ordination
3. Collaboration and networking
4. Applicability of research and importance to the users
5. Success of the implementation of the programme goals and objectives, including added value

This publication includes the report of the evaluation group. Documentation of the programme and projects/consortia is available at <http://fibre.utu.fi/>

Stockholm 2003-02-28

Thomas Elmqvist  
Professor, Chair of the Evaluation Panel



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# 1 Biodiversity Research – International Background

The international context of the FIBRE programme has been several key international conventions and initiatives, most importantly, the Convention of Biological Diversity (CBD). Finland ratified the CBD treaty on October 10, 1994 and has also ratified several other international environmental treaties that aim at the conservation of biodiversity and sustainable use of natural resources, e.g. the Ministerial Conference on the Protection of Forests and the European Union's council directive on the conservation of natural habitats and of wild fauna and flora.

Implementation of the CBD commitments demands new and novel information, within research and administration, as well as in business enterprises. To implement the Convention, each of the Finnish ministries has prepared their own set of actions, which have subsequently been compiled in the Finnish National Action Plan. In this context, Finland recognized the need for building new expertise and capacity within the very broad field of biodiversity and for building close links between science and national and international policy-making. The Finnish Biodiversity Research Programme, FIBRE, has assisted Finland in implementing the Convention on Biological Diversity at the national level. The implementation of FIBRE is also included in the National Action Plan for Biodiversity in Finland, 1997-2005.



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# 2 The FIBRE- programme

The Finnish Council of State made a Decision-in-Principle on 21 December 1995, according to which the Academy of Finland, together with all sectors of administration prepared a multidisciplinary research programme for biological diversity. The cooperative effort led to the Finnish Biodiversity Research Programme FIBRE (1997–2002). A call for proposals for the first stage of FIBRE 1997–1999 was organized in 1996. A mid-term evaluation of the programme took place in March 1999. The second stage of the programme covering the years 2000 – 2002 was launched in December 1999. Approximately 600 research personnel, as well as technicians from different universities and research institutions have participated in FIBRE. Altogether 139 FIBRE doctoral students and 20 post doctoral researchers were financed through the programme.

## Organization

The FIBRE biodiversity research programme has been directed by the Steering Committee nominated by the Academy of Finland. The members of the Steering Committee represented the nine financing organizations, scientific expertise, and the programme coordination. The Chairs of the Steering Committee have been Professor Outi Savolainen, University of Oulu (-31.12.1997), Professor Seppo Kellomäki, University of Joensuu (1.1.1998–31.12.2000) and Professor Pasi Puttonen, University of Helsinki (1.1.2001–31.12.2003).

The Academy of Finland appointed an external coordination body to the programme through an open competition. The Department of Biology, University of Turku, was selected in early 1997 to carry out the administrative and scientific coordination of the programme. The Programme Director has been Dr Mari Walls and the Scientific Secretary MSc Marja Vieno. In addition, an administrative secretary has been part of the coordination team.

The Academy of Finland also appointed an international Advisory Committee to follow up the activities and progress of the programme. The first five members of the Advisory Committee have been Prof. Per Angelstam, Uppsala University, Sweden, Dr Tim Boyle, CIFOR, Indonesia, Dr Richard Bradshaw, GEUS, Denmark, Dr Dan McKenney, Canadian Forest Service, Canada, Prof. Pekka Pamilo, Uppsala University, Sweden. After the resignation of Dr Boyle and Prof. Pamilo, two new members were invited to join the Committee for the second stage of the programme: Prof. Kirsten Christoffersen, University of Copenhagen, Denmark and Prof. Thomas Elmqvist, Stockholm University, Sweden.

## Budget

FIBRE has been funded by the Academy of Finland, National Technology Agency, Tekes, Ministry of Transport and Communications, Ministry of Agriculture and Forestry, Ministry for Foreign Affairs, Ministry of the Environment, Maj and Tor Nessling Foundation, Finnish Forest Industries Federation and the Central Union of

Agricultural Producers and Forest Owners, MTK. The Academy of Finland has covered almost one half of the budget, and the other half has been divided among the other eight financing bodies (APPENDIX I).

The total budget for the first stage of FIBRE was approximately 10.3 million euros. The funding for the second stage of the programme was 9.5 million euros, totalling approximately 20 million euros for the whole financing period. In addition, approximately 6 million euros have been received as external funding to the programme over the six years as in-kind contributions by participating institutions, and from other sources.

### Themes of the research programme

In the final integration and synthesis of the FIBRE programme, four themes emerged that have been used in the evaluation of the programme (for a complete list of projects see APPENDIX II):

- 1) Forest biodiversity and forestry: 13 projects/consortia
- 2) Aquatic environments and biodiversity: 9 projects/consortia
- 3) Agrobiodiversity, traditional rural landscapes and urban environments: 5 projects
- 4) Biodiversity issues and developing countries: 3 projects/consortia

In addition we have evaluated:

- 5) Other projects: projects/consortia (not under any of the above themes)
- 6) The integrative project BITUMI

It should be noted that at the time of the evaluation many projects of the second stage (2000-2002) were still ongoing and not all results in terms of publications, impacts and applications therefore possible to assess.

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### 3 Evaluation procedure

The evaluation took place during a three-day meeting in Helsinki February 3–5, 2003. During the meeting the panel visited the Academy of Finland and the Ministry of the Environment and had meetings and interviews with:

- the coordinator team of FIBRE
- the steering committee of FIBRE
- representatives of the Ministry of Environment and Ministry of Agriculture and Forestry, Forest and Park Service, Finnish Environment Institute
- representative from forest industry
- representatives from NGOs
- representatives from the BITUMI project
- PhD-students
- authors of the National Impact Study

The panel based the evaluation on the interviews and on the following documents:

- Programme memorandum
- Reports and self-evaluations from all projects/consortia
- Publication lists
- FIBRE Summary document
- The National Impact Study
- The Mid-term Evaluation of FIBRE

## 4 Evaluation

### 4.1 Scientific quality of FIBRE

“The objective of the research programme is to produce internationally high-quality interdisciplinary and applicable research on biological diversity with special focus on research needs created by the Convention on Biological Diversity. The socio-economic and legal aspects as well as technological questions call for an interdisciplinary and innovative approach. Research should focus on the analysis of such social and economic mechanisms that enable the inclusion of biological diversity into decision-making. In addition to biological and other scientific research, also research with an emphasis on social and philosophical valuation of natural resources, environmental and resource economics and research on decision-making as well as environmental law are international key topics of biodiversity research. The scientific approach to tackle with biodiversity issues should aim at identifying the underlying mechanisms that create, renew and maintain biological diversity” (Academy of Finland 2000).

The projects receiving funding through FIBRE (APPENDIX II) have primarily been selected on the basis of competition and scientific merits. Altogether 59 projects from various disciplines were accepted to the first stage and 46 projects in the second stage, of which 39 were already part of the programme.

#### 4.1.1 Scientific quality, innovativeness and contribution to the development of biodiversity research

*Forest biodiversity and forestry.* Most individual projects seem to be of high quality and standard, but substantive differences in outputs were found between groups. Contributions to the advancement of knowledge within the discipline are generally up to standard, with some exceptionally significant examples standing out as high quality research. This is the case for research on landscape ecology and landscape level modelling, while some other research projects show more modest contributions in scientific productivity and a more limited advance in their particular discipline.

*Aquatic environments.* The academic qualifications, as well as the quality and innovativeness of research within the aquatic projects, are of high to very high standards, with some exceptions. The integration of molecular, microbiological and traditional ecological methods has been found particularly valuable, and the groups using this approach show very good progress as well as having a high publication record. Similarly, another project, using a combination of descriptive variation in time and space from local to regional scale with experimental set-ups, shows good progress.

*Agrobiodiversity, traditional rural landscapes and urban environments.* The results of these projects are varied. The research project on the maintenance of biodiversity in

rural landscapes is a well-conceived project, with high scientific quality and significant results. Other projects show limitations in scope, scientific output and contributions to the advancement of knowledge in their respective fields. It must however be emphasised, that this is an area in which conceptual ideas are still in the process of development, as a consequence these research efforts will take longer to materialise, especially given the fact that most of the projects started with phase two of FIBRE.

The urban projects are in an initial descriptive phase in a subject field that is just recently emerging worldwide. This is an area of significance for the future, and one in which human capacity and quality research should be developed.

*Developing countries and biodiversity issues.* We also find variation in the scientific quality and output among these projects. In those cases where high quality basic research has been integrated with the use of modern tools of Geographic Information, together with qualified handling of the social and economic components, we find an excellent example of contribution to the advancement of knowledge and concrete impact for biodiversity conservation programmes in the host country.

*Other projects.* Biodiversity and law represents a consortium made up of three projects: “General methodology on Biodiversity Law “, “Legal Mechanisms for Safeguarding Biodiversity and Environmental Quality” and “Biodiversity and Law - Land use Planning and Forest Law”. This consortia stands out since it deals with biodiversity from the humanities point of view, and even though the publication record is limited, the project is considered to be interesting and of potentially great value for Finland.

*General comments:* To date, FIBRE projects have produced over 1340 publications such as scientific articles, reports, books, book chapters, doctoral theses, popular articles, etc (see APPENDIX III). Altogether, 139 FIBRE doctoral students and 20 postdoctoral researchers have been financed through the programme. At the time of the mid-term evaluation in 1999 the evaluation Panel judged the quality of research during the first phase of FIBRE to be of a generally high level. However, as the projects had at this time been running less than two years, it was considered too early to evaluate the scientific productivity and quality in detail. It was nevertheless agreed that the FIBRE programme had reshaped the field of biodiversity research and that it had also initiated novel types of research within the social sciences and the humanities in Finland. Our final conclusion is that the overall scientific quality fulfils the criteria of high international standard and the impact on the training of new professionals in the area of biodiversity has been an important capital for the Finnish scientific community. However, areas of research that end-users referred to as insufficiently studied or as underrepresented included the fields of biodiversity management of commercial forests, habitat requirements of species, particularly those that are threatened, as well as studies of links between biodiversity and ecosystem functioning. Although the FIBRE programme has contributed with excellent advancements in areas such as landscape ecology, landscape level modelling and aquatic sciences, other components remain weak.

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### 4.1.2 Contribution to the development of multi- and interdisciplinary<sup>1</sup> research

Most issues dealing with biodiversity conservation and management, especially when they relate to defining policy, involve interactions with a social-economic component, and consequently require research efforts of a multi- and interdisciplinary nature. Accomplishing successful multi- and interdisciplinarity in research projects is challenging for a number of reasons. FIBRE has nevertheless been praised for including the criterion of multi- and interdisciplinarity among its major goals.

*Forest biodiversity and forestry.* Three of the research projects show rather successful examples of multidisciplinary, with satisfactory results in linking economics with ecology.

*Aquatic environments.* Most projects have a substantial component of multidisciplinary, in the sense of integrating different natural science approaches, such as combining traditional ecological methods with molecular tools. Some of the projects are in the process of launching analyses of water management.

*Agrobiodiversity, traditional rural landscapes and urban environments.* In at least one of the projects there was an attempt to bridge environmental economics, physical geography and plant ecology, but it was still in early development and it is therefore difficult to judge its potential. Multi- and interdisciplinarity among the urban projects did not develop as expected.

*Developing countries and biodiversity issues.* Multidisciplinary is present in all projects but only one of them show a good multidisciplinary approach which has resulted in successful practical applications of the results in influencing conservation policy and defining and establishing natural protected areas.

*Biodiversity and Law.* To some degree the three subprojects have a multidisciplinary approach, since the legal instruments analyzed has to be set in a biological and institutional framework.

*General comments:* Although there are many projects that incorporate researchers from several disciplines within the FIBRE programme, examples of projects that bridge the gap between the natural and social sciences are not that common. Nevertheless, with regard to this there are several successful projects, which should be acknowledged. We emphasise the difficulties in fostering multi- and interdisciplinary research given the constraints of the current structure of the educational and career incentives, as well as of those of the funding agencies.

<sup>1</sup> We define multidisciplinary as involving different disciplines of research under one theme or umbrella, but not necessarily representing substantial interaction between disciplines. Interdisciplinary research is defined as different disciplines working with the same question and strongly interact in formation of the research project.

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### 4.1.3 Scientific competence of the consortia, contribution to researcher – expert training

Capacity building in the area of biodiversity has been a major goal of FIBRE in response to the expressed needs amongst Finnish institutions for more specialists within this area. Fifty-two PhD theses finished within the FIBRE six year period witness the dimension of the effort, which is complemented by the expected completion of 84 additional theses (APPENDIX III). The goal of capacity building has been very satisfactorily achieved, and stakeholders recognised this as a central contribution from the FIBRE programme to the Finnish scientific community in general, and that of ecology and biodiversity in particular.

*Forest biodiversity and forestry.* This theme was the largest and has so far produced 25 PhD-theses, which represents nearly half of all the completed theses within the FIBRE-programme. Of the 13 projects, 8 have been judged as having a good to very good output in terms of training PhDs, post-docs, as well as MSc-students.

*Aquatic environments.* Training of graduate students and a focus on their subsequent mobility has received high priority. The aquatic projects have produced 16 out of 52 reported PhD theses, and several other students are in the process of completing their PhD's. However, it should be pointed out that there is ample margin for improvement in the effort of international collaboration, and also in some cases of graduate student training.

*Agrobiodiversity, traditional rural landscapes and urban environments.* This theme has produced 5 PhDs, 4 within the subject of agrobiodiversity and traditional rural landscapes and one thesis in urban environments. All projects except one started only two years ago, and it is therefore too early to judge the results.

*Developing countries and biodiversity issues.* As in most FIBRE projects, training of graduate students has played an important role in these. Excellent levels were achieved in one project, which had an impact on the training of students native to the project host country. Improving human capacity in the areas of knowledge and management of biodiversity is of direct benefit to the developing country.

*Biodiversity and Law.* In this consortium no PhDs have been completed yet, but four to five are listed to be completed within the next two-three years. Some projects within the consortium appear to have good international connections which are commendable given the usually very national character of legal issues.

*General comments:* The specialist training within FIBRE has incorporated courses on general themes such as the Convention of Biological Diversity, and some specific themes on communication skills, such as on the writing of popular articles and scientific data presentation. One important outcome of the FIBRE training is the establishment of new research teams and junior researchers in the field of socio-economic environmental research and forest economy. It does not seem, however, that all the possibilities for specialist training have been fully explored. It is nevertheless encouraging, that several former students of FIBRE projects currently

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hold important biodiversity-related positions in government agencies and non-governmental organisations.

### 4.2 Functioning of the programme and coordination

The steering committee of FIBRE consisted of 13 members and the programme director. The members of the Steering Committee have been representing the nine financing organizations, scientific expertise, and the programme coordination. Involvement in the management of FIBRE has come to be a learning process for many committee members. Scientists representing academic research has expressed that it has been of great benefit to learn the needs of the end-users. For the end-users, the process may have shown some of the constraints and possibilities that characterise a scientific programme. One comment from several end-users related to the initial sequence of events and many felt that they had had little influence on the principles for the selection process of the first round of proposals.

The management structure of FIBRE is special in that the programme was among the first conducted by the Academy of Finland that had an external coordinating office. The co-ordinating office was ultimately situated at the University of Turku, after having been selected from amongst several competing offers from different universities and research institutes. The coordinating office has had a strong role in the programme management, it has also been active in developing new ideas, and generally kept the programme going. The resources invested in co-ordination were high by normal Finnish standards, but low in comparison with international programmes of comparable scale. FIBRE has aimed to alter aspects of the Finnish research paradigm and has made important progress in this direction. This would have been impossible without the determined and well-organised programme coordination.

*General comments:* The coordination has received very good marks from end-users and the panel view the coordinating office to have succeeded very well, fulfilling many tasks beyond its basic duties.

### 4.3 Collaboration and networking

#### 4.3.1 Collaboration within the programme

Internal collaboration among researchers has been one of the strong features of the FIBRE programme and has been encouraged and facilitated by the coordinators. The main activities promoting collaboration have comprised: *a) the BITUMI project and three integrative book projects b) joint workshops including multiple FIBRE consortia c) FIBRE meetings d) seminars e) FIBRE training courses for research students and f) project reports and other literature.*

BITUMI (see APPENDIX IV) was set up to explore ways to intensify the interactions between FIBRE-groups, the scientific community, decision- and policy-makers as well as local and grass roots organisations. Despite being in operation for only three years, BITUMI has succeeded in creating contacts between partners that were not



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aware of each other's interests. BITUMI is also co-ordinating three books, designed to present the main lines of FIBRE research into a more comprehensive context and language for non-scientists. Many stakeholders and end-users regarded BITUMI as a valuable component of FIBRE and its completion will leave a gap within Finnish biodiversity knowledge transfer.

During the second part of the programme the other tools for stimulating internal collaboration were not as frequently used because of economic reasons and the fact that BITUMI took on some of this role. Projects within the agricultural sector, which were mostly initiated in the second part of the programme, lagged behind the forest sector as regards internal collaboration. Almost all interviewed parties agreed that FIBRE had contributed to increased collaboration, at least within the research community. The co-coordinating team must be given the credit for this important achievement.

### 4.3.2 Collaboration with other Finnish groups (outside FIBRE)

The mid-term evaluation recommended that increased efforts should be directed at collaboration and contacts with various groups outside of FIBRE, particularly outside the research community. While BITUMI has clearly contributed to fill this gap, the impact of FIBRE has so far been limited outside the bounds of the immediate participants. The report on the national impact of FIBRE noted that "the interdisciplinary networking has not generally progressed as much as hoped", although the range of target groups was ambitious and included national and local administrators, the business world, different public and private organisations and universities. Non-FIBRE researchers from universities were the most active outside participants in FIBRE events (international as well as national ones), whereas non-FIBRE researchers from research institutes were slightly less enthusiastic.

### 4.3.3 Collaboration with end-users

Several end-users participated in the FIBRE programme, and while some of these expressed satisfaction, a few stated that their precise needs were not clearly articulated at the outset of the programme. The international peer review of the project proposals also resulted in the rejection of a number of projects with a more applied approach, particularly within the agricultural area. FIBRE brought a number of end-users together and helped them identify their needs more clearly. There was a general feeling that although FIBRE results were not readily accessible to end-users without further interpretation, BITUMI accomplished the task of dissemination to a certain extent.

End-users outside the programme were not as well accommodated by FIBRE and were largely unaware of the programme or its potential relevance. End-users were invited to FIBRE events but often did not attend, and popular publications and press coverage of FIBRE could have been managed in a more consistent manner.

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### 4.3.4 International collaboration

FIBRE was initiated as a programme with a base in the UN Convention on Biodiversity (CBD), and was a pioneer in this respect. However, the FIBRE research programme, with a few notable exceptions, has primarily been focused on internal Finnish issues and its international impact has been limited. Finnish scientists seem to be slightly reluctant to host international meetings, but there was nevertheless a large forest meeting in 2001, and there are also planned meetings for 2003 (marine) and 2004 (freshwater) that involve FIBRE researchers.

The panel asked representatives from a number of international organizations and networks, including the European Commission DG-Research, Diversitas, Canadian Network for Sustainable Forest Management and BORNET for comments on the strengths and weaknesses of the FIBRE programme in international collaboration. The FIBRE programme is in general praised for being both visible and active on the international arena. In the CBD process, both in the Conference of the Parties (COP) and in the Subsidiary Body for Science, Technical and Technological Advice (SBSTTA), Finnish participation has been viewed as professional, partly ascribed to the scientific backing provided by FIBRE. FIBRE is also viewed to have had an important effect on the communication among relevant programmes across Europe. In particular, Finland proposed to the FP5 Environment Programme Committee the establishment of a “European platform for biodiversity research strategy” (EPBRS). The aim of this platform is to allow member states of the EU, the associated states and the European Commission to discuss strategic issues relating to biodiversity research. Since its establishment, this platform has contributed to national and EC preparations for the SBSTTA and COP-meetings, national and EC biodiversity research strategies and priorities, the dissemination of best practices in biodiversity conservation between the member states and the exchange of information on national biodiversity programmes.

The BORNET programme appears to be another fruitful collaboration, drawing comparative research and policy insights from a range of nations (Finland, Sweden, Canada and the former USSR) with boreal biodiversity concerns. This collaborative work has been viewed by several as greatly facilitated through the institutional mechanisms and support provided by the FIBRE – programme.

*General comments:* BITUMI was indeed a constructive creation, but as it was developed rather late in the programme, its full effects will only be accomplished long after the funding period is over. While there is a general impression that there is some very constructive internal collaboration amongst researchers, the interactions between researchers, stakeholders and end-users seems to be considerably less developed. This reflects the broader conceptual gaps between the groups, which need to be bridged.

The emphasis on PhD education has been a success with regard to capacity building, but a programme of post-doctoral exchange and visits of senior researchers would have considerably raised the international profile of the programme. The international contacts could be expected to be more numerous considering the large

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number of scientists involved in FIBRE and the generally high quality of the research output. In contrast, FIBRE appears to have had substantial and constructive impact on several international policy-making processes such as COP, SBSTTA and EPBRS, in the latter case FIBRE in fact initiated the process.

### 4.4 Applicability of Research and Importance to Users

Applicability of research is of great interest to all stakeholders and was also an important issue in the mid-term FIBRE evaluation. The notion of applicability for biodiversity research is complex since biodiversity incorporates many different scales, as do the decisions that affect biodiversity. To assess applicability, the panel reviewed project documents that included commentaries submitted by individual research consortia and interviewed stakeholders. In addition, the panel benefited from a report on the National Impact of the FIBRE programme and an interview with the authors of that report.

*Forest biodiversity and forestry.* Potential stakeholders of forestry research projects generally stated that in spite of the great number of projects, there were only a few directly applicable results produced. Some individual projects did however put great effort into transferring their results. The examples are several and include the results used in the economic evaluation of the Finnish part of the EU-Natura 2000 conservation programme; experts advising government agencies with a base in FIBRE generated knowledge etc.

*Aquatic environments.* The aquatic research produced no directly applicable products. There were however some more indirect accomplishments, particularly relating to the implementation of the EU Water Framework Directive, guidelines for practical management and conservation of aquatic ecosystems as well as developing advanced methods to be used in early warning and monitoring etc.

*Agricultural and urban landscapes.* Agricultural research was represented by only a few projects. They appear to mark only a beginning of a substantive program on agricultural biodiversity, which is now becoming increasingly important as a basis for developing agri-environmental schemes. Direct input into the development of agri-environmental schemes was perceived by the researchers, but not by end-users. Among the urban projects contacts between researchers and municipalities and planning agencies seem to have been developing well.

*Developing country projects.* One project documented a high environmental and biotic variation in the Peruvian Amazon region, which consequently led to the establishment of a forest reserve.

*Other projects.* The researchers claimed no direct economic or social impacts, although new commitments and obligations may arise through the development of appropriate legal instruments, to private as well as public organisations.

*General comments:* There are generally few examples of projects with direct applications by end-users (examples include enzyme kit development to be utilized

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in aquatic as well as soil environments, the development of the National Forest Inventory for biodiversity purposes, and the development of non-flowering birches). Few individual project reports identified direct economic or social impacts in a quantitative manner, although many less tangible impacts were reported. There was a general feeling that FIBRE results were not readily applicable to end-users without further interpretation. Most stakeholders agreed that projects had generally not been as applied as they desired. It is nevertheless important to put this perception into perspective. The international peer review of the project proposals resulted in the rejection of a number of projects with a more applied approach, particularly within the agricultural area. Moreover, some stakeholders admitted that they might have had unrealistic expectations about applicability and adoption, affirming that their particular needs had not been clearly articulated at the outset of the programme. It appears that these end-users were mainly expecting concrete technology or very particular management solutions. Many expressed the opinion that BITUMI-like activities should have been part of the FIBRE programme from an earlier stage – this would in all probability have helped researchers and stakeholders work together to refine project questions and hence improve the applicability of research projects. While there is no current aim of the Academy to extend FIBRE, or of creating a new biodiversity research programme, the Ministry of Agriculture and Forestry and the Ministry of Environment are now collaborating on a targeted biodiversity research programme. In this programme, selection of proposals appears to be made without an official peer review. The view of the panel is that even in targeted programmes like this, a peer review system is advisable for judging quality of proposals.

FIBRE has supported a number of societal and political processes. This is another aspect of applied research benefits that is difficult to measure. FIBRE has most likely shaped perceptions and preferences regarding biodiversity conservation issues of the Finnish public. Awareness of public opinion is essential for government agencies trying to efficiently allocate financial resources. Thus, FIBRE has probably provided a more solid ground for incorporating biodiversity objectives into various policies, as stipulated by the Convention on Biological Diversity.

The panel recommends the establishment of a more permanent interface between biodiversity researchers, stakeholders and end-users. This interface could be a neutral forum hosted by the Academy of Finland, where the groups can meet as required for technology transfer, policy discussions and for familiarising themselves with the aims and constraints of each of the interested parties. This kind of interaction would require some co-ordination with the end-users.

### 4.5 Implementation of specific programme goals and objectives

In the Academy of Finland memorandum for the second phase of FIBRE, several specific objectives of the programme were listed (*Academy of Finland 1999 pp. 14-19*) which we have evaluated and commented upon more in detail.

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### 4.5.1 Global inter-dependency calls for actions in developing countries, neighbouring countries and northern areas

International collaboration has occurred within boreal forest networks which include neighbouring countries, but this objective has perhaps been implemented to a larger degree in projects in developing countries. One of the projects reached excellent levels, which has had an impact on the training of students native to the project host country. This is an invaluable contribution and a significant accomplishment for the goals of the FIBRE programme. It benefits the developing country directly, improving human capacity in the areas of knowledge and management of biodiversity.

### 4.5.2 Protection and management of biodiversity as means of sustainable use of natural resources

*Analyse present silvicultural practices and develop novel methods to promote ecologically sustainable forestry (ESF):* As has been noted, FIBRE has had several successful forest-related projects, particularly notable are landscape level modelling projects. However, it is also worth pointing out that there were not any projects directly addressing alternative silvicultural practices, such as variable retention harvesting methods and their impacts on different biota. There are many important research questions, about ESF, yet to be probed.

*Maintaining agricultural diversity and traditional rural landscapes and methods of sustainable use, criteria and indicators:* Research was initiated into some of the topics listed in the call for proposals, but gaps remain. There was for example no research into the genetic diversity of cultivated species in agriculture, or of issues related to gene banks and property rights of genetic material. There was some progress in the studies of traditional rural landscapes and investigation of some of the controls on diversity. However, new methods for sustainable use, criteria and indicators cannot be fully developed until research in this area of biodiversity is more fully explored.

*The biological diversity of inland waters (lakes and streams) and the Baltic Sea:*

The objectives for biological diversity research into inland waters and the Baltic Sea were well covered in both phases of the programme. There have been some very specifically targeted projects, as well as projects that adopt a more holistic perspective. The projects have provided new insights into species diversity, structure and function within littoral, benthic and pelagic communities. The interactions between aquatic ecosystems and human activity have been addressed, and factors threatening aquatic biodiversity, productivity and land-use have also been considered.

*Impact assessment of invasive species:* The programme has addressed this objective only to a limited extent. Given the current rates of transcontinental travel and trade, land use changes and climate change, this is a topic that deserves high research priority, particularly on the effects of rapid changes in species composition on ecosystem functioning and on the generation of important ecosystem services.

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*Socio-economic aspects of sustainable use of biological diversity:* Several FIBRE projects, which examined societal perceptions, preferences and legal institutions relating to biodiversity conservation, have brought about a deeper insight of the social dimensions of biodiversity. This knowledge may not always lead to any direct improvements in natural resource management, but should nevertheless help policymakers and government agencies to identify the fundamental prerequisites of sustainable biodiversity utilisation in Finland. The integration of the natural and social science approaches will further the incorporation of this broader perspective on biological resources, as envisioned by the Convention of Biological Diversity, into the sectoral policies of Finland.

### 4.6 Comments emerging from the mid-term evaluation

In reviewing the mid-term evaluation (*FIBRE Mid-term Evaluation, Panel Report 1999*) the panel finds that most of the 18 recommendations made have indeed been addressed at least to some extent and we commend the Academy of Finland and the coordinating office for this accomplishment. However, there are two notable exceptions:

*Recommendation 2: The panel recommends that FIBRE explore ways of strengthening research on ecosystem functions, including their role in providing ecosystem goods and services and to develop tools and methodologies for ecosystem management.*

*Recommendation 18: The panel recommends that each consortium, when appropriate, have a data policy to ensure that after completion of the project, data are available for future researchers or end-users. In some cases data should be lodged with national and international data banks and clearing agencies. At the very least, the data should be held in an intelligible and organised form within the collecting organisation.*

These recommendations have been modified and included in the final recommendations to the Academy of Finland.

### 4.7 Concluding summary on strengths and weaknesses

The evaluation of FIBRE is summarised by concluding that the programme, despite some clear weaknesses related to degree of interdisciplinarity and applicability of results, has contributed with substantial capacity building and a very high quality research programme. The panel is also of the opinion that FIBRE has contributed with a significant added value by bringing a global perspective on biodiversity issues to Finland, and also by highlighting the non-biological aspects of biodiversity issues, such as economic valuation, legal perspectives and social perceptions of biodiversity. The panel concludes that FIBRE to a significant degree has facilitated cooperation on biodiversity research in Finland and been instrumental in helping stakeholders formulate and articulate their own needs. This represents an important added value of the financiers coming together and interacting both with the researchers and with each other. Furthermore, the coordination of the programme has received very good marks from all stakeholders and sectors of interest and the panel view the coordinating office to have succeeded very well in managing the programme.

Finally, the panel also wants to point out that the FIBRE programme in general has been praised for being both visible and active on the international policy-making arena.

## 5 General recommendations to the Academy of Finland

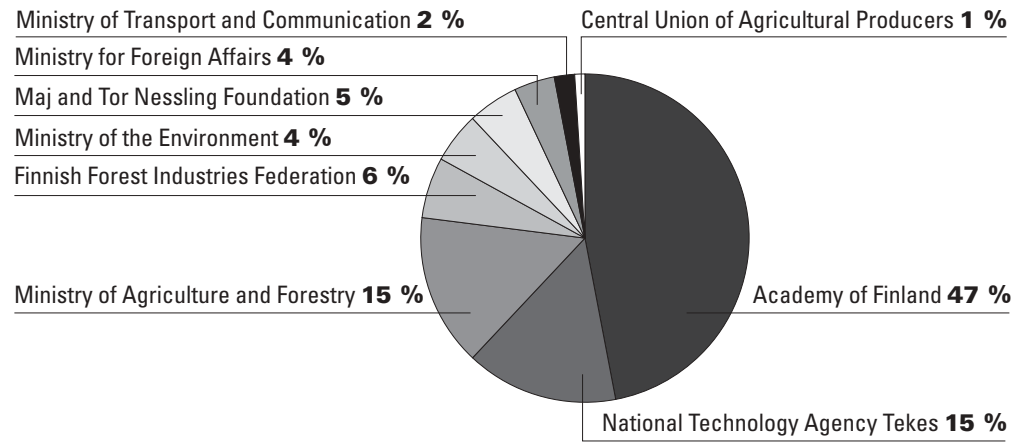
1. The panel acknowledges the significance of the Academy of Finland in influencing criteria of research evaluations and academic career incentives to promote and facilitate interdisciplinary research in the future. In particular, the panel recommends that the Academy of Finland initiate interdisciplinary programmes that continue to integrate ecological, economic and social research for developing effective strategies for ecosystem management.
2. The panel recommends that the Academy of Finland in the future considers integrated efforts to promote research on the role of biodiversity in ecosystem functioning and generation of ecosystem services. We also encourage further support of emerging research on agrobiodiversity, rural landscapes and urban environments and a stronger internationalization of these fields.
3. The panel recommends that future research programmes of the scale of FIBRE adopt a similar coordinating policy and invest sufficient resources in coordination and dissemination. This will ensure that research projects interact with actors outside the immediate research environment and make certain that future programmes have an impact upon society, policy and industry. For programs like FIBRE, the panel also recommends that the Academy considers a consistent public relations policy.
4. The panel points to the need of building a forum for continued successful involvement of the Finnish research community in national and international policy-making related to biodiversity issues.
5. The panel believes that the Academy of Finland has to play an active role in supporting the development of a permanent interface for biodiversity information handling and dissemination in Finland, including the introduction of reward systems and credits for scientists participating in this process.
6. The panel recommends that the long-term effects of FIBRE be analysed through a special follow-up in 3-4 years time, perhaps in relation to the planned follow-up of the national action plan. The panel considers follow-up surveys of FIBRE student careers following their completion of PhDs to be particularly important.



## Contents

### Appendix I

#### FIBRE Funding 1997-2002



#### FIBRE Personnel during 1997-2002 in the thematic groups

Personnel	Aquatic	Forest	Agricult.	Develop.	Total
Number of researchers	130	217	83	42	472
Number of PhD students	39	61	22	17	139

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### Appendix II

#### FIBRE (1997-2002) projects organized under themes

##### Forest biodiversity and forestry

Professor Rauno Alatalo, University of Jyväskylä. *Viability of populations, assessment of biodiversity and conservation value.* (1997–2002).

Professor Ilkka Hanski, University of Helsinki. *Biodiversity in boreal forests: ecology and dynamics of species in complex landscapes.* (1997–2002)

Dr. Heikki Henttonen, Finnish Forest Research Institute. *Forest regeneration options in the light of biodiversity and economics.* (1997–1999)

Professor Jaakko Hyvönen, University of Turku. *Coordination of research and training in systematic biology* (consortium) (1997–1999)

Prof. Jaakko Hyvönen, University of Turku *Phylogeny of Polytrichales*

Professor Timo Koponen, University of Helsinki, *The Biodiversity of bryophytes in tropical Southeast Asia*

Dr. Jyrki Muona, University of Helsinki, *Biogeography of the Pacific Ocean*

Dr. Risto Väinölä, University of Helsinki (Molecular approaches to the diversity and history of boreal fauna 1997–2002)

Phil. Lic. (For.) Simo Kaila, Metsäteho Oy. *Research as an active part in developing forest management towards ecosystem management* (consortium) (1997–1999)

M.Sc. (For.) Vesa Imponen, Metsäteho Oy, *Impacts on wood procurement*

Dr. Annikki Mäkelä, University of Helsinki, *Early dynamics of mixed species stands and their manipulation through forest management*

Professor Jari Niemelä, University of Helsinki *Effect of the size of retention tree groups on biodiversity in forest regeneration (RETREE 1997–2002)*

Dr. Matti Kamppinen, Finland Futures Research Centre, Turku School of Economics and Business Administration. *The cultural selection of biodiversity: the meanings and possible futures of Finnish forests from the viewpoint of cognitive anthropology* (1997–1999). Research Director Matti Kamppinen, Turku School of Economics and Business Administration. *Expert models of forest biodiversity* (2000–2002)

Dr. Timo Kuuluvainen, University of Helsinki. *Structure and dynamics of natural and managed boreal forest landscapes – linking landscape pattern, stand structure and species diversity.* (1997–2002)

M.Sc. (For.) Eero Lukkarinen, Metsäteho Oy (consortium leader until 31.1.1999). MSc (For) Tapio Räsänen, Metsäteho Oy (consortium leader after 1.2.1999). *Producing small scaled biodiversity and stand information by remote sensing* (consortium) (1997–1999)

Dr. Mikko Mönkkönen, University of Oulu. *Managing northern boreal forest landscapes for biodiversity: ecological and economic perspectives* (1997–2002)

Prof. Jari Niemelä, University of Helsinki. *Effect of the size of retention tree groups on biodiversity in forest regeneration (RETREE)* (2000–2002)

Professor Markku Orell, University of Oulu. *Maintenance of genetic diversity in fragmented boreal forests* (1997–1999)

Professor Tapio Palva, University of Helsinki. *Biodiversity in birch and its utilisation* (consortium) (1997–1999)

Dr. Jarkko Hantula, Finnish Forest Research Institute, *Diversity of the fungal community on birch shoots and leaves*

Dr. Jaakko Kangasjärvi, University of Helsinki, *Biodiversity of stress response in birch shoots and leaves*

Dr. Sirkka-Liisa Varvio, University of Helsinki, *Mapping of the birch genome*

Professor Kim von Weissenberg, University of Helsinki, *Biodiversity in birch for improvement of disease resistance* (1997–1999)

Professor Timo Pukkala, University of Joensuu. *Integrating landscape ecology into forest planning* (1997–2002)

Dr. Matti Rousi, Finnish Forest Research Institute. *Genetic biodiversity of forest trees - a case study of mechanisms affecting polymorphism in a natural population of *Betula pendula** (consortium)

Professor Veikko Koski, Finnish Forest Research Institute *Distribution and dynamics of genetic variation at minor tree species* (1997–1999)

Professor Jorma Tahvanainen, University of Joensuu, *Herbivory in relation to variable defenses of northern woody plants – phylogeny of willows* (1997–2002)

Dr. Robin Sen, University of Helsinki. *Tree root associated microbial diversity in undisturbed and clear-cut Scots pine forests: interactions and impacts on nutrient cycling and seedling growth* (1997-2002)

Dr. Heikki Setälä, University of Jyväskylä. *Functional importance of biological diversity of soil decomposers to ecosystem's ability to resist disturbances – experiments using wood ash and draught as disturbants* (1997–1999). *Habitat fragmentation and performance of decomposer communities – linking the mechanisms affecting diversity of soil decomposer organisms to tree growth* (2000–2002). (1997–2002)

Professor Tuomas Sapanen, University of Joensuu. *Development of non-flowering birches using recombinant DNA techniques*. (1997–2002)

Professor Olli Tahvonen, Finnish Forest Research Institute. *Biodiversity and economics of forestry* (consortium)

Prof. Olli Tahvonen, Finnish Forest Research Institute, *Economic Dynamics of harvesting forest age class systems with environmental values* (1997–2002)

Professor Erkki Koskela, University of Helsinki, *Timber production, biodiversity preservation and multiple-use of forests* (1997–1999)

Dr. Lauri Valsta, Finnish Forest Research Institute (1997–1999)

Prof. Jari Kuuluvainen, University of Helsinki. *Valuing biodiversity preserving forest regeneration policies and nature conservation programmes* (2000–2002)

Researcher Paula Horne and Dr Ville Ovaskainen, Finnish Forest Research Institute. *Public preferences for biodiversity in recreation areas for national policy instruments in biodiversity conservation* (1997–2002)

Senior Researcher Arto Naskali, Finnish Forest Research Institute. *Pluralism in forest ecosystem management and economics incentives* (1997–2002)

Professor Erkki Tomppo, Finnish Forest Research Institute. *Temporal and spatial diversity of boreal forest and peatland vegetation. "TEMPOS"* (consortium)

Prof. Kimmo Tolonen, from Nov.1st, 2000 onwards:

Prof. Pertti Huttunen, University of Joensuu, *Long-term changes in biodiversity of mire and forest vegetation based on stratigraphical studies* (1997–2002)

### Agricultural biodiversity, traditional landscapes and urban environments

Professor Ilkka Alanen, University of Jyväskylä. *Social Aspects of Plant Breeding on Genetic Diversity* (1997–1999)

Dr Marko Hyvärinen, University of Oulu. *Extinction risk and management of rare plants in patchy seashore habitats.* (2000–2002)

Senior scientist Mikko Kuussaari, Finnish Environment Institute, *Maintaining biodiversity in traditional rural landscapes – optimal management and area networks.* (2000–2002)

Research director Ilkka P. Laurila, Agrifood Research Finland. *Biodiversity implications of agricultural policies: integrated approach (BIAPIA)* (2000–2002)

Director Juhani Lokki, Finnish Museum of Natural History, University of Helsinki, *Urban ecology and biodiversity* (consortium) (2000–2002)

Professor Jari Niemelä, University of Helsinki, *Ecology and urban planning (ECOPLAN)* (1997–2002)

Professor Juhani Pietarinen, University of Turku. *Preservation of Biodiversity and Environmental Politics* (1997-1999)

Dr. Kari Saikkonen, University of Turku. *Diversity of endophytic fungi in natural and man-made habitats* (1997-1999)

Dr. Juha Tiainen, Finnish Game and Fisheries Research Institute. *Biodiversity in agricultural environments: spatial and temporal variation at multiple scales and functional significance for the cultivation system.* (1997–2002)

Professor Maija Valtonen, University of Kuopio. *Ex-situ conservation of endangered species by cryopreservation of gametes and embryos.* (1997–1999)

## Aquatic biodiversity

Professor Nils G. Holm, Åbo Akademi University. *Socio-cultural plurality and biodiversity: compatibility or clash?* (1997–1999)

Director Raimo Ihme, Finnish Environment Institute. *The biodiversity, ecological management and restoration methods of northern water systems (BEMARES)* (2000–2002)

Professor Timo Kairesalo, University of Helsinki. *Biodiversity and humus in forest soil and lake sediment: Biogeochemical Mechanisms Regulating Biodiversity in Forest and Lake Ecosystems of the Boreal Zone* (consortium)

Dr. Kaarina Sivonen, University of Helsinki (1997–2002) *Genetic diversity and functional competence of Baltic sea cyanobacteria*

Prof. Kielo Haahtela, University of Helsinki,  
*Biodiversity and humus: direct effects of clear-cutting on microbial and microfaunal biodiversity of pine rhizosphere and humus soil.*

Prof. Helinä Hartikainen, University of Helsinki,  
*Humus transport from forest soils as affected by clear-cutting and consequent biogeochemical changes in recipient lakes.* (2000–2002)

Dr. Kirsten Jørgensen, Finnish Environment Institute,  
*Effect on the biodiversity of the microbial community in forest soil by introduction of genetically modified organisms* (1997–2002)

Prof. Risto Kalliola, University of Turku. *Managing biodiversity data on Finnish coastal ecosystems: development of functional solutions for the information society* (2000–2002)

Dr. Jorma Kuparinen, Finnish Institute of Marine Research. *Hydrophysical control of phytoplankton species diversity* (1997–1999). *Genetic diversity and functional competence of Baltic Sea cyanobacteria* (consortium) (2000–2002)

Dr. Kaarina Sivonen, University of Helsinki, *Genetic diversity and functional competence of Baltic Sea cyanobacteria* (2000–2002) (1997–2002)

Professor Erkki Leppäkoski, Åbo Akademi University. *Aquatic Biodiversity, Eutrophication and Habitat Value. Cross-analysis of the Baltic Sea and the Lake Saimaa, Finland* (1997–2002)

Dr. Timo Muotka, University of Jyväskylä. *Biodiversity and its conservation in boreal streams* (1997–1999). *Biodiversity and its conservation in boreal streams and other small water bodies* (2000–2002) (1997–2002)

Dr. Uwe Münster, University of Helsinki. *Bacterial diversity in Boreal Aquatic Interfaces (BioFace)* (1997–1999). *Archaeal and bacterial diversity in boreal environments: a multiphasic approach including anthropogenic impacts (ARBAC)* (consortium) (2000–2002).

Dr. Maarit Niemi, Finnish Environment Institute. *Development of a test kit based on enzyme activities for the measurement of microbial diversity* (2000–2002) (1997–2002)

Dr Maarit Niemi, Finnish Environment Institute. *Microbial diversity in soil as measured by enzyme activities and functional groups*. (1997–1999)

Professor Matti Ojala, University of Helsinki. *Maintaining genetic diversity of salmonids*. (1997–2002)

Senior Researcher Associate Risto Väinölä, Finnish Museum of Natural History, University of Helsinki. *Molecular approaches to the diversity and history of boreal fauna* (1997–2002)

## Developing countries and biodiversity issues

Professor Olavi Luukkanen, University of Helsinki. Management of biodiversity in the East Usambaras, Tanzania (1997–1999). *Tropical forest management and rehabilitation as means of biodiversity conservation in Africa* (2000–2002)

Professor Olli Saastamoinen, University of Joensuu. *Between subsistence and global markets: grassroot economics, social structures and nation policies in sustaining non-wood forest products*. (1997–1999)

Docent Hanna Tuomisto, University of Turku (2000-2002), Professor Jukka Salo, University of Turku (1997–1999). *Origins and maintenance of biodiversity in the Western Amazon: A multidisciplinary approach* (1997–2002)

Dr. Antti Otsamo (consortium leader 1.12.2001 onwards). Dr. Kari Tuomela (consortium leader until 30.11.2001) Stora Enso Forest Consulting. *Effects of biological, socioeconomic and juridical issues on biodiversity management in industrial tree plantations in the tropics: a case study from West Kalimantan* (consortium). Programme manager Anssi Niskanen, University of Joensuu, *Effects of biological, socio-economic and juridical issues on biodiversity management in industrial tree plantations in the tropics: a case study from West Kalimantan* (2000–2002)

## Other

### **Environmental Law**

Professor Erkki Hollo, University of Helsinki. *Biodiversity and law* (consortium) (1997–2002)

Professor Pekka Vihervuori, Helsinki University of Technology (1997–1999), *Spatial planning, sustainable development and biodiversity*

Prof. Ari Ekroos, Helsinki University of Technology, *Biodiversity – land use planning and forest law* (2000–2002)

Prof. Kari Kuusiniemi, University of Turku (1997–2002) *Legal mechanisms for safeguarding biodiversity and environmental quality*

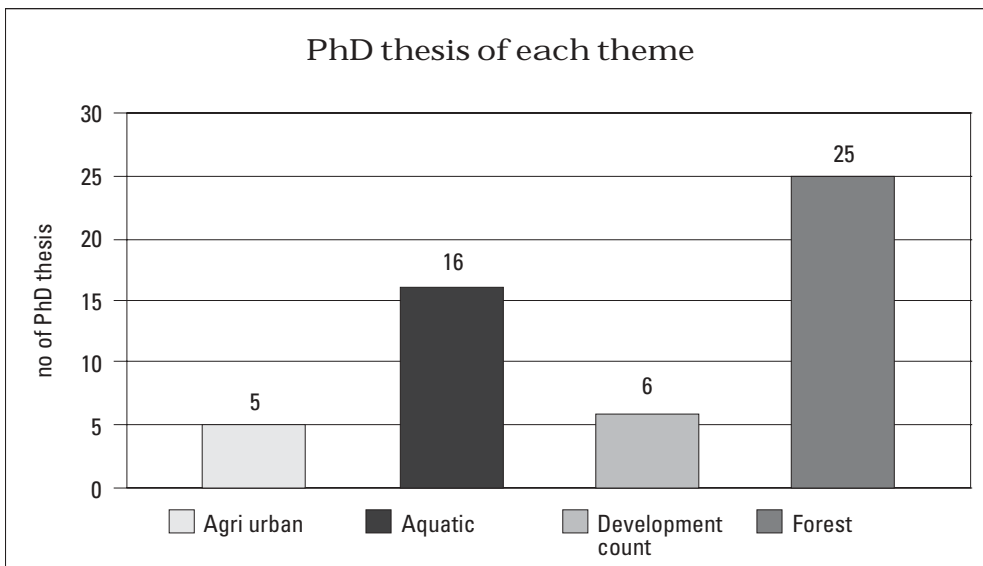
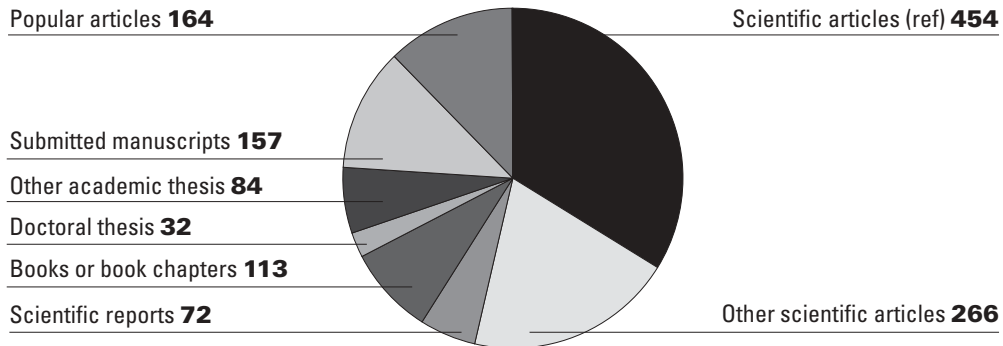
### **Integration of FIBRE**

Prof. Jari Niemelä, University of Helsinki, Prof. Risto Kalliola, University of Turku, Programme Director Mari Walls, FIBRE, University of Turku, *FIBRE integration project (BITUMI)* (2000-2002)

## Contents

### Appendix III

#### No of publications all categories



## Contents

### Appendix IV

#### The Integration and Synthesis Project Bitumi

The objective of the integration and synthesis project BITUMI has been to promote the applicability and use of research results of the FIBRE programme. The main audience for this integration project has been the various experts who need information about biodiversity in their work. BITUMI has been exploring ways to enhance interaction among FIBRE-researchers, scientific community, decision-makers and other end-users of biodiversity information.

#### Organization

BITUMI was carried out as a joint project of the Universities of Turku and Helsinki. BITUMI steering group members were Dr. Mari Walls (chair, FIBRE co-ordination), MSc Marja Vieno (vice chair, FIBRE co-ordination), prof. Jari Niemelä (University of Helsinki, Ecology), prof. Risto Kalliola (University of Turku, Geography) and MSc Pasi Laihonen (University of Turku, Biology), and the researchers MSc Mia Rönkä (University of Turku, Biology), MSc Tuuli Toivonen (University of Turku, Geography), MSc Lauri Saaristo (University of Helsinki, Ecology) and Dr. Jaana Vormisto (University of Turku, Biology, Jan 2000 – June 2001).

#### Themes

Biodiversity knowledge has been compiled within BITUMI in four main themes following the themes of the working groups of researchers and stakeholders:

- Forest biodiversity and forestry
- Agrobiodiversity, traditional rural landscapes and urban environments
- Aquatic environments and biodiversity
- Biodiversity issues and developing countries

#### Cooperation

BITUMI activities have been linked to many other ongoing processes e.g. with the follow-up working groups of the Finnish National Action Plan for Biodiversity (will be carried out 1997-2005) and with the Finnish Clearing House Mechanism LUMONET maintained by the Finnish environment Institute. Knowledge achieved during the FIBRE programme has been channelled to various international processes, e.g. the Convention of Biological Diversity including the preparatory work in Finland for the SBSTTA and COP meetings. BITUMI experts were also consulted in discussions with the Ministry for Foreign affairs when the scientific base of environmental issues for the Johannesburg summit 2002 was under preparation.


Forest BITUMI has co-operated with BORNET, which is a network of boreal forest biodiversity researchers and users. BITUMI has also acted as a Finnish national biodiversity platform in an EU-funded thematic network EPBRS (European Platform for Biodiversity Research Strategy).



## Implementation

Work groups, workshops, seminars and networks between scientists and end users form the basis of the BITUMI work. The BITUMI project will produce the following main outputs:

- a series of books (three) based on FIBRE themes and results will be published (autumn 2003),
- a report on the applicability and use of research results based on interview material,
- a methodological report,
- project descriptions, theme texts and an expert directory will be produced to the Finnish Clearing-House Mechanisms of the CBD abbreviated LUMONET,
- development of communication and working mechanisms between researchers and end-users,
- initiation of mechanisms to disseminate scientific knowledge with the help of scientific networking,
- various activities including meetings, seminars, field trips to convey scientific understanding on biodiversity issues to various sectors and stakeholders, and reports from these activities,
- recommendations as how to develop a national platform for biodiversity researcher and other stakeholders



*The report of an international evaluation panel, appointed by the Academy of Finland, addresses several sets of questions which are vital when determining the strengths and weaknesses of the Finnish Biodiversity Research Programme FIBRE and the added value the programme has generated to the global perspective on biodiversity issues.*

*The FIBRE programme was carried out in two phases, the first in 1997-1999 and the second in 2000-2002. The programme aimed at producing internationally competitive and innovative research on biological diversity. The projects funded within the programme represented a broad range of disciplines from biological sciences, forestry, and biotechnology to social sciences, economics, humanities, and environmental law.*

ISBN 951-715-438-0 (print)  
ISBN 951-715-439-9 (pdf)  
ISSN 0358-9153

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