



PROFOREST
Centre of Excellence
QLK1-CT-2002-30315/ PROFOREST

**Protection of Forest Resources
in Central Europe
at the Forest Research Institute
in Warsaw**

Final Report

2003-2006



May 2006, Warsaw

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PROFOREST – Protection of Forest Resources in Central Europe

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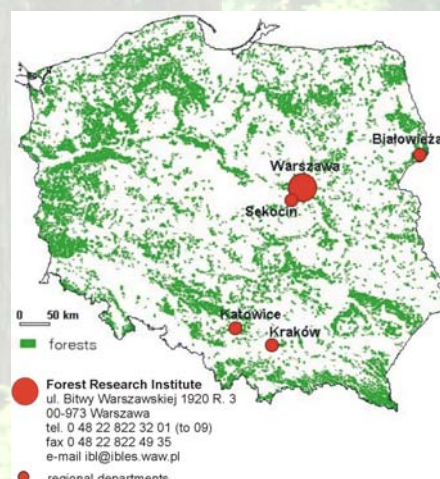
<http://www.proforest.ibles.waw.pl>

1. General project description

On 17th July 2002 the European Commission officially approved a three-year project focusing on the development of a European Research Area (ERA) involving protection of forest resources in Central Europe, within the 5th Framework Programme: Quality of Life and Management of Living Resources. Independent experts gave a high rating (average 4.85 out of a maximum of 5 points) to the proposal that a Centre of Excellence (CoE) be established at the Forest Research Institute in Warsaw (FRIW).

The FRI Warsaw, as the largest research centre in the forestry sector in Poland, serves as a common platform for breaking down barriers and establishing links between forest researchers from Central Europe and practitioners as well. It combines both basic and applied research on environment-oriented problems, forest protection, monitoring forest health. It publishes 2 periodicals and several scientific reports per year. This potential defines the scope of possible achievements.

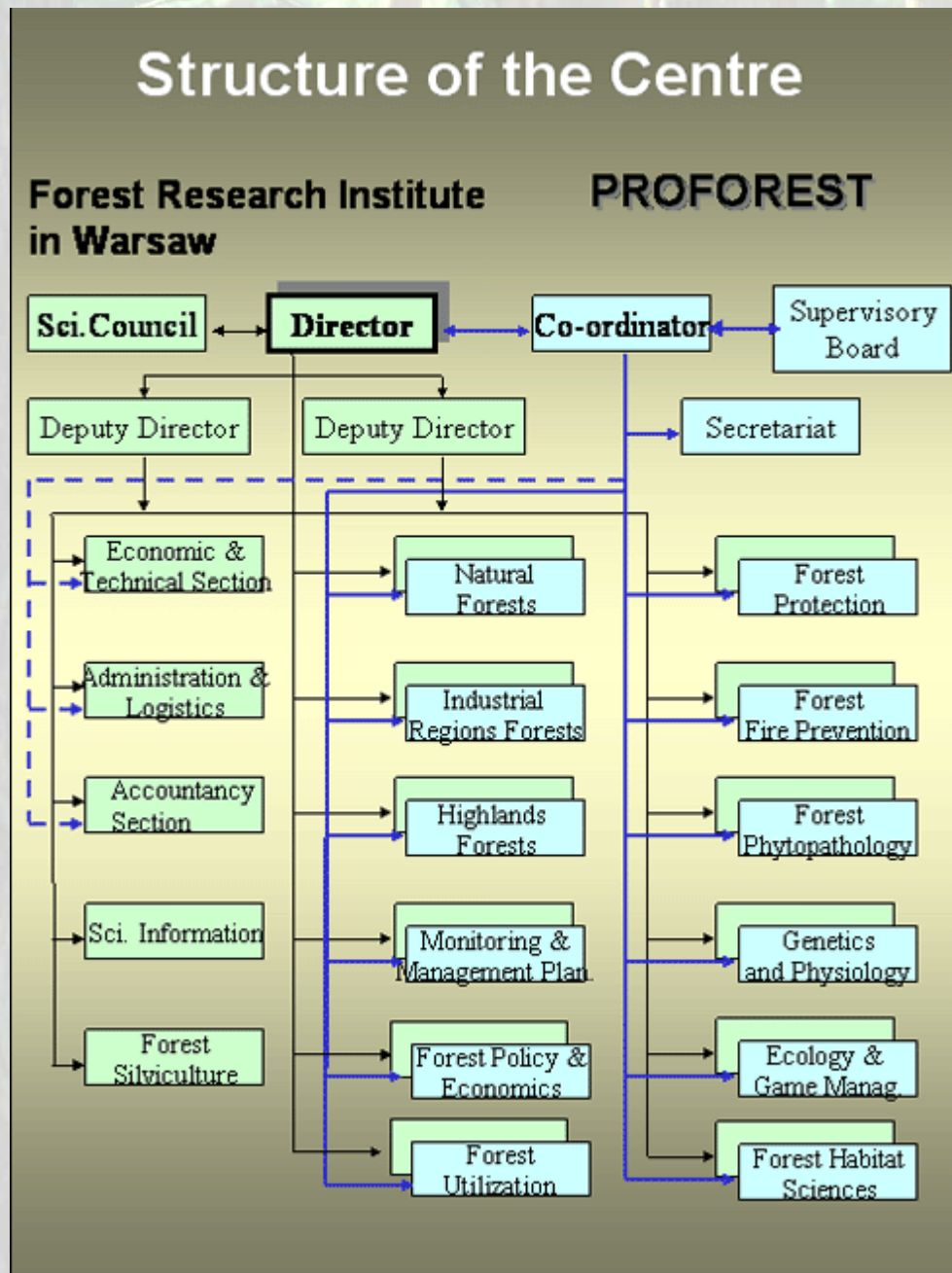
The PROFOREST CoE was located in the middle of Europe's forests and dealt with many basic and applied research problems in forest science; therefore it facilitated contacts between researchers throughout Europe. The network thus formed enabled researchers to pool their knowledge and exchange details of methodologies and research techniques. The resulting contacts between distinguished scientists and young researchers and students will facilitate rapid development of the subject area.



Establishment of the Centre at the Forest Research Institute in Warsaw (FRIW) resulted from its 75 years' experience and knowledge on problems of forest protection against insect pests, fungal pathogens, fires, emissions, wildlife, protection of forest soils and waters, biodiversity, gene resources, and nature conservation. FRIW's Department of Natural Forests located in the world-famous Białowieża Primeval Forest in particular can serve as a basis for joint research efforts of scientists from the whole of Europe. Thanks to the FRIW's Department of Mountain Forests and Department of Forestry in Industrial Regions, a wide spectrum of modern forestry problems in Central Europe could be addressed.

Project structure

The PROFOREST Centre of Excellence (CoE) at the Forest Research Institute in Warsaw brought together a team of 20 scientific personnel from selected Departments of the Institute to develop a network of international co-operation, integrative activity and education, and to foster the development of forest science related to protection of forest resources in Europe.



The project was divided into 9 Workpackages, with 38 project actions covering:

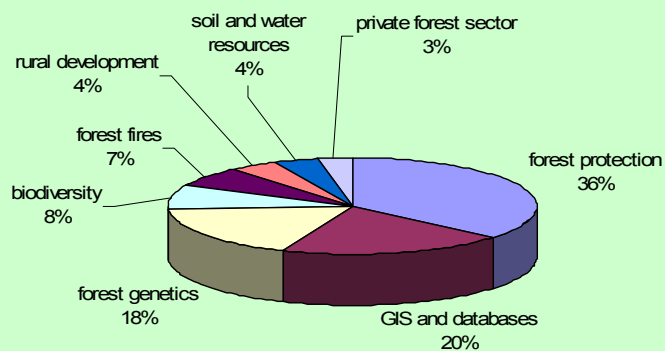
WP 1 Building the research capacity – visits of experienced scientists to the Centre, to share their knowledge with younger researchers invited from the New Accession States (NAS), and from Eastern European countries in some justified cases (5 project actions);

WP 2 Dissemination of knowledge – visits of young scientists to the Centre, to acquire high-level knowledge (7 project actions);

WP 3 Post-doctoral courses – visits of PhD fellows from Lithuania, Belarus and Ukraine, to upgrade their professional research skills (3 project actions);

WP 4 Exchange of experience and extension of the Centre's basic research to other countries – visits of the Institutes' staff to other EU centres for personal capacity building (5 project actions);

The share of forestry issues studied in the Centre



WP 5 Workshops – eight workshops roughly covering the Centre's entire area of interest (9 project actions);

WP 6 International conferences – organisation of five international conferences and one practical course, where barriers between scientists of our continent could be broken down and new fruitful links established, and scientific knowledge and experience was passed on to practitioners (3 project actions);

WP 7 Networking – networking of European databases on forest pests (2 project actions);

WP 8 Interdisciplinary training schools – two winter and two summer schools for sharing knowledge on forest genetics, and soil and water conservation in forests (3 project actions);

WP 9 Administrative co-ordination – administrative workpackage connected with co-ordinating all the work during 3 years of the Centre's activity, with 3 persons involved: project co-ordinator, project technical manager and project secretary.

It is easy to see that the workpackages contain diverse subject themes but are all carried out within one mode of action. This introduced an order into the Centre's activities and enabled easy reporting. The experience acquired over time was gathered and arranged in a clear and transparent way.

2. Project general objectives and aims

The general objective of the PROFOREST Centre of Excellence (PROFOREST CoE) project focuses on specific chapters of the 5th Framework Programme for Research and Technological Development (RTD) of the European Community, as follows:

QOL-2001-5.3 Sustainable and multi-purpose utilisation of forest resources; the integrated forestry-wood chain,

containing:

QOL-2001-5.3.1 Multifunctional management of forests

QOL-2001-5.3.2 Strategies for the sustainable and multipurpose utilisation of forest resources; the forestry-wood chain.

The main aim of the PROFOREST CoE is to pursue and stimulate the process of integration of forest scientists working on the protection of forest resources in Central Europe. The PROFOREST CoE serves to strengthen personal contacts and encourage closer Europe-wide co-operation and integration of researchers in formulating joint grant proposals. It also fosters the development of forest sciences in the countries of Central and Eastern Europe, towards better management of forests for future generations.

Specific project objectives cover development of integration between forest scientists from Central and Eastern European Countries (CEEC) and EU experts in the protection of forest resources in Central Europe, in connection with creating the European Research Area (ERA).



Photo: T. Oszako

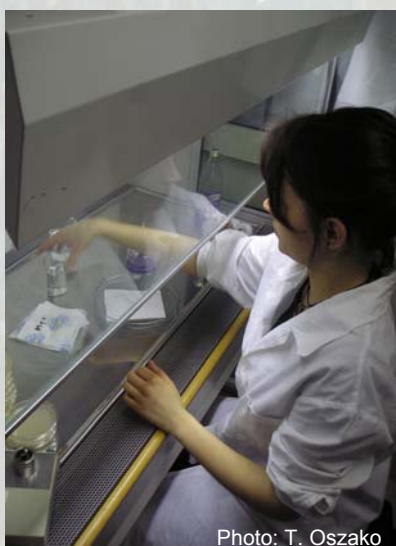


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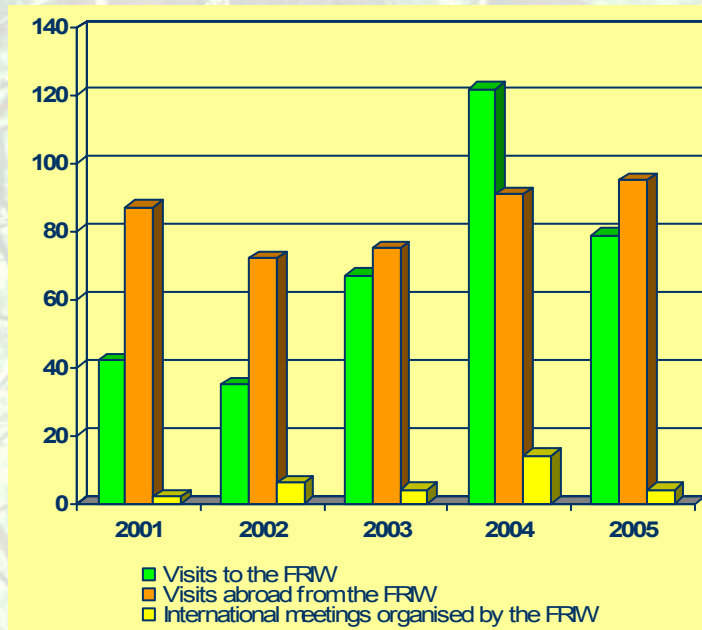
Photo: W. Grodzki

The following measures contributed to the overall aim of the project:

- transforming the research and development (R&D) potential of the Centre towards advanced fields of European forestry,
- improving the links with outstanding Centres in the EU and NAS (New Accession States),
- reorienting the activities of the Forest Research Institute towards new priorities of forest protection in the Centre,
- increasing networking with both research and forest administration partners for better forest protection management,
- increasing the Institute's capacity through the Centre's activities,
- supporting and bringing together theoretical and applied research,
- building the potential and activity of the Centre,
- improving the quality and structure of research,
- upgrading professional qualifications,
- strengthening co-operation at the European level,
- co-operating with the State Forest service,
- preparing successive European research projects, increasing participation in international and interdisciplinary projects,
- integrating the Centre and the Institute with the European Research Area and forest industry,
- establishing twinning mechanisms with foreign partners involved in the Centre's activities,
- attracting young researchers from both Western and Eastern Europe,
- re-establishing links with Ukraine, Russia and other NIS (Newly Independent States),
- optimising the technological regimes in chemical control of forest pests,
- increasing the efficiency and innovativeness of research project implementation,
- ensuring sustainable development of staff careers,
- increasing the scope of new research fields in forest genetics, pathology and entomology extending activities towards stronger involvement of industry in Poland and international co-operation,
- establishing a leading training site by organising international workshops, schools and post-doctoral studies,
- strengthening the links with regional authorities through open conferences and workshops,
- participating in both national and European networks,
- increasing capacity by updating infrastructure and gaining new management skills during the Centre of Excellence project,
- signing twinning agreements with many European research units.

2. Results and conclusions from the project

Thanks to the PROFOREST Centre, the Forest Research Institute has opened up more to Europe, and has become a high-ranking centre for the protection of forest resources. The location of Poland in the centre of Europe, its high share of forest resources, experience in combating forest pests, the scale of afforestation of former agricultural land, and the topically and logistically well-prepared Forest Research Institute sections, resulted in substantive development of the Centre, closer international co-operation, better research results, and elaboration of a strategy to improve the protection of European forests.



Strong integration with the European Research Area is necessary. Before the Centre was established, the Institute had five bilateral co-operation agreements with European forestry institutions: the Research Institute of Forestry and Game Management (Czech Republic), the Landesforstanstalt Eberswalde (Germany), the Lithuanian Forest Research Institute (Lithuania), the Forest Research Institute in Zvolen (Slovakia), and the Ukrainian State University of Forestry and Wood Technology (Ukraine). During the Centre's activities joint work between the FRIW and those institutions was also supported, among many other activities. Implementation of the Centre's tasks resulted in one formal bilateral agreement between the FRIW and the Faculty of Forestry, Agricultural Academy in Jelgava, Latvia, while another one, with the University of Applied Sciences in Lullier, Switzerland, is in the final stage of realisation. Moreover, one informal agreement regarding co-operation in forest genetics and gene resources conservation was signed between the FRIW and the Latvian Forestry Research Institute (SILAVA).



Photo: M. Topczewska



Photo: M. Topczewska



Photo: M. Topczewska

Researchers, practitioners, and students from local and European areas gathered in Poland to discuss and gain an understanding of the problems of protection and silviculture in multifunctional forests, to collect materials for research and comparative assessments, and to foster the development of new research networks. The Centre facilitated contacts between young researchers and students (three post-doctoral courses (training visits) were organised for young researchers from Lithuania, Belarus and Ukraine), and hosted meetings, workshops and seminars on the protection of forests and their resources. Also thanks to the Centre, co-operation developed between interdisciplinary research scientists and practitioners from the EU, Poland, the NAS and other European countries for improving the quality of ERA.



Photo: L. Kruczek



Photo: L. Kruczek



Photo: W. Grodzki



Photo: T. Oszako



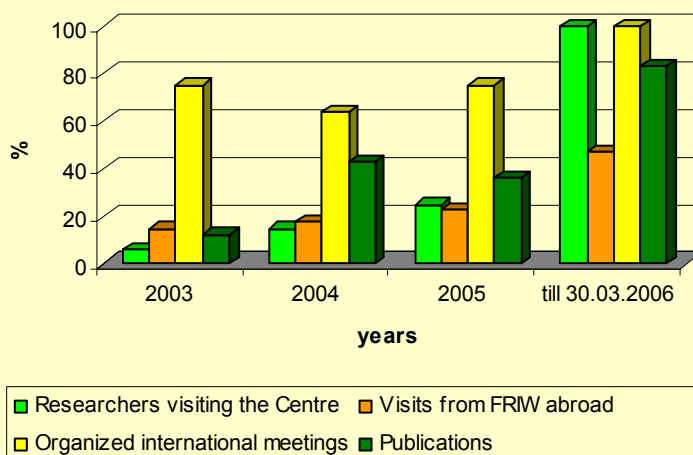
Photo: T. Oszako

In 2003-2006, 5 international conferences, 8 workshops and 4 schools were organised with the participation of the Institute and the PROFOREST CoE, in association with the State Forests Holding. A conference concerning butt and root rot was organised together with the IUFRO 7.02.02 Session (Poznań, 2004), and another dealing with protection of soil and water was held with the FAO 24th Session of the Working Party (Cracow, 2004). Moreover, a practical course regarding molecular technologies for diagnostics of *Phytophthora spp.* was carried out. This harmonization of basic research with application established a model of working with the forest industry, combined with education of higher staff of the Forest Service.

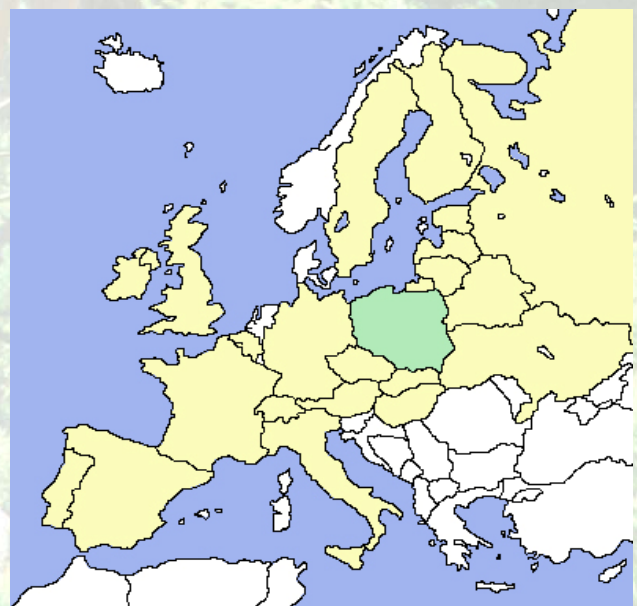
The PROFOREST Centre of Excellence at the Forest Research Institute in Warsaw - in the middle of Europe's forests and of many basic and applied research problems of interest to the forest sciences - facilitated contacts between scientists in Europe. It was possible to bring forest knowledge together here, and to exchange knowledge and experiences. **26 short-term and 4 long-term study visits for CoE researchers in MS, ACC or NIS** (Austria, Belarus, Belgium, Czech Republic, Estonia, Finland, France, Germany, Hungary, Italy, Latvia, Lithuania, Portugal, Scotland, Slovakia, Spain, Sweden, Switzerland, the UK) were carried out. **17 short-term and 9 long-term visits to the CoE were realised** from Austria, the Czech Republic, Estonia, Finland, France, Germany, Latvia, Lithuania, Russia, Slovakia, Spain, Sweden, Switzerland, the UK, Ukraine.

Knowledge was exchanged and a common Central European database was built. Researchers from the Institute participated in **3 training courses** on GIS systems, digital maps and database systems in Belgium and Austria.

The percentage share of the Centre tasks realisation in overall Institute activities



In activities connected with protecting mountain forests, networking was developed with scientists from the Czech Republic, Estonia, Lithuania, Slovakia and Ukraine, involving a range of databases and numerical map creation dealing with biotic threats to the forest stands, and from Sweden and Slovakia (attractants and anti-attractants in forest protection). **22 visits in a range of networking and twinning** projects proceeded both from and to the Centre.



European countries involved in carrying out the Centre's tasks.

The number of tasks in the last year of project implementation increased with the project Scientific Office's consent. The main purpose of the proposed additional PROFOREST activities was to follow up the established ERA. Designed international meetings (2), and scientific missions to the CE (3) and from the Centre (8) also aimed to prepare joint projects within the European Support Scheme in order to prolong the PROFOREST ideas once the project itself had been completed.



Eminent representatives of forest science from several European institutes and universities were invited to the Advisory Board for co-ordination: Prof. Timo Karjalainen, Chairman (FI), Prof. Thomas Geburek (DE), Prof. François Lieutier (FR), Dr Benoît Marçais (FR), Prof. Ladislav Paule (SR), Prof. Fredrik Schlyter (SW), Prof. Christian Tomiczek (AU), Doz. Dr. Petr Zahradnik (CR) – members of the External Part, and Prof. Tomasz Borecki, Warsaw Agricultural University, Prof. Andrzej Kłoczek, FRIW, Dr Edward Lenart, Department of Forestry at the Ministry of the Environment – members of the Internal Part.

During the three years of project activities, the Centre's 12-member co-ordinating body held 4 meetings, in Warsaw, Białowieża, Cracow and Warsaw. During the Sessions, the Advisory Board collected information on the Centre's condition, plans and resources. It analysed the draft reports from each year of the CoE's activity, where work task implementations were discussed and recommendations for the Workpackage Co-ordinators were prepared. Each meeting ended with a statement from the Advisory Board Members recording progress in project implementation and stressing points in need of improvement.

Thanks to the co-ordinating work of the Head and those responsible for the implementation of the Workpackages by the Advisory Board, as well as the assistance of the Directorate of the FRIW and its Administration & Logistic services, there was no problem with the full attainment of the goals set and Deliverables planned.

In co-operation with the National Contact Point, the Centre trained its own staff and network members in preparing joint projects and carrying them out within Framework Programmes. The work of the Centre brought the Institute out onto a broader European arena and enabled researchers from abroad to benefit from the experience of the Institute's scientific workers at present and in the long term.

The Centre's activity has contributed to developing current achievements in the area of forestry and general ecology, increasing knowledge, teaching young researchers, expanding post-doctoral studies, developing new ideas and hypotheses and promoting new trends. Other areas that developed well include basic research in forestry, dissemination of knowledge, expansion of co-operation among all the countries of Europe, and promoting the holism of scientific progress.

Publications

The following 13 publications were printed as a result of the international conferences and workshops co-organised and organised by the PROFOREST CE office, comprising a collection of articles originating from those meetings:

1. Afforestations in Europe; experiences and prospects.
2. Forest management planning status and changes after political and economic transformation in Central Europe.
3. Analysis of microsatellite sequences in Scots pine.
4. Large-area forest fires.
5. GIS and databases in the forest protection in Central Europe.
6. Protection of forests against pest insects and diseases. European Oak Decline Study Case.
7. Protection of soil and water resources in forestry areas.
8. Phytophthora in nurseries and forest stands.
9. Assessing soil and water conditions in forests.
10. Private forestry contractors in Central and Eastern European countries.
11. Possible limitation of decline phenomena in broadleaved stands.
12. Insect outbreaks in managed and unmanaged forests.
13. Current problems of forest protection in spruce stands under conversion.

Copies of nearly all the above-mentioned publications are available free of charge through the FRIW website http://www.ibles.waw.pl/index_a.html. All publications edited within PROFOREST are sent to 129 libraries and institutions all over the world that have a free publications exchange agreement with the FRIW.

29 scientific papers and articles were published as a result of PROFOREST activity, both in internal and external forestry press.



Photo: L. Kruczek

Within the 6th Framework Programme for RTD of European Communities, Sub-priority 6.3. Global Changes and Ecosystems, **4 project proposals were approved** with the FRIW as a partner:

- **EFORWOOD** – Tools for Sustainability Impact Assessment of the Forestry-Wood Chain. This is a four-year integrated project (IP) involving 38 organisations from 18 countries,

- **FIREPARADOX** – An Innovative Approach of Integrated Wildland Fire Management Regulating the Wildfire Problem by the Wise Use of Fire: Solving the Fire Paradox. This is a four-year integrated project (IP) involving 31 organisations from 14 countries,



Photo: K. Jodłowski



Photo: J. Piwnicki



Photo: M. Topczewski

- **EVOLTREE** – Evaluation of Trees as Drivers of Terrestrial Biodiversity. This is a four-year project, a network of excellence (NoE) involving 25 organisations from 15 countries,

- **TREEBREEDER** – a working model network of tree improvement for competitive multifunctional and sustainable European forestry. This is a four-year project, co-ordination action (CA) involving 28 institutions from 18 countries.

Moreover, the Forest Research Institute participates in the Leonardo da Vinci Programme “Teaching and Learning in Virtual Learning Environments for Water Management”. This is a two-year project involving 11 organisations from 5 countries.



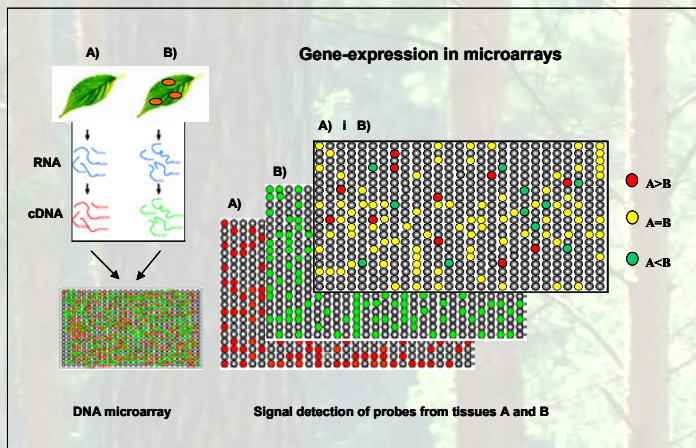
Photo: W. Grodzki

The Deliverables attained and assumed Milestones of the PROFOREST CoE project will enable to improve forest science methods used in Central Europe, to bridge knowledge and skills throughout Europe, and to assist EC Member States, NAS and other European countries in establishing mutual fruitful contacts and implementing forest research projects in the 7th Framework Programme. Overall, 44 deliverables were achieved regarding emerging issues in forest protection, of which 26 are scientific reports that have been collected and printed.



The most important issues regarding the protection of forest resources on different levels – genetic, specimen, population and landscape – presented in the Deliverables reports include:

- Molecular ecophysiology, e.g. ecological adaptations at the molecule level, and *vice versa*, the role of molecules in the ecological comportment of whole organisms; a report on plant phenotype diversity and longevity.
- Genetic diversity conservation of Scots pine. Neither reserves nor seed banks, alone or together, are sufficient. Conservation must be integrated with other land uses, such as timber harvest, recreation, agriculture, and even how we build our cities.
- Practical genetic diversity conservation involving two different types of methods, namely those *in situ* (on site) and those *ex situ* (off site).
- Genetic resources conservation methods by micro-reproduction and cold preservation of forest tree species, as *ex situ* conservation methods.
- New genetic approaches in plant genetics, DNA analysis, and the micro-arrays technique. For some time now, gene-expression has been studied among woody plants with regard to development and growth processes, resistance mechanisms against biotic and abiotic factors.



- Controlling pathogenic fungi, especially *Phytophthora* spp. An analysis of the exchange of diseased plant material samples was prepared, and problems of fungal cultures as well as research experiences in this field were discussed. Attention was paid to genetic methods of pathogen identification, especially with the real time PCR protocol.
- Environment-friendly methods against damage caused by deer in Scots pine protection. It was concluded that this should cover such topics as: development of methods of damage inventory, standardized methods of damage and wildlife inventories in ecosystems divided by state borders, creating educational programs for hunters and forest owners to increase their knowledge about forest ecology, and promoting natural regeneration as the most natural and effective method of forest protection against damage caused by deer.
- Protection of forest plantations against forest pests, especially against *Hylobius abietis*. Some control methods (silvicultural, physical, chemical and biological) were discussed, and recommendations were prepared.



Photo: M. Topczewska



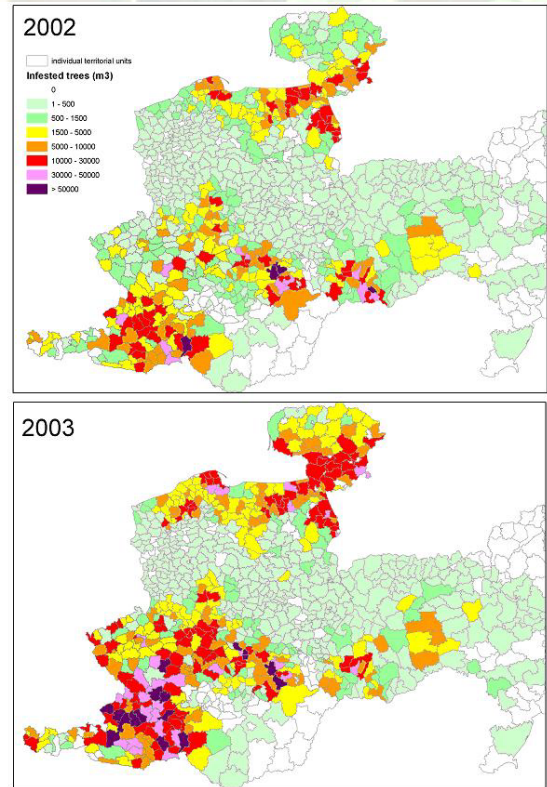
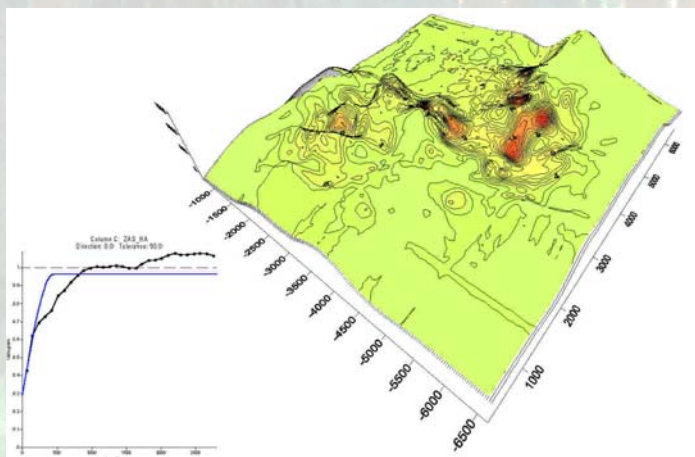
Photo: W. Janiszewski



Photo: A. Rachwald

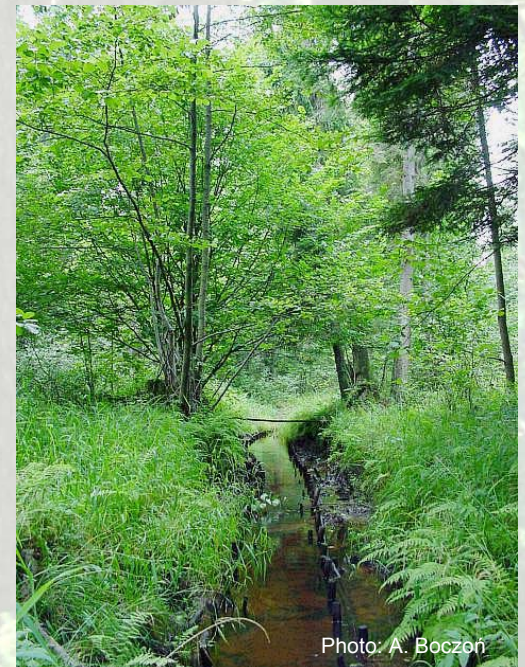
- The role of bats as useful indicators of forest environment condition and biodiversity. It was found that the presence of bats in a forest depends both on external factors like environmental pollution, and on such features as age and spatial structure which depend on forest management; bats are an important indicator of forest environment condition, although more detailed studies are necessary.
- Future needs and neglected research areas of operational use and research on Integrated Pest Management (IPM) strategies and techniques in Central and Eastern European countries, especially new members of the EU.

- Measures and procedures of the best forest protection strategy suitable for different types of forest ecosystems: the major directions for and objectives of forest policy with respect to forest protection, preventive measures in forest protection, strategies of protective conduct in forest ecosystems endangered by foliophages and cambioophages, strategy for the control of defoliating insect populations in pine stands, strategy for the control of bark- and wood-boring insects in mountain spruce stands.
- Possibilities of research and development work on modern environmentally safe methods of soil pest control in forestry, including pathogenic fungi.
- The role of forests and forestry in countryside landscapes, particularly on afforested sites, and the main functions of afforestation. Afforestation will considerably improve the general condition of the natural environment, and will be profitable to rural and urban inhabitants.
- The role of forests and forestry in developing rural areas, and the main functions of forests. For the future, the role of forests in rural development should be seen in a broader perspective than timber production alone.



- The use of GIS methods in forest pathology, and databases from selected Central European countries. MS Excel and MS Access for Windows were used for data management. For the maps and geostatistics, ESRI ArcView GIS 3.2 and ArcGIS 9.0 were applied. The partners involved in this work were: from the Czech Republic – Forestry and Game Management Research Institute Jiloviste-Strnady, from Slovakia – Forest Research Institute Zvolen, from Poland – Forest Research Institute Warsaw/Kraków (PROFOREST CE). Maps were prepared representing the occurrence of bark beetles in the years 2002, 2003 and 2004 in forest complexes of the individual countries.
- Assessment of the health state of Norway spruce stands in the continuous area covering 3 adjacent countries (Poland, Czech Republic and Slovakia), a pilot database, geostatistical methods, and GIS maps of forest health state representing the occurrence of bark beetles.

- Limitation of losses caused by fires in forest ecosystems, and guidelines for diagnosis.
- The management of biodiversity of insects in managed forests. The main objective was to recognize and compare the following: the basic structure and functioning of forestry (in Poland and Sweden); the quality and range of insect pest threat in forestry; forest protection methods against insect pests in forestry; methods of biodiversity research in forestry in the aspect of forest protection; methods of protecting and increasing the biodiversity in managed forests.
- Forest protection against pest insects and the role and usefulness of attractants and anti-attractants.
- Methods of soil and water protection and assurance of the quality of data obtained by chemical analysis of soil properties as well as chemical composition of water and plants, based on European criteria and laboratory results.
- Improvement of soil and water conditions in forests, and principles of sustainable use and development of forests. Assessment of soil conditions should consider the following processes which could be the cause of soil degradation: erosion, contamination, organic matter, biodiversity, sealing, compaction, floods and landslides, salinisation.



Overall, 80 tasks were planned for the 3 years of the project's duration, but 105 were ultimately carried out due to a need for stronger networking and twinning between MS and NAS groups of researchers.

Promotion

Two colour leaflets were printed, introducing the non-specialist audience to the project's objectives and predicted results, and presenting the implemented and planned tasks. Moreover, short information on the PROFOREST Centre's co-ordination body, the Advisory Board and research focus was included with contact data at the end.

Short information on the PROFOREST Centre was also included in a folder produced by the Institute for broad public dissemination.

Centre of Excellence PROFOREST

An interactive tool
for Protection
of Forest Resources
in Central Europe
from the 5th to 6th Framework Programme



QLK1-CT-2002-30315/PROFOREST
at the Forest Research Institute
in Warsaw



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Centre of Excellence PROFOREST

at the Forest Research Institute in Warsaw

Second issue

An interactive tool
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Information about the Centre's activities was disseminated by participants in their native countries both at research units and in the local press. Moreover, an insert was published in *IUFRO e-notes* and *IUFRO News* as well as the EU publication *The Forestry Wood Chain; the impact of EU research (1998-2004)*. Workshops and conferences were advertised through well-known web pages such as the 'IUFRO calendar of meetings' and through announcement leaflets distributed to all interested parties.

The project's website <http://www.proforest.ibfles.waw.pl> was constantly updated with information about the project, its progress, upcoming events, publications etc.

3. Plans for the future

The European Research Area still needs to be developed and strengthened. The 'Centre of Excellence' instrument created in the 5FP was successful and its new edition is foreseen in the 7FP. The activities of the Centre at the Forest Research Institute brought significant benefits to both the Institute as an organisation and to its individual researchers. Its scientific work and fields of interest are now much better known to European scientists and practitioners.



Photo: M. Topczewska

The Forest Research Institute was established in 1930 as an Experimental Station of the State Forests (National Forest Holding). Since 1945 it has been acting as the Forest Research Institute, at the present time subordinated to the Minister of Environment.

The Director and the Scientific Council are the head organs of the Institute. The Scientific Council is a decisive, initiating and advisory body of the Institute, and is empowered to carry out doctoral studies and studies qualifying for associate professor degree, and also to apply for the conferring of a professor title.



Photo: L. Kruczek



Photo: L. Kruczek

The main research directions

The Institute carries out scientific research and developmental work to the benefit of all forests, forest management and other fields of forestry. It is in order to get a better knowledge of nature, social, technical, and economic circumstances influencing the state of forest resources, and to shape their multi-sided and balanced use due to satisfy the needs of contemporary and future generations in the field of forest productive, protective and social services.

The Institute actively participates in elaborating legal acts and other documents, including those resulting from international conventions and agreements, and from Forest Policy of the State, and it undertakes activities for organs of the state power.

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