Evaluating Forestry Incentive and Assistance Programmes in Europe – Challenges to Improve Policy Effectiveness

Heikki Pajuoja, Ludek Sisak and Krzysztof Kaczmarek (eds.)

EFI Proceedings No. 54, 2005

European Forest Institute

The Polish Forest Research Institute
(Instytut Badawczy Lesnictwa, Poland)

This conference was organised in the context of the project “Evaluating Financing of Forestry in Europe” (EFFE), which was carried out with the financial support from the Commission of the European Communities, DG Research – Quality of Life and Management of Living Resources Programme under the contract number QLK5-CT-2000-01228.

EFI Proceedings No. 54, 2005
Evaluating Forestry Incentive and Assistance Programmes in Europe
– Challenges to Improve Policy Effectiveness
Heikki Pajuoja, Ludek Sisak and Krzysztof Kaczmarek (eds.)

Publisher: European Forest Institute

Series Editors: Risto Päivinen, Editor-in-Chief
Minna Korhonen, Technical Editor
Brita Pajari, Conference Manager

Editorial Office: European Forest Institute
Torikatu 34
FIN-80100 Joensuu, Finland

Phone: +358 13 252 020
Fax. +358 13 124 393
Email: publications@efi.fi
WWW: http://www.efi.fi/

Cover photo: Saku Ruusila
Layout: Kuvaste Oy
Printing: Gummerus Printing
Saarijärvi, Finland 2005

ISSN 1237-8801 (printed)
ISBN 952-5453-11-1 (printed)
ISSN 1457-0610 (online)
ISBN 952-5453-12-X (online)

Contents

Foreword

There is wide consensus globally and in Europe on the need to create 'financial mechanisms to develop new markets for environmental services' (UNFF-3) and the use of 'innovative economic instruments for achieving forest-related goals' (MCPFE-4). In this respect, evaluations of recent public interventions in forestry may provide useful information for designing future strategies and related implementation tools.

Strategic planning and operational programming need to be based on adequate informational basis. Regular evaluation and systematic use of evaluation findings in the planning and prioritisation of activities has recently become a practice within the European Commission's Services. At the same time, assessing domestic and international impacts of government support measures has been high on the agenda of international organisations concerned with promotion of efficient and sustainable patterns of economic growth and development. The international organisations (WTO, EFTA, EC, OECD) in particular wary of the adverse effects of subsidisation policies such as distortions in international competition or harmful environmental effects. In this regard, policy and programme evaluations can help to enhance accountability and transparency of public expenditure programmes. They can also assist in the allocation of scarce resources. Given recent public budgetary constraints, improving cost efficiency and implementation success of support policies is of no less concern to national governments.

This conference aimed to provide forum for state-of-the-art discussions in the field of forest policy evaluation and analysis. It has also served dissemination of the EFFE project results (Evaluating Financing of Forestry in Europe), discussion of further research needs as well as facilitation of future research co-operation and networking. The conference has gathered policy decision-makers, representatives of forestry administration, private and public forest owners, social and environmental NGOs, as well as forest policy and economics researchers.

The conference was arranged in the frame of the EFFE research project. The project was carried out in the period of 2000–2004, with the financial support from the Commission of the European Communities (5th Framework Programme, QLK5-CT-2000-01228). The conference has been jointly organised by the European Forest Institute and the Polish Forest Research Institute. The conference programme and list of participants are included at the end of these proceedings.

These proceedings include keynote presentations of the introductory session titled 'The Voice of Stakeholders', presentations given in session 2 ('Economic, environmental, and social impacts of forest policy measures'), session 3 ('Forest policy measures from national and international perspective') and session 4 ('Conclusions and further research needs') as well as posters. In this volume, the conference presentations have been grouped into the following four thematic sections:

Heikki Pajuoja, Ludek Sisak and Krzysztof Kaczmarek (eds.)
Evaluating Forestry Incentive and Assistance Programmes in Europe – Challenges to Improve Policy Effectiveness
EFI Proceedings No. 54, 2005

- Financing Sustainable Forest Management,
- Theoretical and Methodological Aspects of Policy Analysis and Evaluation,
- Economic, Environmental and Social Impacts of Forestry Assistance and Incentive Programmes,
- Policy Implications and Recommendations.

On behalf of the EFFE research consortium, the European Forest Institute would like to thank the Commission of the European Communities for the financial support to the conference and the proceedings. The conference organisers would like to thank the authors who contributed with their presentations and all the participants for their active involvement in the discussions. As editors of these proceedings we would like to thank Ms. Brita Pajari, Ms. Mirja Kokkonen, European Forest Institute, and Mr. Adam Kaliszewski, Polish Forest Research Institute, for their excellent conference arrangements. We would also like to express our gratitude to Mr. Ilpo Tikkanen, Dr. Andreas Ottitsch, European Forest Institute, and Professor Birger Solberg, Agricultural University of Norway, for chairing the conference sessions, and to Ms. Olga Zyrina, European Forest Institute, Mr. Harri Hänninen, Mr. Jussi Leppänen, Finnish Forest Research Institute, Ms. Diana Feliciano, Portuguese Catholic University, and Mr. Even Bergseng, Agricultural University of Norway, for taking notes of the discussions. We wish to extend our special thanks to Ms. Minna Korhonen, European Forest Institute, for the technical editing and kind assistance in co-ordinating the compilation of this volume.

February 2005
Heikki Pajuoja
Ludek Sisak
Krzysztof Kaczmarek

Executive summary

Session 1: The Voice of Stakeholders

In the first session, representatives of various forestry stakeholders discussed importance of promoting economic, environmental and social aspects of sustainable forest management. The invited keynote speakers gave the following presentations:

- Roman Michalak, Ministerial Conference on the Protection of Forests in Europe, Liaison Unit Warsaw, '*MCPFE's view on the new directions for sustainable forest management financing*';
- Odin Knudsen, The World Bank, '*Strategic Investment, Policy an Research in a Highly Uncertain World*';
- Michael Martin, FAO Forestry Department, '*Forest sector priorities for financial assistance in developing countries*';
- Natalie Hufnagl, Confederation of European Forest Owners '*Investment in sustainability – how to make it work for European family forest owners?*';
- Tomasz Wojcik, State Forest Service, Poland '*International support in State Forests*';
- Tamas Marghescu, IUCN Europe, '*One scenario of the future of forests in Europe*'.

The most compelling issues raised by the keynote speakers have been summarised below.

High level of uncertainty needs to be increasingly incorporated into planning and monitoring of forest-related activities. This requires implementation of new, adaptive procedures.

Sustainable forest management in developing countries calls for policy and market reforms facilitating better involvement of the informal sector in forestry. In this respect, a policy environment that promotes both entrepreneurship and stewardship of land should become a focus of future development.

Family forestry in Europe has been presented as a sector managing not only commercial but also ecological and social functions. This has to be recognised by society and acknowledged as priced goods and services. Forest owners would prefer to be paid and not just compensated for the commodities they produce. A common European forest policy could provide useful platform for finding solutions to such issues. Forest certification undertaken by private forest owners needs to be acknowledged by society as activity having a price on it. At the same time, certified wood products need to be advertised more actively.

There has also been underlined a need for change in thinking from general financing of forestry or input-oriented subsidies, towards 'payments for goods and services provided by forests' (output related subsidies). The incentives should be developed based on the desired future achievements, taking into account possible trends in forestry. It was shown that

Heikki Pajuoja, Ludek Sisak and Krzysztof Kaczmarek (eds.)
Evaluating Forestry Incentive and Assistance Programmes in Europe – Challenges to Improve Policy Effectiveness
EFI Proceedings No. 54, 2005

international support, which is well defined, planned and implemented, can be an effective tool for sustainable forestry development. Future forestry developments need to be envisaged including possible changes in demands for forestry-related goods and services.

Session 2: Economic, environmental, and social impacts of forest policy measures

The second session has been devoted to presentation and discussion of results of the different evaluation studies dealing with economic, environmental and social impacts of forestry assistance and incentive programmes. Below we give a brief overview of some of the findings discussed.

Econometric analysis of the Finnish regional panel data showed that government cost-sharing schemes have a potential to increase investments and wood supply among NIPF-owners. However, it was noted that modelling complex economic settings might hinder validity of the results.

Distributional effects can be incorporated into the project assessment by combining equity and efficiency criteria in the Efficiency and Distributional Cost-Benefit Analysis (EDCBA). This new methodology was tested in the equity analysis of afforestation programmes. The EDCBA method provides decision-makers with an integrated indicator of welfare change (social desirability).

High private opportunity costs to afforestation, e.g. those of agricultural production, may hinder implementation of afforestation schemes. However, public financial assistance to afforestation can be well justified on the basis of positive social profitability (carbon sequestration and bioenergy production). It was acknowledged in the discussion that maintenance of forests in general might be justified and explained by other than purely economic values.

A survey recently conducted in Great Britain confirmed that values of non-market benefits might reach substantial levels, with biodiversity and recreation each having the highest share. According to the same study, among the new policy mechanisms capturing non-market benefits there could be considered auctions (challenge funds) and trading systems.

The choice experiment based approach (individuals choose the best available alternative to maximise their utility) can be useful tool in policy implementation. It can help, for example, to identify target groups for conservation contracts and determine adequate levels of compensation payments for voluntary biodiversity protection contracts. This approach can be also useful in policy decision-making, as it allows estimation of social acceptance and economic impacts of alternative policy measures.

Session 3: Forest policy measures from national and international perspective

Presentations of the session 3 introduced a number of interesting experiences with financial policy instruments. Some of these experiences are summarised below.

The study dealing with the demand for information and extension services among private forest owners in Estonia concluded that different forest management issues require different information channels and extension methods. Printed and audio-video information seem to be, in general, the most preferred information sources (easy to reach for large number of forest owners, and low cost).

As reported from the USA, assessing effectiveness of different incentive programs at an aggregated level requires linking spatial forest inventory data to incentive programs of the different agencies. In addition, special attention has to be paid to reconcile tensions among standardized, decentralized record keeping and privacy.

The analysis of public financial support to forestry in Czech Republic revealed that more successful programme implementation would require improvements in the design of delivery mechanisms (information, applications, etc.). Also, the institutional arrangements (e.g. accessibility for small-scale forest owners) would need to be improved.

The study of 'relief plan' for forests damaged by 1999 storm in the Vosges region (France) found out that certain implementation failures could be the result of imperfect planning of programme objectives and means. It was stressed out that comparing assisted groups or regions with those exposed to only market self-regulatory mechanisms would be essential for future decision making.

In the discussion it has also been highlighted that greater emphasis ought to be put on consistent and systematic evaluation of financial forest policy instruments. Further research should address the outputs and impacts as well as the extent to which public financing provides forest goods and services in efficient and effective way.

Among the possible improvements in the implementation of afforestation programmes in Flanders (Belgium) there have been mentioned increased public participation in policy processes and better information distribution to NIPF owners, including effective extension services.

There has also been discussed the role of forestry funding programmes in supporting innovations in Central European countries. The level of innovation activities in forestry appears to be quite low compared to other sectors. It is partly due to the fact that forestry programmes are not designed to support the early phases of innovation. In Central Europe, sectoral innovation systems do not provide comprehensive support for innovation activities in forestry.

Session 4: Conclusions and further research needs

The conference conclusions can be summarised as follows:

- linking spatial inventory data to forest policy incentive program data would considerably facilitate programme evaluations at the aggregate levels,
- forest policies, and public forestry programs in particular, should be designed so that the objectives and definitions of public assistance are clear enough for ex post evaluations,
- forest policies and programs should better stimulate forestry innovations,
- collection and use of panel data to capture variation in behaviour at individual level should be promoted.

The conference presentations and discussions identified the following future research needs:

- specifying causal policy models, including policy variables and non-controlled explanatory variables (impacts of policies and other factors),
- the integrated equity and efficiency analysis would require further developing of decomposable indicators of social desirability/sustainability,
- employing behavioural sciences in order to estimate behavioural responses of target groups (e.g. forest owners) to implemented policy interventions,
- comprehensive policy analysis of the different types of forestry activities, e.g. biodiversity protection, protective functions of forests, stand improvement etc.,

- in the implementation analysis – more extensive use of rational choice theory in agency situations with asymmetric information,
- the role of institutions in policy implementation (e.g., the role of associations) and good governance at large (law enforcement, capacity building, etc.),
- better assessments and international comparisons of government assistance programmes in forestry require comprehensive and comparable information systems on forestry funding mechanisms,
- expanding analysis across the policy sectors (cross-sectoral policy impacts on SFM; economic, social & environmental aspects).

Opening Address

Edward Lenart

Department of Forestry, Ministry of Environment, Poland

On behalf of the Minister of the Environment, Mr Jerzy Swaton, and the organizers I cordially welcome you to conference 'Evaluating Forestry Incentive and Assistance Programmes in Europe – Challenges to Improve Policy Effectiveness'.

First, I kindly thank the organizers of this conference – the European Forest Institute and the Forest Research Institute in Warsaw, for their excellent arrangements. I do hope that those of you who took part in yesterday's field trip to the Nidzica Forest District (State Forests) found it interesting and enjoyable. Let me please briefly note that government support for afforestation of marginal agricultural land has in Poland a long-standing tradition that goes back to the 1930s.

I am very pleased to welcome national and international representatives of various stakeholders actively involved in forest policy formulation and implementation. I am convinced that the keynote presentations of the first session titled 'The Voice of Stakeholders' will provide an important and interesting introduction to this conference.

The conference objectives match very well with the practical needs for planning and programming of forest policy activities. Of course, evaluation findings and conclusions do provide essential information for policy formulation and implementation. On the one hand, policy makers wish to see forestry incentive and assistance programmes efficient and effective. On the other hand, programme managers, that is public forestry administration, are interested in further improvement of the existing programmes as well as in learning from the past, especially when designing future forest policy measures.

Given the importance of problems discussed at this conference and the role of scientific research in policy development, I look forward to inspiring outcomes of this meeting.

Heikki Pajuoja, Ludek Sisak and Krzysztof Kaczmarek (eds.)
Evaluating Forestry Incentive and Assistance Programmes in Europe – Challenges to Improve Policy Effectiveness
EFI Proceedings No. 54, 2005

Financing Sustainable Forest Management

MCPFE's View on the New Directions of Sustainable Forest Management Financing

Roman Michalak

Ministerial Conference on the Protection of Forests in Europe, Liaison Unit Warsaw

Heikki Pajuoja, Ludek Sisak and Krzysztof Kaczmarek (eds.)
Evaluating Forestry Incentive and Assistance Programmes in Europe – Challenges to Improve Policy Effectiveness
EFI Proceedings No. 54, 2005

MCPFE Liaison Unit Warsaw

MCPFE OVERALL GOAL

- to **promote sustainable forest management (SFM)** in Europe through participatory and open co-operation
- 44 European countries + EC and
- 41 "observer" countries/organisations

MCPFE's view on SFM financing Warszawa, 11-12 October 2004

MCPFE Liaison Unit Warsaw

CONTENTS

- **MCPFE – Economic viability - Process Review**
- **MCPFE – Directions of financing**
- **Current Work**

MCPFE's view on SFM financing Warszawa, 11-12 October 2004

MCPFE Liaison Unit Warsaw

MCPFE PROCESS
1990 - 2004 - .....

MCPFE's view on SFM financing Warszawa, 11-12 October 2004

MCPFE Liaison Unit Warsaw

HELSINKI 1993

Definition of Sustainable Forest Management

*"... the **stewardship and use** of forests and forest lands in a way, and at a rate, **that maintains** their biodiversity, productivity, regeneration capacity, vitality and their **potential to fulfil**, **now and in the future**, relevant ecological, **economic** and social functions, at local, national, and global levels, and that does not cause damage to other ecosystems."*

MCPFE's view on SFM financing Warszawa, 11-12 October 2004

MCPFE Liaison Unit Warsaw

HELSINKI 1993

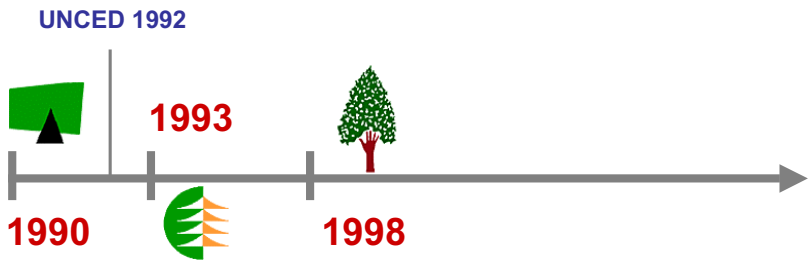
H1: General Guidelines for SFM

*„ … Forest owners who provide multiple-use benefits to the community **should be** encouraged and **supported by society or other beneficiaries**, as appropriate, when such provision involves them in excessive costs."*

MCPFE's view on SFM financing Warszawa, 11-12 October 2004

MCPFE Liaison Unit Warsaw

MCPFE PROCESS
1990 - 2004 - .....



MCPFE's view on SFM financing Warszawa, 11-12 October 2004

MCPFE Liaison Unit Warsaw

LISBON 1998

Lisbon Declaration

Society, *…,* ***will support a sound development of the forest sector*** *by providing conducive regulatory, institutional, economic and social frameworks for practising sustainable forest management,* ***taking informed decisions on the best possible use of wood and non-wood forest products and services,*** *…*

MCPFE's view on SFM financing Warszawa, 11-12 October 2004

MCPFE Liaison Unit Warsaw

LISBON 1998

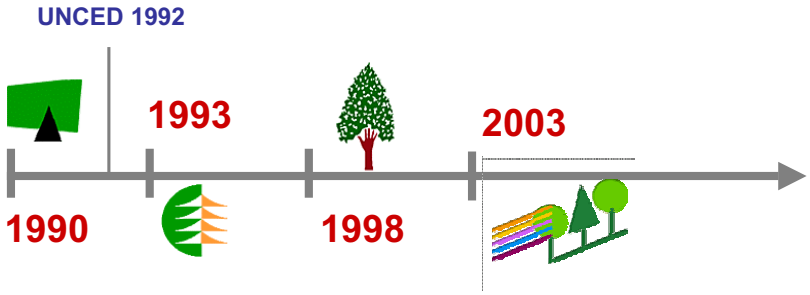
L2: Pan-European C&I and PEOLG for SFM

„In order to facilitate the implementation of these voluntary Guidelines, there might be a need for the promotion and equitable ***support by government, society and other beneficiaries*** *to create and maintain a sound balance of interests including* ***a sound economic basis for forestry****."*

MCPFE's view on SFM financing Warszawa, 11-12 October 2004

MCPFE Liaison Unit Warsaw

MCPFE PROCESS
1990 - 2004 - .....



MCPFE's view on SFM financing Warszawa, 11-12 October 2004

MCPFE Liaison Unit Warsaw

VIENNA 2003

… conditions for sustainable forest management have led to economic challenges for the forest sector in many regions of Europe,

Resolution V2

MCPFE's view on SFM financing Warszawa, 11-12 October 2004

MCPFE Liaison Unit Warsaw

VIENNA 2003

Vienna Declaration

„ … strengthen conditions for the economic viability of sustainable forest management …"

MCPFE's view on SFM financing Warszawa, 11-12 October 2004

MCPFE Liaison Unit Warsaw

VIENNA 2003

Resolution V2

„ … economic viability is a key pillar of sustainable forest management and of crucial importance for maintaining forests and their multiple benefits for society, …"

MCPFE's view on SFM financing Warszawa, 11-12 October 2004

MCPFE Liaison Unit Warsaw

Directions of Sustainable Forest Management financing

- **marketed forest products & services**
- **valuation and promotion of full range of forest good and services**

MCPFE's view on SFM financing Warszawa, 11-12 October 2004

MCPFE Liaison Unit Warsaw

MCPFE views – marketed forest products & services

- European forest resources expand
- Forest based products are environmentally friendly and renewable materials
- The production, marketing and consumption of forest products and services **from forests under sustainable management**, should be promoted
- Finance forest management, benefit owners and societies

(H1, LD,VD, V2)

MCPFE's view on SFM financing Warszawa, 11-12 October 2004

MCPFE Liaison Unit Warsaw

MCPFE views – marketed forest products & services - commitments

- **promote the use of wood** from sustainably managed forests
- **support research** as well as mechanisms for the dissemination of generated knowledge
- **increase** the sound use of wood **from SFM**
- **improve enabling conditions** for the market-based provision of a diversified range of non-wood goods and services from sustainably managed forests

L1, VD, V2

MCPFE's view on SFM financing Warszawa, 11-12 October 2004

MCPFE Liaison Unit Warsaw

MCPFE views – valuation of full range of forest good and services

- forests provide a broad range of social, cultural and environmental values to society,
- non-marketed cultural, social and environmental services of forests need to be evaluated
- income generated from revenues from currently non-marketed where appropriate could improve the economic viability of SFM

L2, V2

MCPFE's view on SFM financing Warszawa, 11-12 October 2004

MCPFE Liaison Unit Warsaw

MCPFE views – promotion of full range of forest goods and services

- research on assessment and valuation of the full range of forest goods and services
- work towards common approaches to the practical application of these valuation (information systems)
- co-operate with relevant organisations in order to incorporate the outcome of these valuations in relevant policies and programmes

L1, V2

MCPFE's view on SFM financing Warszawa, 11-12 October 2004

MCPFE Liaison Unit Warsaw

MCPFE views – implementation (1)

- promotion of the **incorporation of the economic viability** of sustainable forest management **into rural development policies and strategies**
- encouraging sustainable forest management practices through **possible implementation of forestry activities under the Kyoto Protocol,**
- application of **national and sub-national forest programmes** as a means for effective inter-sectoral co-ordination,
- implementation of **MCPFE Criteria and Indicators for SFM**

MCPFE's view on SFM financing Warszawa, 11-12 October 2004

MCPFE Liaison Unit Warsaw

MCPFE views - implementation (2)

The Multi-stakeholder Dialogue (part of the Fourth Ministerial Conference on the Protection of Forests in Europe) - representatives of the five major groups:

- Forest Owners,
- Forest Industry,
- Social NGOs,
- Environmental NGOs and
- Scientific Community

MCPFE Liaison Unit Warsaw

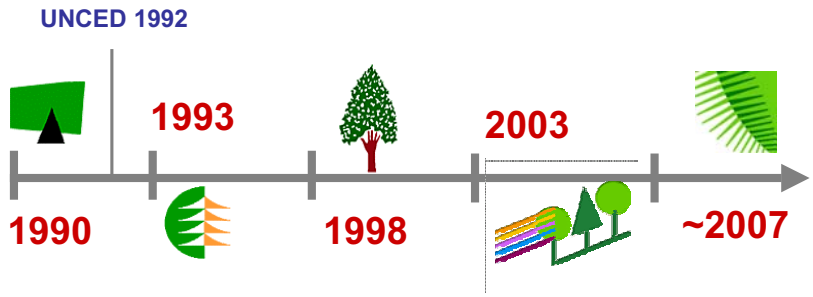
MCPFE Current Work

- **MCPFE Work Programme**
  - **adopted at ELM in October 2003**
  - **implemetation of Vienna and previous commitments**

MCPFE's view on SFM financing Warszawa, 11-12 October 2004

MCPFE Liaison Unit Warsaw

MCPFE PROCESS 1990 - 2004 - .....



MCPFE's view on SFM financing Warszawa, 11-12 October 2004

MCPFE Liaison Unit Warsaw

MCPFE Current Work – Examples

· Workshop on practical application of "MCPFE Approach to NFPs in Europe" and the use of C&I for SFM as a component of the nfp process (2004)

· Report - "European Consumers and Their Attitudes towards Wood, Substitute Materials and the Image of Forest Industries" (2005)

· Workshop on best PR practices concerning the sound use if wood and wood promotion campaigns (2005)

· Seminar on policies fostering investment and innovation in support of rural development (2005)

· Workshop on resource mobilisation and comprehensive wood utilisation strategies in support of SFM (2005)

· Workshop on valuation of the full range of goods and services of forests and its marketing (2006)

MCPFE's view on SFM financing Warszawa, 11-12 October 2004

MCPFE Liaison Unit Warsaw

CONCLUSIONS

- The MCPFE recognises economic viability as a a key pillar of sustainable forest management
- Significance of economic viability of SFM has been constantly increasing
- Process supports diversified sources of SFM financing:
  - developing traditional sources
  - looking for a new opportunities and instruments for SFM financing

MCPFE's view on SFM financing Warszawa, 11-12 October 2004

MCPFE Liaison Unit Warsaw

MINISTERIAL CONFERENCE ON THE FOREST PROTECTION IN EUROPE

www.mcpfe.org

THANK YOU FOR YOUR ATTENTION !

MCPFE's view on SFM financing Warszawa, 11-12 October 2004

Strategic Investment, Policy and Research in a Highly Uncertain World: Or What to Do About Forest Resources When We Don't Have a Clue What Is Going to Happen

Odin Knudsen[1]

Environment and Socially Sustainable Development World Bank

We live in a highly uncertain world: five or so major international financial crisis occurred in the 1990s, commodity prices remain unstable (note the recent surge in oil prices and fall in cotton prices), exchange rates fluctuate with major swings (even among strong currencies such as the euro and dollar), severe weather events seem to becoming more frequent, and terrorism can send unexpected tremors through financial markets.

These uncertainties are transmitted across regions and the world. Globalization has created a much more closely integrated world. Competition is intensifying not just in manufacturing but also in services. Agricultural markets are more integrated. Capital flows with light speed and technological change is an international phenomenon, dispersing quickly across countries. With globalization, trade and movement of labor are growing and becoming more critical for national economies whether developed or developing. Disruptions in trade and even labor movements have large and sometime unpredictable effects.[2]

While this globalization presents opportunities, it also presents uncertain threats. These range from rapid and deep movements of exchange rates (40% rise of the euro with respect to the dollar), changes in trade restrictions driven by domestic needs (for example, the ban forest harvesting of China, rises in interest rates occurring outside of domestic monetary policy, loss of markets to new competitors (for example, the recent experience with the expansion of coffee production in Brazil), new international agreements linked to the environment or other international public goods (for example, the Kyoto Protocol) along with a long list of other "exogenous factors" outside of the control of governments and investors.

All of these uncertainties affect returns to forest resources and make policymaking more difficult. What may be appropriate approaches to forest management and policy in the past may not longer be applicable in the future, in fact, may actually be destructive to forests.

1 Senior Advisor, Environment and Socially Sustainable Development World Bank. The views are that of the author and not necessarily those of the World Bank.

2 It can be argued that globalization by opening up more markets and therefore diversifying trade creates more stability. So far the casual evidence seems to indicate more instability, certainly as reflected in exchange rates. Likewise labor movements should create more stability but his has yet to be evaluated.

Heikki Pajuoja, Ludek Sisak and Krzysztof Kaczmarek (eds.)
Evaluating Forestry Incentive and Assistance Programmes in Europe – Challenges to Improve Policy Effectiveness
EFI Proceedings No. 54, 2005

The purpose of this paper is to outline approaches to the management of uncertainty and to apply these broadly to the forest sector. In doing this, we will review how various techniques have been used for strategic planning. We will focus on an emerging approach based on scenario analysis using real options. We then conclude with a brief look at climate change and how this creates new opportunities and options.

The Traditional Approaches to Strategic Planning

Traditionally managers have relied on strategic plans. These plans are forward-looking maps of how to move from point A in the present to point B in the future based around objectives and desired outcomes. These maps can be of various duration, some as long as five years, the specific length depending on the lag-time for an organization to reach an outcome.

This traditional method of strategic planning has largely fallen out of favor sudden and unexpected events make these plans mostly irrelevant. Unless the plans are updated on a continuous basis they soon become worthless. Few organizations today are willing to spend the resources to do continual updates.

Another technique is scenario planning where trends and prospects are mapped out for various possible futures. These scenarios are created by games where various stakeholders react to each others decisions and movements or by a Delphi method where expert opinion is sought or by Monte Carlo simulations where probabilities are attached to various outcomes. The game approach has been used largely by the military in constructing various war or conflict scenarios. The Delphi method has been applied more broadly and is driven by the desire to come up with a consensus scenario. In this sense, it falls closer to strategic planning. Monte Carlo simulations are used extensively in benefit-cost analysis to construct a mean and dispersion around net present values for investment.

The scenario techniques have some strengths, which make it attractive over conventional strategic plans. It is participative, detail rich, interactive and often with broad scope. It tends to systemize thinking and offer a learning-by-doing feedback.

But the techniques also have some significant weaknesses. It can create potentially unwieldy scenarios of so many possibilities that it is difficult for a decision-maker to know what to do, except to know that the future is highly uncertain and that outcomes can range widely. It also provides no quantification of different scenarios or the benefits of various decisions. The result can be more confusion and lack of consensus on what to do.

While Monte Carlo simulations have been applied to the analysis of forest decisions, other scenario techniques have generally not be used for strategic decision and policy making for forests.

Real Options Approaches

Real options analysis is a technique for investment analysis that is slowly gaining some prevalence. It has rarely been applied to policy analysis.

This technique focuses on opportunities and threats created by uncertainty and irreversibility. It is stakeholder focus as options are rights that are held by a specific party. It engenders value to waiting for more information, creating flexibility, providing for the possibility of expansion and contraction including exit, and giving the opportunity to learn before proceeding to later stages. It has the advantage of quantification using computer programs.

A real option is defined as an opportunity but not the obligation to take an action in the future. Options are valuable because of uncertainty, in fact, the higher the degree of uncertainty the more valuable they tend to be everything else equal. They are the real asset equivalent of financial derivatives that are traded and used widely in commodity and equity markets. As such they can provide the ability to hedge various investments.

Using real options, investment and policy decisions can be evaluated as a stream of net benefits plus a set of positive and negative options. For example by rehabilitating a forest or investing in a plantation, a stream of net benefits is anticipated that depends on classic forest parameters and expected prices. But the investment decision also creates options in the future but needs also to account for the destruction of the option to wait to see how prices will evolve. Some of these future options could be positive to net benefits such as the opportunity to sell carbon assets or could be negative such as the threat from third parties to sue the owners over environmental practices. The waiting option is always a cost that needs to be overridden by net benefits.

Using the real options approach can help in forming a strategic vision that depends on contingencies which can be quantified under many circumstances. Even when the options cannot be specifically quantified, the approach provides a structure to the analysis and way of thinking that can be illuminating.

The real options approach can also be combined with a scenario or events framework. This takes the best of both scenario planning and options. Each branch of a scenario can have a "node" where options are quantified. As paths in the scenario develop over time, these option values can be used to make a decision on which direction to proceed. Also, as the scenario is developed the planners or evaluators can explore whether other options can be created and whether threat options can be managed or insured against.

The advantages of real options analysis is that it systemizes a way of thinking about uncertainty and contingencies, it can be quantitatively rigorous, puts a premium on the timing of decisions, and has proven to be intuitively appealing.

Its disadvantage is that it can be subjective and/or data intensive. Decision makers need to make estimates of the likelihood of some events if historic data or a replicating portfolio cannot be found. Assumptions may also be needed on the variability of some parameters where market data is unavailable.

The real options approach has had some application in valuing forest resources, mainly in deciding when to harvest a forest under uncertainty on prices and growing conditions, such as weather. It has not been systematically or widely applied to forest management although it could be easily be added to existing forest management models.

Viewing Climate Change through the Prism of Real Options

It is being increasingly accepted that the climate of the earth has and is predicted to continue to change both regionally and globally (see Figure 1). Temperatures have been rising in parallel with the growth of the world's carbon-based economies. Climate change is projected to cause, besides warmer temperatures, different global precipitation patterns with more floods and drought, higher sea level, retreat of glaciers, reduced sea ice, and more frequent and extreme weather events.

These predictions are the result of expert opinion and computer simulated scenarios of the future. To make these scenarios, parameters on GDP growth, population, and industrialization had to be made outward for 50 or so years (see Figure 2). The range for these parameters came from expert opinion.

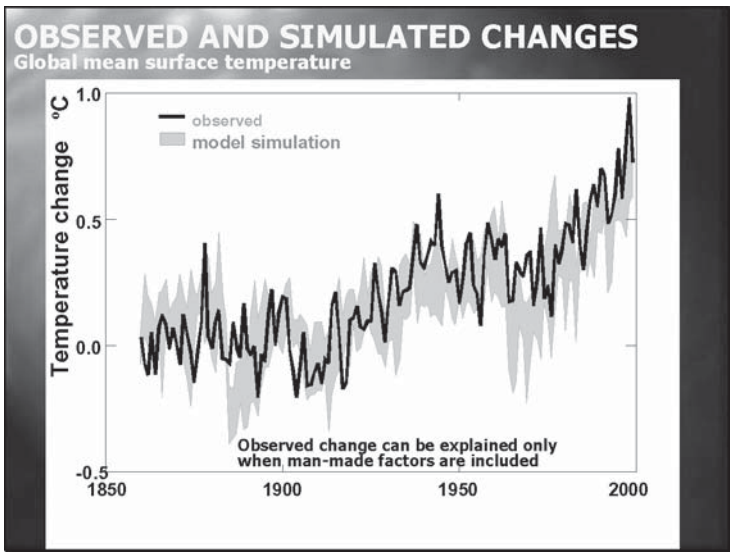


Figure 1. Observed and simulated changes – global mean surface temperature.

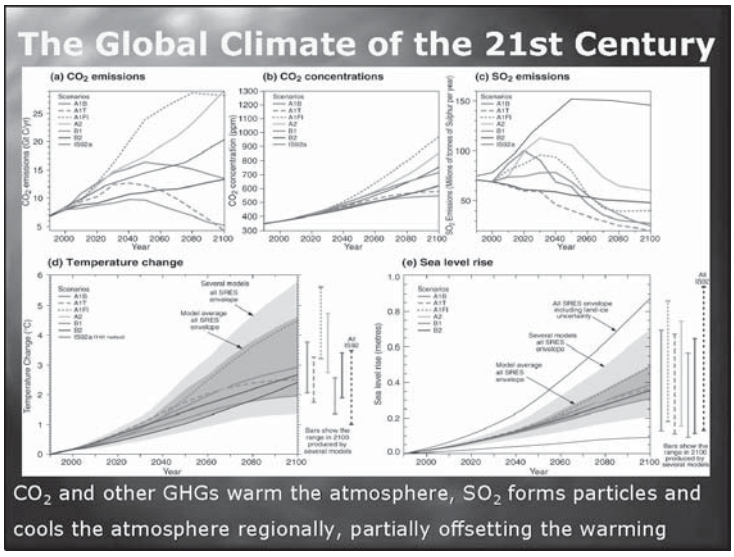


Figure 2. Scenarios of climate change.

While these scenarios are useful in giving us some sleepless nights and possibly ignited policymakers to take action like ratify the Kyoto Protocol, they do not give much insight into relative tradeoffs or to really weight the benefits and costs of different actions. Although it is beyond the scope of this paper to do the analysis, we can point to how real options combined with scenarios be used to create opportunities.

It is estimated that currently the atmosphere contains 760 billion tons of carbon of which 180 billion is manmade. Each year an estimated 3 to 4 billion tons of manmade carbon is being added to the atmosphere. At current trading prices, the manmade carbon in the atmosphere has, if sequestered, a value of about $2 to 4 trillion with an added value creation of $30 to $60 billion from new net emissions. As these market values are emerging in a very uncertain market with the Kyoto Protocol not then ratified, each carbon asset purchased has an option value impeded in the price. The higher the degree of uncertainty in the future, the more valuable is the option. Furthermore this value will change depending on which scenario in Figure 2 plays out.

In the valuation of a forest, the analysis should take into account not only the real option value coming from more traditional uncertainties associated with price of wood and yields, but also the option value of the carbon derived from various scenarios of climate change. It is clear that such an analysis will change the economics and timing of forest investments and management techniques.

Conclusions

It is clear that the only certainty that forest planners and policymakers face is that of uncertainty. While making investment decisions more difficult to evaluate, uncertainty also presents opportunities that should be imbedded in these decisions. Traditional approaches to valuation guiding these decisions have not been sufficiently robust to deal with high degrees of uncertainty. With the long gestation of forest investments, these traditional techniques fall short in analyzing forest plans and policies. The real option approach offers a technique of evaluation that can yield additional insight in forest decision-making. Combined with scenario analysis, real options should be added to traditional approaches to forest valuation. Climate change and emerging carbon markets make an scenario and real options approach even more necessary. Additional research is needed to expand the methodology of real options and to development applications for evaluating policy and investments in the forests and natural resource sectors.

Channelling and Prioritising Financial Assistance to the Forest Sector in Developing Countries

R. Michael Martin[1]

Forestry Policy and Information, Forestry Department, Food & Agriculture Organization of the United Nations
Rome, Italy

Abstract

The non-industrial forest sector or informal sector is a large and diffuse group of forest owners and users worldwide. In developing countries, the majority of forest users are in the informal sector. They include woodcutters, bush-meat hunters, charcoal makers, rattan gatherers and the like. These are largely rural people supplementing their livelihoods with subsistence and cash crops extracted from the forest. They are pit-sawyers, furniture-makers and coffee-growers. More and more of the trees they use are grown on farms, along roadsides and canals. This paper suggests that the future of forests in the developing world is in their hands and that future financial assistance to the forest sector in developing countries should be channelled to developing a policy and regulatory environment that embraces the informal sector and advances these important stakeholders from the informal to formal sector. This will be a policy environment that fosters small-scale entrepreneurship and stewardship of smallholders.

Introduction

It is widely understood that forests provide a mix of public[2] and private[3] goods. Forest is often considered a vital component of the national patrimony because of the wide spectrum of public goods it provides ranging from watershed services and carbon sequestration to habitat for rare species. This patrimony is sometimes held outright as "state-owned" or national land

1 The author is Director, Forestry Policy and Information, Forestry Department, Food & Agriculture Organization of the United Nations, Rome, Italy. The article is a professional but personal contribution to this conference and cannot be attributed in any way to reflect the official position of FAO or its member countries.
2 Public goods are sometimes referred to as non-consumptive goods because one person's consumption, for example, of a clean air provided through an anti-pollution campaign does not preclude the equal enjoyment of another person.
3 Private goods are sometimes referred to as consumptive goods because one person's consumption, for example, of a loaf of bread, precludes another person's enjoyment of the same loaf.

Heikki Pajuoja, Ludek Sisak and Krzysztof Kaczmarek (eds.)
Evaluating Forestry Incentive and Assistance Programmes in Europe – Challenges to Improve Policy Effectiveness
EFI Proceedings No. 54, 2005

and in other circumstances there is a series of easements or public rights on forests "owned" privately. Equally, forests also produce a range of "private" goods such as timber, wild game and other edibles. In developing countries, this list of private goods is extended to include a very important commodity – fuelwood and charcoal. Forest science and forestry professionals often refer to this provision of public goods as justifying a higher level of investment in sustainable forest management than simple financial analysis would merit. The rationale being that the individuals and private business will under invest in forests because they receive no revenues associated with the provision of public goods.

While the economic implications of this mix of public-private goods have been widely debated, deciding the corrective policy action is confounded by the great variation seen across countries in the ownership and use of the world's forests. European and North American literature make frequent reference to the important role of non-industrial forest owners noting the fact that they own large percentage shares of the forest estate. The literature often concerns itself with the means and methods to encourage small non-industrial owners to manage their forests actively for wood production. More recently, the literature has expanded this concern to a more holistic one stressing the need to achieve sustainable forest management across a mosaic of ownership and ecologic types.

Less well understood is the equally vital role that will be played by users of forests from the informal sector in the future of forests in the developing world. One of the biggest challenges facing sustainable forest management globally is the need to lower the barriers for entry for transforming informal sector actors into formalized market-based and policy guided entrepreneurs with a stake in the future of their forest. This paper identifies this group as the priority policy concern for financial assistance to the forestry sector in developing countries.

Recognizing the informal sector as an object of policy formulation

Estimates of the number people dependent worldwide on forests vary enormously and proliferate through the development assistance literature. These estimates vary based on the assumptions made about dependence – a little or a lot[4]. While a sense of dependence may be appealing as a justification, it tells us little about what policy measures, including market or financial incentives are needed to promote good stewardship of the land. From the perspective of management, a more interesting estimate would be the number of forest users and owners.

At a global scale, considerably less is known about this. The North American and European literature focuses on the attitudes, perspectives and incentives available to private forest owners and many nations estimate the number of non-industrial forest owners. Attention is given to the fiscal and taxation incentives to encourage private forest landowners to maintain their tracts and avoid subdivision or conversion to other land uses.[5]

Through a series of studies[6] conducted over the last few years by the Food and Agriculture Organization of the United Nations[7], the importance of forest users in developing countries to

4 Assertions of dependence are, at best, speculative. The real test is to what extent substitutes exist for the product or service and it is not related to the frequency of forest use. For example, a well-to-do New Yorker may buy a derivative of a forest product for health purposes but surely a capacity to find and use alternatives exists and thus real dependence is weak. An AIDS –afflicted person in Botswana may well vitally depend upon specific plants with medical properties from the Miombo woodlands and he may have no realizable alternative. In this case the dependence is very clear and real.

5 The concern about subdivision seems based on assumptions about economies of scale in timber production, marketing and silviculture. Reference is often made to the fact that restitution programmes in eastern and central Europe have led to uneconomically sized forest ownerships with the implication that this will inevitably lead to land conversion or lack of attention to intensive management.

6 Food and Agriculture Organization of the United Nations, 1998. Asia-Pacific Forestry Towards 2010. Rome, Italy. 242 p.

7 Food and Agriculture Organization of the United Nations, 2003. Forestry Outlook Study for Africa: Regional report – opportunities and challenges towards 2020. Rome, Italy. 66 p. ISSN 0258-6150

the future of forests has become increasingly clear. For example, in Africa, it was observed that the informal sector provides a substantial share of total goods and service production and is the foremost source of employment in the forest sector. Activities such as wood collection, charcoal making, pit-sawing, the collection and marketing of non-wood forest products, and small-scale furniture making form the mainstay of the livelihoods of thousands if not millions. The study highlighted that a main feature of the informal sector was that few of those involved in informal sector activities own the resources. Three broad types of informal activities were found in African forestry:

- low-value unorganised activities largely geared to local subsistence consumption (for example, collection and use of wood fuel and poles for personal use);
- informal sector activities linked to markets (for example, charcoal production, gathering of medicinal plants);
- high-value informal activities, often managed by well-organized illegal networks (for example, exportation of tropical timber without permit or payment of required duties).

A recent workshop on illegal logging in Europe demonstrated that a number of governments in the developed world faced similar challenges[8] .

In the absence of strong economic expansion in the developing regions, the informal sector is expected to swell if increases in the labour force outstrip job growth in the formal economy. While the informal sector is a critical source of income, the report identifies three detrimental impacts of its growth.

- Resource depletion. Most of those operating in the informal sector do not own the resources and have no ability to protect their interests. Thus there is no incentive to practice resource-extending behaviours.
- Lack of incentive to invest. Without tenure, the informal sector hesitates to invest in the needed technologies to extend or protect the life of the resource.
- Increased competition for forest resources between the formal and informal sectors furthering weakening the rule-of-law and fostering social conflict.

Progressively, FAO's analytical work and outlook studies in the developing regions show four emerging outcomes:

- Public sector capacity to shape and influence change has progressively weakened.
- Over-regulation combined with weak or poorly defined public capacities renders a large share of forest production officially "illegal" or outside of the approved norm.
- The informal sector is large, growing and often the dominant source of the real economy.
- More and more forest users are becoming forest owners as the share of forest production moves from public (in the largest sense) to community or private lands.

Until now, the policy response in many countries to the existence of the informal sector has been to ignore it or restate the penalties for non-compliance with the law. At least one author has argued that the informal sector participants are not the problem but "the solution," to major development issues such as poverty.[9] This paper asserts that policy and market reform to bring the informal sector into the light is essential to raising the prospects for sustainable forest management.

8 Summary Report, Joint UNECE/FAO Workshop on illegal logging and trade of illegally-derived forest products in the UNECE Region. Geneva 16–17, 2004. http://www.unece.org/trade/timber/docs/sem/2004-1/summarynote.pdf

9 De Soto, Hernando. The Mystery of Capital.

Sustainable use of forests, legality and the informal sector – fostering champions for the future of forests.

The preceding section highlights a number of emerging outcomes visible in developing regions of the world resulting in a growing presence of the informal sector. To avoid serious forest degradation, an honest assessment of the policy implications is needed and appropriate possible responses launched.

Changing public sector role unfunded

The FAO work finds that public sector capacity to shape and influence change has progressively weakened. Further, an accumulation of zealous regulation has transformed public sector foresters from visionaries and community leaders working with stakeholders to regulatory bureaucrats.

For developing countries, this is a result of serious fiscal constraints faced by governments over the last three decades where public sector employment was reduced and rationalized. However meritorious this may have been from a national fiscal standpoint, the result has been highly detrimental to forest resources for two reasons. First, the capacity to do strategic planning and policy setting declined in the face of operational support to existing laws.

Second, a proliferation of environmental interests over the last thirty years has riddled the sector with excessive regulations relative the public sector's capacity to implement them. The proposed solutions to this public sector gap were decentralization of authority to lower levels and the introduction of community forestry. While appropriate, these remedies came without the recognition that both activities are more labour intensive at least in the near-term and require different knowledge and capacities. Stagnant budgets with little training support have left most forestry departments around the world unequipped to face an informal sector in need of extension assistance. With declining quantities of wood supplies coming from natural forests relative to plantations and small holder production, it is vital to retool forestry departments around the world to concentrate on extension support to small-holders, the informal sector and others rather than continued focus on the operational oversight of concession holders on public lands.

Illegal forest activities

The current legislative and administrative environment in many countries is a maze of laudatory phrases and detailed prescriptions out-of-step with the reality on the ground. Complicated legal and administrative procedures encourage rent-seeking behaviour (sometimes called corruption) by unfunded public officials and simple law-breaking by forest users. The policy goal is to separate the poverty-driven elements of the informal sector from the profit-driven components. Recently, FAO conducted a number of studies on the forest revenue system and government expenditure in 32 countries.[10] Analysis of the data reveals that forest charges are complicated and duplicated in many countries. While the charge for commercial grade wood is almost universally low relative to comparable market based transactions, the charges or fees for non-commercial grade wood and non-wood forest products seldom equal the costs of collecting them and servicing the process to enforce their collection.

10 Food & Agriculture Organization of the United Nations. 2001, 2002. The forest revenue system and government expenditure in ... 32 country reports. Forest Finance Working Paper series. Rome (also available at www.fao.org/forestry/finance).

Furthermore, the studies showed that it is common for forest users to pay more than ten different taxes and charges. As demonstrated by de Soto (2002), these complexities and barriers to entry for business licensing are the prime motivations for informal sector participants to remain at the edge of the formal economy. Furthermore, he demonstrates that the informal sector has wealth and is prepared to invest if their interests are protected. Without tenure on the resource or a legitimate means to demonstrate a capacity to earn income, they cannot invest in improving their productivity and incomes and remain condemned to subsistence living.

Informal sector as a large share of the real economy

The first step in moving forward to better forest management in developing countries begins with the recognition that the informal sector exists, it is big, and it is important to the future of forests. One estimate of global forest-based employment suggests that the informal sector constitutes 63 percent of the total forest-based employment worldwide.[11] In a number of countries, research and analytical work is needed to demonstrate irrefutably the scope and magnitude of the informal sector as well as its economic and environmental impacts. It could be argued that the reason the informal sector lives and operates in the shadows is that the economic agents with legal access and influence over forest resources seek to maintain the exclusivity of their position. Others may argue that the transactions cost of managing informal sector actors is simply prohibitive. Whatever the rationale, the evidence is needed that keeping them out of the formal system has serious economic and environmental costs. *Solid research is required into the significance and role of the informal sector***.**

Lowering the barriers to participation in the formal economy

The second step to improving forest management, and the one that will require political determination and financial assistance, is to *develop an operating environment that lowers the legal and regulatory barriers for informal sector actors to participant formally in the economy***.** In some cases, this is more challenging process of granting some types of tenure but more often it is simply a radical streamlining and simplification of the permitting process.

An example may be helpful at this point. The underlying constitutional principle in a country may be that any user of a private good from public lands should be a “fair” price. The intent being both equity and efficiency considerations – fair in the sense that everyone should pay regardless of social status and efficient in the sense that a “price” deters needless waste of the resource. Even some of the poorest countries in the world will often institute this as a complex array of permits and charges. Subsistence collectors of fuelwood “should” have a permit and pay a charge per cubic meter. Similarly, charcoal makers may be required to have a fixed quantity permit and pay a variety of charges. Since few forestry agencies in these countries have sufficient staffing in rural areas to meet even the permitting needs of subsistence users, suddenly, a large portion of the rural population becomes engaged in an illegal activity. They now have a reason to fear and avoid the forestry staff. This helps to yield assertions by some analysts that a large share of the world’s wood harvest is “illegal.” The reality is that the legal and regulatory procedures are out of step with the social and institutional realities on the ground.

11 International Labour Organization, 2001. Globalization and sustainability: the forestry and wood industries on the move. Geneva. TMFWI/2001

Nurturing the future champions of good forest practice

Silviculture is founded upon the principle that what is left in the forest after harvest is the basis for regeneration and renewal. From an institutional point of view, the first step in influencing what is left in the forest after harvest is the control of what is taken and thus most silvicultural systems prescribe very often size, species or other limits for removal. The reverse side of this is to describe what is desired after harvest – often referred to as performance objectives for forest stewardship. The key to success with forest users is to recognize their right to use (grant a permit with minimum conditions) but engage them as stakeholders anxious to see that their future needs are met. *Future policy initiatives need to acknowledge that some form of tenure or rights to product is necessary to obtain their commitment and investment to safeguard the future of forests as a productive land use.* Equally tenure and responsibility go together.

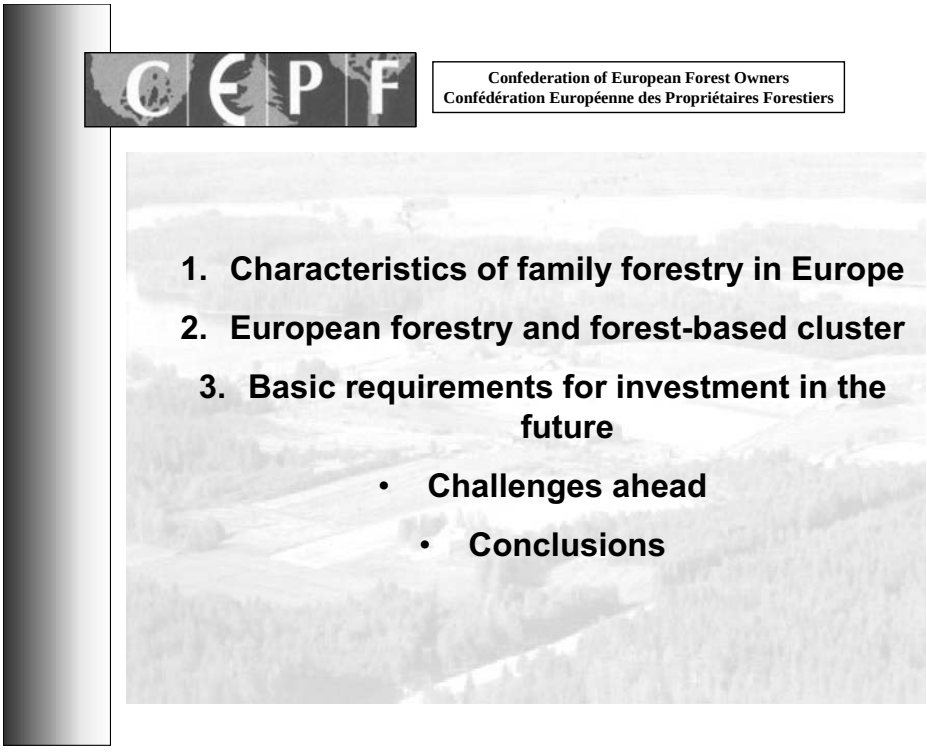
Conclusion

The road to sustainable forest management will pass through difficult terrain. A major hurdle facing developing countries is the presence of a large and growing informal sector. Participants in the informal sector live in this shadowy underworld very often not because they wish to work outside the law but often as a result of costly, time-consuming or unrealistic regulations. Efforts to refocus the forestry legal, policy and regulatory environment will become a priority for channelling financial assistance to the forest sector in developing countries. Public administration and oversight in the forest sector must focus on performance objectives rather than input control. The desired outcome is a policy environment that simultaneously promotes entrepreneurship and stewardship.

Investment in Sustainability – How to Make It Work for European Family Forest Owners?

Natalie Hufnagl

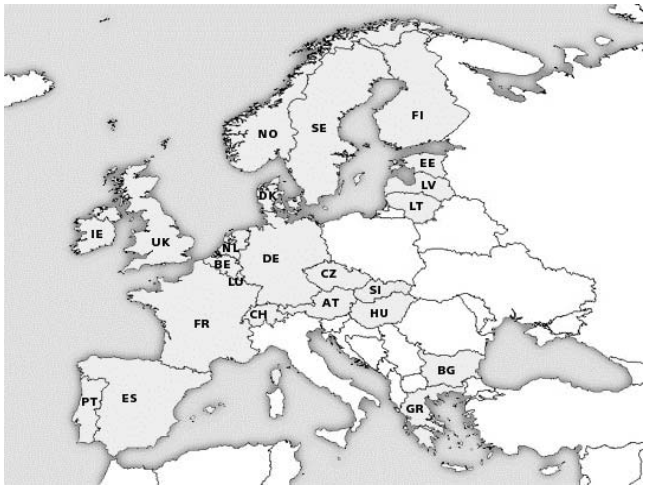
Confederation of European Forest Owners
Belgium



Heikki Pajuoja, Ludek Sisak and Krzysztof Kaczmarek (eds.)
Evaluating Forestry Incentive and Assistance Programmes in Europe – Challenges to Improve Policy Effectiveness
EFI Proceedings No. 54, 2005

Confederation of European Forest Owners
Confédération Européenne des Propriétaires Forestiers

CEPF – the umbrella federation of family forestry in Europe



Confederation of European Forest Owners
Confédération Européenne des Propriétaires Forestiers

Characteristics of family forestry in Europe

- 60% of EU 15 forests are owned and managed by families – generation bridging management and experience
- 36% estimated share of private forestry in CEEC
- Small scale forest holdings: (average size: EU15 = 5 ha; CEEC = 2 ha)
- 15 million family forest owners (EU 25)
- Multifunctional forest management balancing economic, social, ecological and cultural requirements respecting the diversity across Europe
- Family forestry as stabilising factor for socio-economic networks on local level

Confederation of European Forest Owners
Confédération Européenne des Propriétaires Forestiers

Forestry and forest based cluster in the core of a sustainable Europe

- Represents 9% of the manufacturing industries in Europe
- Provides employment to 4 million people
- 400 billion annual turnover
- Added value through the forest-wood-paper chain approach

Confederation of European Forest Owners
Confédération Européenne des Propriétaires Forestiers

Basic requirements for invesment in the future

Framework conditions

- Secure property rights as the fundament of democratic societies
- Legal security and political stability in the long-term

Management conditions

- Self responsibility within a given legal framework
- Entrepreneurial freedom – diversification upon need
- Motivation through co-operation with other family forest owners
- Flexibility to invest in voluntary action that builds on practical experience

Confederation of European Forest Owners
Confédération Européenne des Propriétaires Forestiers

Challenges ahead

Socio-demographic challenges

- New generations of forest owners
- Virtual perception on natural resource management continues

Structural challenges

- Globalisation of industries
- Resource potential in small scale forests
- Forest owner associations as most important structural tool to mobilise forest resources
- New service concepts to meet the needs of a highly diverse forest owner clientel

Guiding principle: Help forest owners to help themselves

Confederation of European Forest Owners
Confédération Européenne des Propriétaires Forestiers

Conclusions

- Balance between short-term Zeitgeist demands and long-term forestry needs
- Public incentives and support are profitable public investment in sustainability - need for evaluation mechanisms
- Income diversification to stabilise market fluctuation – soft value market development
- Consumers need to reward voluntary commitment, PEFC as communication tool
- Family forest owners are reliable trustees for the sustainable management of Europe´s forests

Evaluating Forestry Incentives and Assistance Programmes in Europe – One Scenario of the Future of Forests in Europe

Tamás Marghescu

The World Conservation Unit, IUCN
Belgium

Heikki Pajuoja, Ludek Sisak and Krzysztof Kaczmarek (eds.)
Evaluating Forestry Incentive and Assistance Programmes in Europe – Challenges to Improve Policy Effectiveness
EFI Proceedings No. 54, 2005

Some possible trends

COUNTDOWN 2010
Halt the loss of biodiversity

- **Wood (especially low and medium quality) is increasingly produced and processed, where it is most effectively and economically grown (globalization) – and this is most likely not going to be in Europe;**
- **Demand for European wood products most likely decreasing, because under free market conditions, forestry intervention are often economically not viable and prices would be higher than for wood products from elsewhere;**
- **So far 'free services' of forests, such as clean air, clean water, beauty of landscape are getting higher in demand in a service oriented society….;**

IUCN

Some possible trends

COUNTDOWN 2010
Halt the loss of biodiversity

- **Rural development in the EU strives at supporting the production of healthy food and the maintenance of rural landscape;**
- **Rural life can become completely transformed by the 'electronic society';**
- **Afforestation is becoming an income opportunity through carbon storage and trading;**

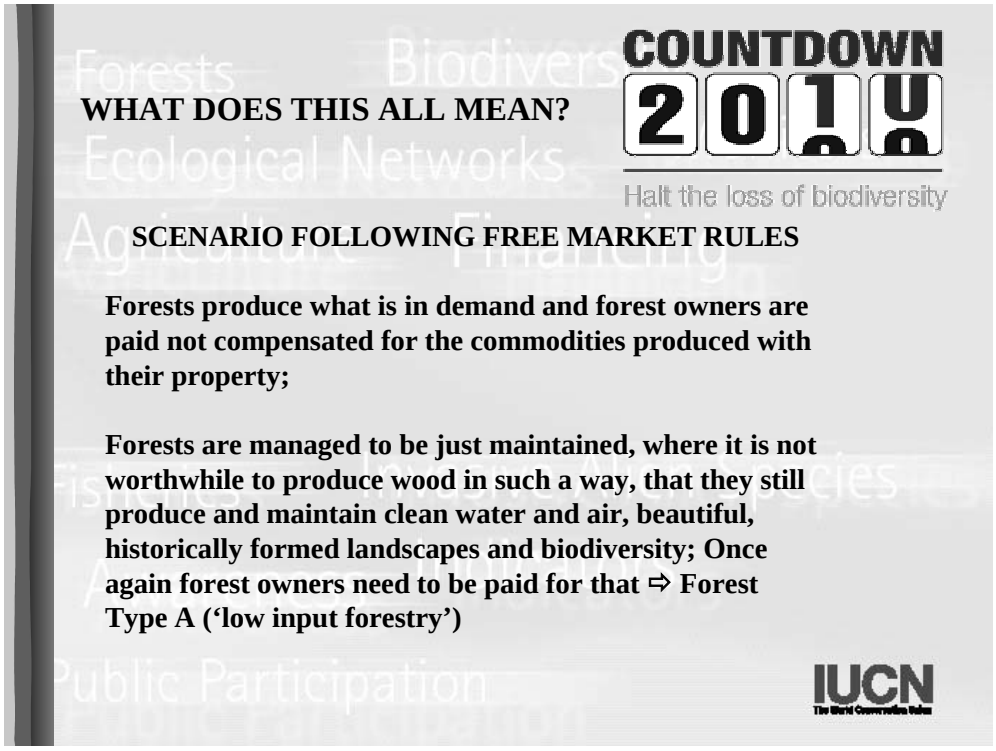
IUCN

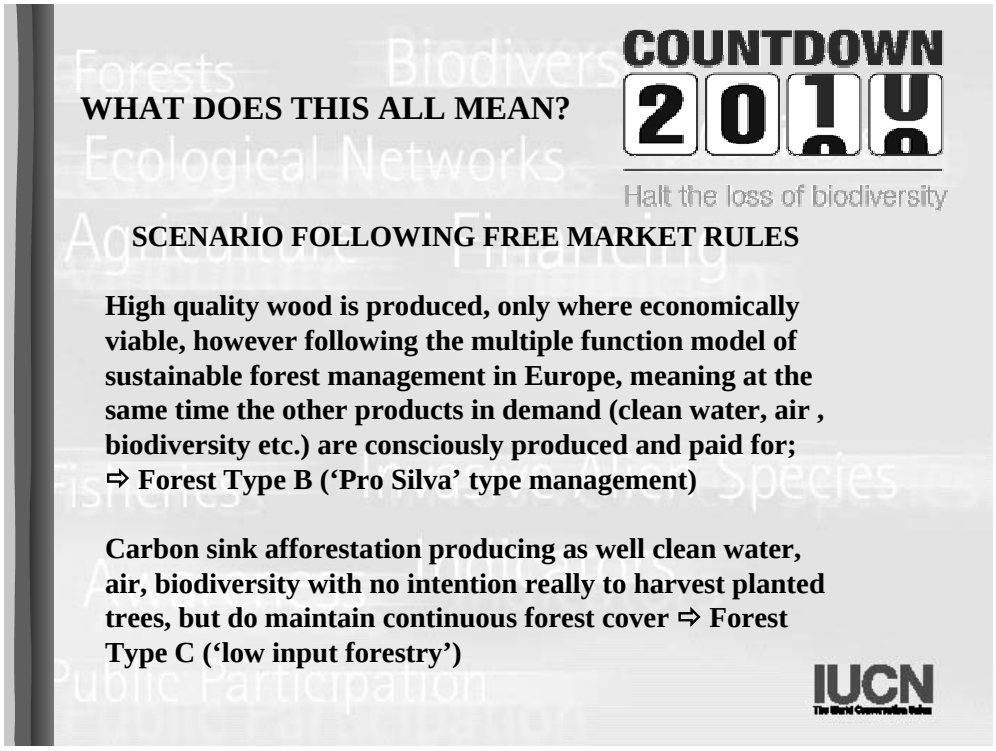

COUNTDOWN 2010
Halt the loss of biodiversity
In a free market economy:
Production is following the demand! Forestry should be supplying what is in demand and not what it is used to supply. Like in any business, one should adapt to changing market conditions.
In demand are e.g.:
- Clean water
- Clean air
- Beautiful landscape
- Carbon sink
IUCN

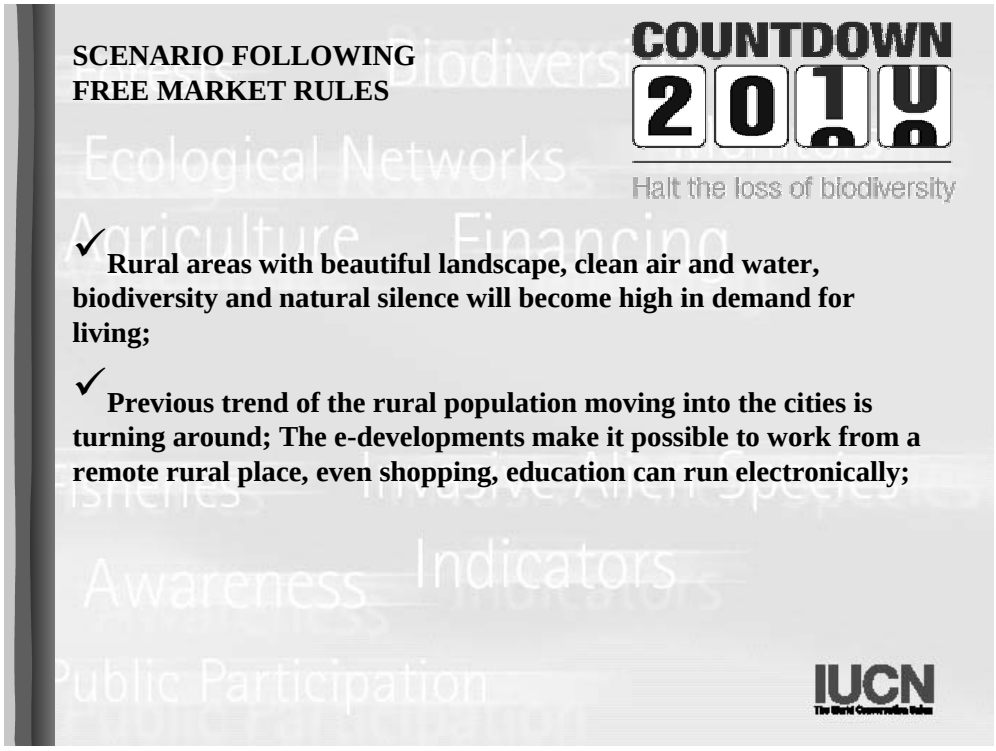

COUNTDOWN 2010
Halt the loss of biodiversity
In a free market economy:
Wood production and processing should focus on quality, if it is not in the position to compete in terms of quantity.
IUCN

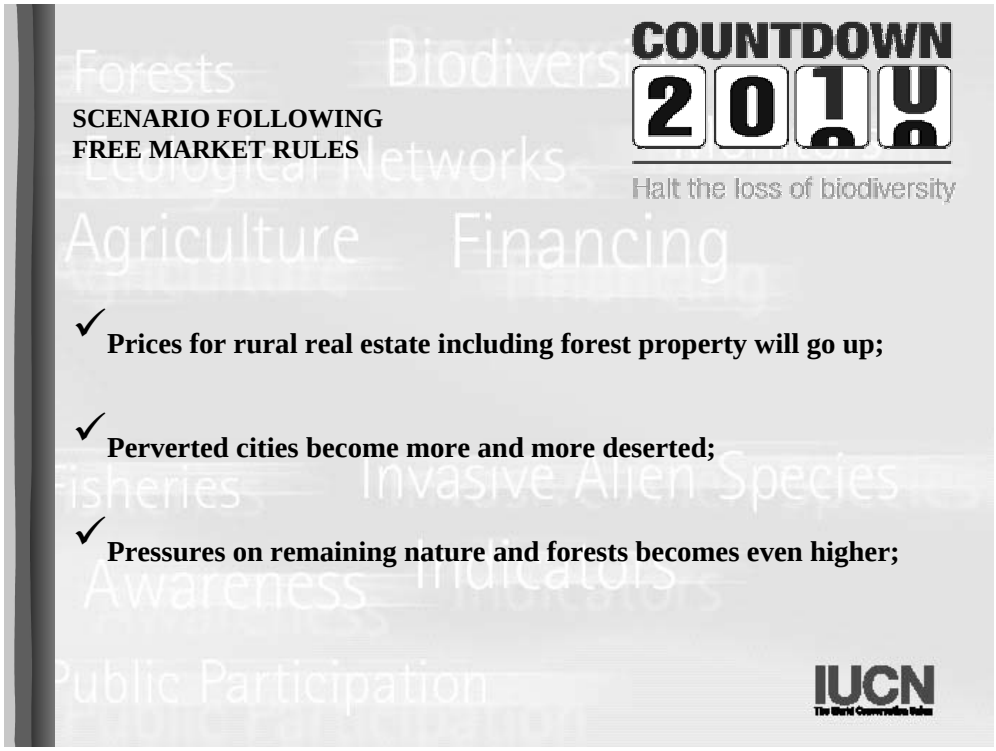

In a free market economy:
COUNTDOWN 2010
Halt the loss of biodiversity
One tries to reduce costs of production.
➢ Reduce inputs ⇒ 'Low-input forestry' 'biological automatization'
➢ Production only where ⇒ where one can produce
➢ the profit margin is high quality in sufficient
➢ enough quantity
IUCN

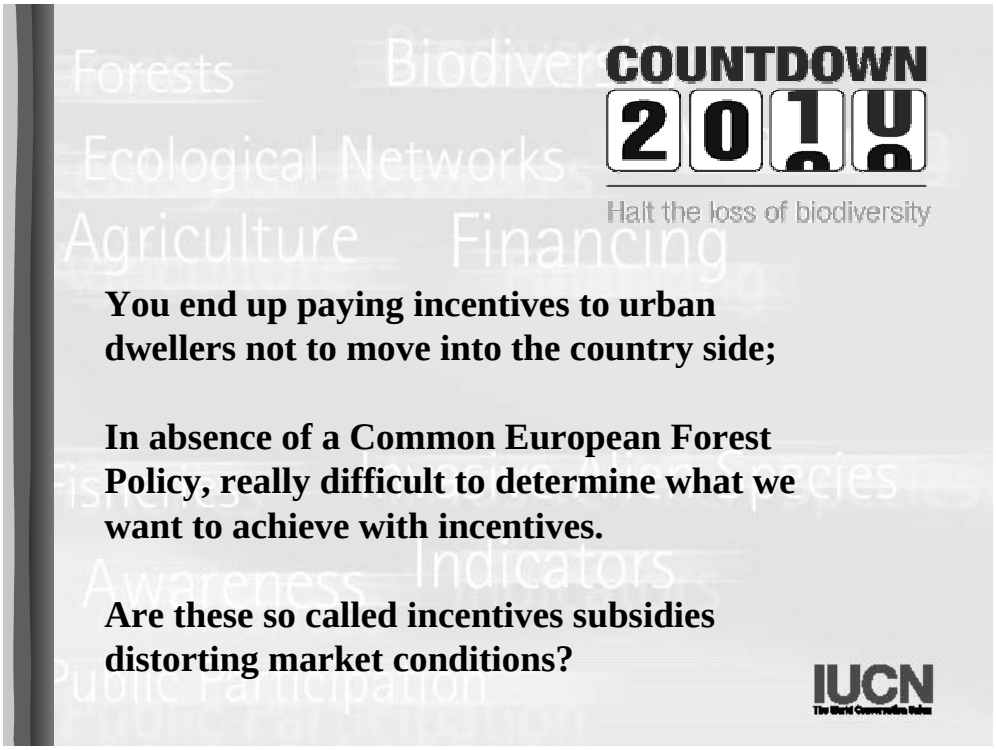

COUNTDOWN 2010
Halt the loss of biodiversity
In a free market economy:
Those who demand and consume the product have to pay for it.
The legal context of the utilization of increasingly scarce "free goods" (clean water and air, beauty of landscape) produced by forests needs to be reviewed
IUCN


WHAT DOES THIS ALL MEAN?
COUNTDOWN 2010
Halt the loss of biodiversity
SCENARIO FOLLOWING FREE MARKET RULES
Forests produce what is in demand and forest owners are paid not compensated for the commodities produced with their property;
Forests are managed to be just maintained, where it is not worthwhile to produce wood in such a way, that they still produce and maintain clean water and air, beautiful, historically formed landscapes and biodiversity; Once again forest owners need to be paid for that ⇨ Forest Type A ('low input forestry')
IUCN


WHAT DOES THIS ALL MEAN?
COUNTDOWN 2010
Halt the loss of biodiversity
SCENARIO FOLLOWING FREE MARKET RULES
High quality wood is produced, only where economically viable, however following the multiple function model of sustainable forest management in Europe, meaning at the same time the other products in demand (clean water, air , biodiversity etc.) are consciously produced and paid for; ⇨ Forest Type B ('Pro Silva' type management)
Carbon sink afforestation producing as well clean water, air, biodiversity with no intention really to harvest planted trees, but do maintain continuous forest cover ⇨ Forest Type C ('low input forestry')
IUCN


SCENARIO FOLLOWING
FREE MARKET RULES
COUNTDOWN 2010
Halt the loss of biodiversity
✓ Rural areas with beautiful landscape, clean air and water, biodiversity and natural silence will become high in demand for living;
✓ Previous trend of the rural population moving into the cities is turning around; The e-developments make it possible to work from a remote rural place, even shopping, education can run electronically;
IUCN


SCENARIO FOLLOWING
FREE MARKET RULES
COUNTDOWN 2010
Halt the loss of biodiversity
✓ Prices for rural real estate including forest property will go up;
✓ Perverted cities become more and more deserted;
✓ Pressures on remaining nature and forests becomes even higher;
IUCN


COUNTDOWN
2010
Halt the loss of biodiversity
You end up paying incentives to urban dwellers not to move into the country side;
In absence of a Common European Forest Policy, really difficult to determine what we want to achieve with incentives.
Are these so called incentives subsidies distorting market conditions?
IUCN

International Forest Policy Dialogue – Economic Aspects of Forests

Catalina Santamaria

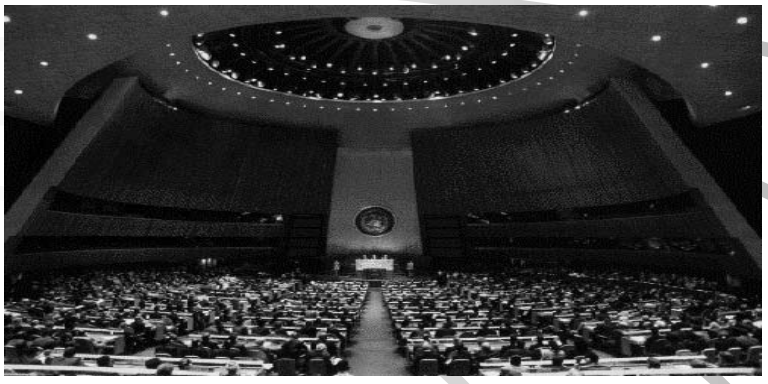
Secretariat of the UN Forum on Forests

Overview

1. What is the international forest policy dialogue?
2. Work of the UNFF and High Level Session at UNFF 5
3. Economic Aspects of Forests
4. Recommendations AHEG

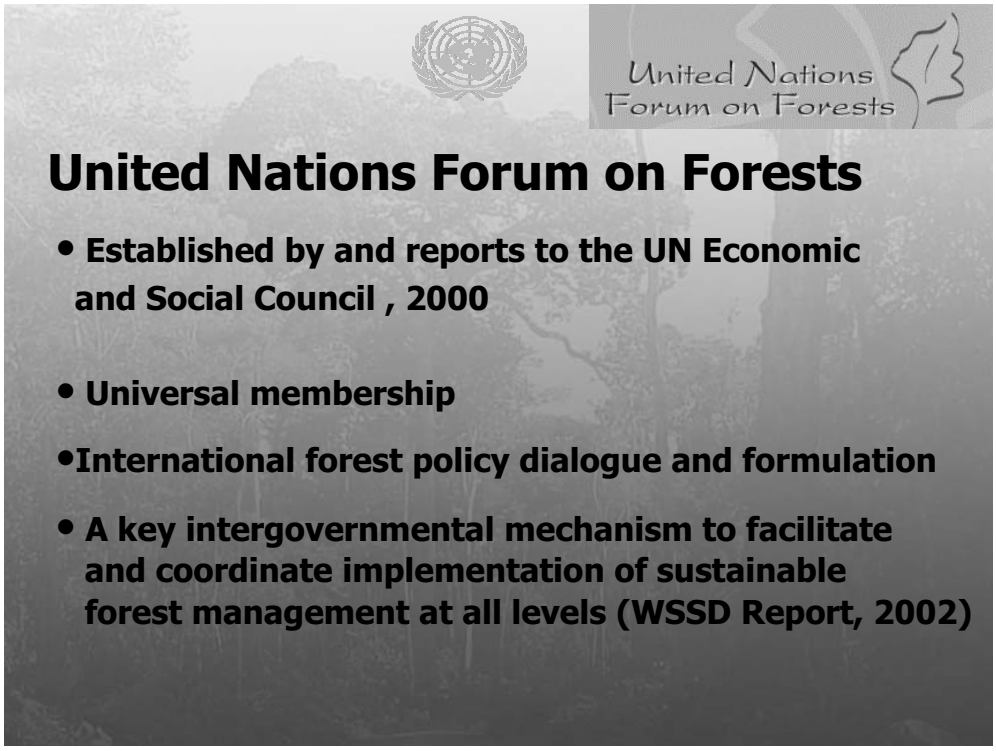
Heikki Pajuoja, Ludek Sisak and Krzysztof Kaczmarek (eds.)
Evaluating Forestry Incentive and Assistance Programmes in Europe – Challenges to Improve Policy Effectiveness
EFI Proceedings No. 54, 2005

What is the international forest policy dialogue?



International Forest Policy Dialogue

- **1992 – UNCED:** ***Rio Earth Summit***
  - ***-controversy around forest issues***
  - ***-Forest Principles***
  - ***-Chapter 11 of Agenda 21***
- **1995 – 1997: UN Intergovernmental Panel on Forests (IPF)**
- **1997 – 2000: UN Intergovernmental Forum on Forests (IFF)**
  - ***- IPF/IFF consensus on many policy issues***
  - ***-IPF/IFF Proposals for Action***



Sessions of the UNFF

Means of implementation:
Finance; Transfer of environmentally sound technologies; Capacity-building

Common items for each session:
Multi-stakeholder Dialogue; Enhanced cooperation and policy and programme coordination CPF; Country experiences and lessons learned; Emerging issues for country implementation; Inter-sessional work; Monitoring, assessment and reporting; Promoting public participation; National forest programmes; Trade; Enabling environment

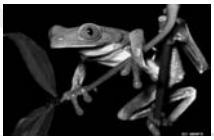
Second session	*Third session*	*Fourth session*
Combating deforestation and forest degradation	**Economic aspects of forests**	**Traditional forest-related knowledge**
Forest conservation; protection of unique forest types & fragile ecosystems	**Forest health and productivity**	**Forest-related scientific knowledge**
Rehabilitation & conservation for LFCC	**Maintaining forest cover to meet present & future needs**	**Social and cultural aspects of forests**
Rehabilitation & restoration of degraded lands & promotion of natural and planted forests		**MAR, concepts and terminology and definitions**
Concepts, terminology and definitions		**C&I of sustainable forest management**

Upcoming Session of UNFF 5

16-27 May 2005 in NY

- **High level Ministerial Segment**
- **Review of Progress** on **SFM** and **Future Actions**
- **Review of the Effectiveness of the IAF**
- **Consider with a view to recommending the parameters of a mandate for developing a legal framework on all types of forests**

Economic Aspects of Forests in the Context of UNFF



Economic Aspects of Forests

Priority on the international political agenda

Economic Viability of SFM

- Land tenure
- Law enforcement
- Governance
- Valuation of goods and services
- Partnerships among stakeholders

AHEG on Finance

National level- Within Forest Sector

- National Forest Programmes
- Enabling conditions for SFM
- Approaches to sharing of costs and benefits

National level-outside Forest Sector

- **Mainstream SFM**
- **Improve legal frameworks**
- **Intersectoral cooperation**

International level

- **Foster partnerships**
- **SFM as part of GEF land management focal topic**
- **SFM in lending and grant programmes**

AHEG: Next steps

CLI for UNFF 5:

Innovative Financial Mechanisms:
Searching for Viable Alternatives to Secure the Basis for the Financial Sustainability of Forests

San Jose, Costa Rica 8-11 March 2005

Summary

- UNFF fosters actions towards SFM
- Raise importance of economic aspects
- Involvement of stakeholders
- Development of self-financing concepts and practices for SFM and to build capacity
- Commitment to reaching common goals

Thank you for your attention.

http://www.un.org/esa/forests

Emerging Challenges for Evaluating Forest Landowner Incentive Programs in the United States

S. Hummel

USDA Forest Service PNW Research Station
Portland, Oregon USA

Abstract

Three broad categories of forest landowner incentive programs exist in the United States: financial, technical, and educational. Collectively, they are intended to encourage desired management practices on non-industrial private forestland. The details of incentive programs vary among the states because forest regulations and program objectives differ across the country. Activities supported by financial programs traditionally focused on wood production but recent trends include an emphasis on non-wood objectives. As forest landowner incentive programs expand to include new objectives, new methods are needed to evaluate program effectiveness. In particular, developing techniques to link forest inventory data with forest landowner incentive program data across administrative units and identifying measurable response variables for non-wood objectives are vital.

Introduction

Forest landowner incentive programs have existed in the United States (U.S.) for decades (Best and Wayburn 2001, Chapter 4). Early social objectives, like stabilizing landowner income, continue to be important but ecological objectives, like providing wildlife habitat, are being added. In contrast to regulations, which compel compliance with minimum standards for forest practices, incentives are designed to encourage management practices above these minimum levels. The details of incentive programs vary among the states because forest regulations and program objectives differ across the country. The Pacific Coast states (Washington, Oregon, and California) have the most comprehensive mix of regulations and incentives (Moffatt and Cubbage 2001). This paper gives a brief overview of forest landowner incentive programs in the U.S. and identifies some emerging challenges for evaluating their effectiveness.

Heikki Pajuoja, Ludek Sisak and Krzysztof Kaczmarek (eds.)
Evaluating Forestry Incentive and Assistance Programmes in Europe – Challenges to Improve Policy Effectiveness
EFI Proceedings No. 54, 2005

Forest landowner incentive programs

Forestland in the U.S. is defined as land at least 10% stocked by forest trees of any size. According to 1997 inventory statistics, the continental U.S. (which excludes Alaska and Hawaii) contains approximately 250 thousand hectares of forestland (Haynes 2003). Owners of non-industrial, private land are the targeted beneficiaries of forest landowner incentive programs in the U.S. This ownership category, called 'non-industrial private owners or NIPF,' includes tribal and individual owners of private land who do not operate wood-processing facilities. Over half (53%) of the forestland in the continental U.S. is in NIPF ownership (Haynes 2003). This ownership varies by region, with the southern U.S. having proportionally more NIPF than other regions.

Landowner incentive programs are funded to a large extent through the Congressional appropriations process of the U.S. government. These federal funds are then distributed to States through departments like the U.S. Department of Agriculture (USDA) and its associated agencies. Although the bulk of forest landowner incentive programs fall under the USDA Forest Service, other USDA agencies like the Farm Services Administration are involved when farms contain land suitable for reforestation, as in riparian areas. The State and Private Forestry division of the USDA Forest Service has primary responsibility for making appropriated federal funds available to States for incentive programs. Cooperation between federal and state partners is required by law, and both must agree on the use of funds for specific incentive programs. Federal funding of the programs has fluctuated substantially over the past four decades (Best and Wayburn 2001, p. 129). States often contribute local revenues to stabilize the amount of annual funds available to NIPF.

Three broad categories of forest landowner incentive programs exist in the U.S.: financial, technical, and educational. Financial incentive programs provide funds for specific activities, like planting trees, while technical programs offer expertise for tasks like writing a stewardship plan. Financial programs include both direct and indirect assistance to NIPF. Direct assistance often takes the form of cost-share programs while indirect assistance might be in the form of state tax credits. Traditionally, activities supported by financial programs focused on wood production objectives but this is shifting to emphasize non-wood resources. Indeed, in recent years there has been a trend toward activities supporting reforestation and restoration objectives rather than on activities for managing established forests. Evaluating program effectiveness therefore requires more than information on landowner participation, total program investment, and wood production. In particular, the shift from wood to non-wood objectives creates a need for ecological data and is creating interest in spatially specific analyses. One indication of this interest is a pilot project that endeavors to develop geographic information system (GIS) layers that link forest inventory data with stewardship plans (http://www.clear.uconn.edu/stewdata). The project is based at the University of Connecticut with financial support from the USDA Forest Service.

A trend to spatially specific analyses portends several challenges, including:

- Linking spatial forest inventory data to forest landowner incentive program data across administrative units;
- Identifying proxy variables that measure incentive program effectiveness;
- Understanding the spatial and temporal scales at which to measure effectiveness for the different variables;
- Reconciling tensions between the need for standardized recordkeeping and the desire for decentralized application and privacy.

When forest landowner incentive program objectives include non-wood objectives like wildlife habitat or water quality, for example, variables for them need to be defined and

measured. This might include forest structural elements like the range of tree species and sizes, or the total length of a stream reach that is shaded by trees. Whatever the variable, being able to link it directly with forest landowner incentive program investments over time is essential for evaluating the effectiveness of a particular program type.

Summary

If the objective for forest landowner incentive programs is financial, then non-spatially explicit economic analysis methods might be sufficient. If, however, forest landowner incentive programs include ecological objectives, then new methods are required to evaluate program effectiveness. These methods require linking data on forest dynamics with information on landowner participation in specific incentive programs.

References

Best, C. and Wayburn, L.A. 2001. America's private forests: status and stewardship. Island Press, Covelo, CA. 268 p.

Haynes, R.W. (tech. coord.) 2003. An analysis of the timber situation in the United States: 1952 to 2050. United States Department of Agriculture, Forest Service. Pacific Northwest Research Station, Portland, Oregon General Technical Report, PNW-GTR-560. 254 p.

Moffat, S.O and Cubbage, F.W. 2001. NW forest practices regulation and forest management certification. Northwest Woodlands Magazine (Spring) and online at http://www.ccffa-oswa.org/NWForestPractices.html

The Role of Forestry Funding Programmes in Supporting Innovations in Central European Countries

Gerhard Weiss, Anja Bauer and Ewald Rametsteiner

EFI PC INNOFORCE Innovation and Entrepreneurship in Forestry, University of Natural Resources and Applied Life Sciences
Vienna, Austria

Abstract

Financial incentives play an important role in the decisions of entrepreneurs to undertake innovation activities. As innovations in forestry become more and more important for the development of the sector as well as for rural development it is worthwhile to investigate the role of public forestry funding programmes in supporting innovations in forestry. Research results on innovation activities of forest holdings in eight Central European countries show that there are major shortcomings in sectoral innovation policy in general and in providing financial incentives for innovation in particular. While informational and financial support for the diffusion of certain pre-selected innovations is provided quite well, support for the development of new ideas, innovations new to the market or innovations crossing sectoral boundaries is missing. In order to better support innovation, funding programmes would have to be re-designed along innovation support principles.

Keywords: innovation, innovation policy, financial incentives, forestry, sectoral innovation system.

1. Introduction

In recent decades increasing demands have been put on forestry by society – from protecting nature, to creating recreational environments, to providing renewable resources, to securing employment and income in rural areas. Even more changes have occurred in the countries with economies in transition with the restitution of forest property. These changes require adaptations and innovations by forest owners and managers as well as by those actors that manage the frame conditions under which innovations can take place. Thus, innovation

Heikki Pajuoja, Ludek Sisak and Krzysztof Kaczmarek (eds.)
Evaluating Forestry Incentive and Assistance Programmes in Europe – Challenges to Improve Policy Effectiveness
EFI Proceedings No. 54, 2005

becomes crucial for the competitiveness of forest holdings, the development of forestry and rural areas and thereby for the income and well-being of people living in rural areas.

The innovation process requires a range of resources from enterprises, including knowledge, time and financial means. Sufficient available financing is a necessity for the successful development and introduction of innovations. However, as innovation projects always include the risk of failure, outcomes are uncertain and the returns to investments are not assured (O'Sullivan 2003: 2). Therefore the question of how firms get access to the resources needed for innovation is crucial for their innovativeness. If internal and private external financing is not sufficient public policies and programmes to support innovations and to improve the environment for financing innovation may enhance innovation activities by enterprises.

The objective of this paper is to study in how far forestry funding programmes are designed to support innovations in forestry and for which particular activities incentives are provided. The arguments presented base on the results of surveys and case studies conducted in the course of the European Forest Institute (EFI) Project Centre (PC) INNOFORCE 2001–2003.

The paper aims at answering the following research questions:

- Do forestry funding programmes support innovations in the sector?
- How does the forestry sectoral innovation system fulfil the function of providing incentives for innovation?
- How can public forestry funding programmes be improved regarding the support of innovations?

The paper starts with a short overview over the theoretical concepts and approaches for studying innovation and innovation systems used in the research of the EFI PC INNOFORCE and presents a typology of financial instruments. In the empirical part the actual situation of innovation in forestry in Central Europe and the role of public financial instruments in supporting innovations is presented. Further, the main features of funding programmes for forestry and the role of the Sectoral Innovation System in providing pecuniary incentives to forest holdings will be discussed. In the conclusion recommendations are given on how funding programmes could be improved in order to support innovations.

2. Theoretical and methodical background

2.1 Innovation, innovation system and its functions

Within the EFI PC INNOFORCE innovation is defined as discontinuous intentional change in the inputs, processes or outputs of an enterprise. This understanding of innovation includes changes which are radical or incremental as well as changes new to the firm or new to the market (Rametsteiner et al. 2005). Two main categories of innovation are distinguished: product innovation and process innovation. Product innovation is defined as changes in the output of an enterprise, this might be goods or services. Process innovation is a change in the process of an enterprise that is caused either by technological or organisational novelties or improvements.

For the analysis of innovation activity in forestry and the role of institutional actors a systemic view was adopted. In innovation system approaches innovation is seen as an institutional process (see, for example, Lundvall et al. 2002; Edquist 1997), in which it is not only the entrepreneur who is responsible for the innovativeness of his or her firm. Rather entrepreneur and firm are embedded in a system of institutions that build the general framework for the decisions and activities of the entrepreneur (Rametsteiner et al. 2005).

Innovation Systems comprise of actors, institutions and their interactions. Three different but complementary approaches of Innovations Systems are distinguished: The National Innovation System (NIS) approach, the Sectoral Innovation System (SIS) approach and the Regional Innovation System (RIS) approach. The Sectoral Innovation System approach and the Regional Innovation System approach were identified as the approaches most relevant for the analysis of innovation in forestry. A Sectoral Innovation System as defined by Breschi and Malerba (1997: 131) is a "system of firms active in developing and making a sector's products and in generating and utilising a sector's technologies." Regional Innovation System approaches are based on a territorial concept and look at the innovation process at the local or regional level. Learning processes and technological change are here characterised by regional specificities. Following Edquist and Johnson (1997: 51ff) institutions of an innovation system have three main functions in supporting innovations within a sector or an economy:

1. the reduction of uncertainties by providing information,
2. the management of conflicts and cooperation and
3. the provision of pecuniary and non-pecuniary incentives.

This paper focuses on parts of the third function – the provision of pecuniary incentives.

Pecuniary incentives influence the decisions of entrepreneurs by providing financial benefits to innovative firms. Pecuniary incentives may be given by a wide range of formal and informal institutions such as salary and wage schemes, income taxes, tax allowances, government subsidies, inheritance rules and property rights, etc. (Edquist and Johnson 1997: 53). These institutions are important in affecting the amount of resources devoted to innovation in a country, in a sector, or in a firm. On the other hand, pecuniary sticks, such as loosing competitiveness or the risk of going bankrupt if the firm is not innovative enough, influence the decisions of entrepreneurs as well (Edquist and Johnson 1997: 53). However, there are also disincentives related to innovation and the financial situation of an enterprise. These disincentives comprise for example a high risk of failing and loosing financial resources, especially if radical innovations or innovations new to the market are introduced. The innovation process is characterised by a high level of uncertainty concerning the outcomes of innovation projects and the returns of investments in innovation activities (O'Sullivan 2003: 27). In addition, pecuniary incentives provided by market institutions may not be sufficient for an enterprise as internal and external resources to initiate innovation activities may lack. This is especially the case for small or micro enterprises to which the majority of forest holdings in Central European countries belongs. While large companies are generally able to finance innovation internally, small and medium sized enterprises (SMEs) have only limited internal resources and therefore are more likely to seek external finance. However, they very often face problems in receiving bank credits or other private financing due to a high level of uncertainty and informational asymmetries related to the innovation process. As mentioned before, the returns to innovative activities are often skewed and highly uncertain. Further, entrepreneurs generally possess more information about the nature and characteristics of their products and processes than potential financiers. Finally, innovative activities are usually intangible thereby making the assessment of their monetary values difficult before they become commercially successful. Thus, financing innovative SMEs may be risky and uncertain, making it difficult for SMEs to find investors (OECD 2004: 5). Consequently, government policies and programmes may become crucial for innovators if the development of innovations implies too high risks (e.g. new technologies, unstable economic environments) or causes investments that the firms are not able to bear on their own or by private financing sources.

2.2 Role of public financing measures in supporting innovation

There is a wide range of policies and instruments governments use in order to close financing gaps by innovative firms and stimulate innovation activities. Three broad categories of financial measures are distinguished:

1. Direct financial support to firms
2. Indirect financial support to firms
3. Policies to enable the supply side for financing innovation.

Direct financial support comprises funds that are directly provided by government or government-controlled agencies to companies in order to finance innovation projects. The instruments of direct financial support can take one of the following forms:

- Grants for innovation projects or research and development,
- Soft loans for investment or the costs of R&D or other innovation activities, usually at preferential interest rates,
- Government – backed provision of capital to companies undertaking innovative activities by taking equity in companies, and
- Subsidies for capital goods investment, projects, etc.

Direct financial support accounts for around 50% among financing measures within the EU-15 (European Commission 2001).

Instruments of indirect financial support to firms are:

- Provision of loan and equity guarantees for investors.
- Providing tax incentives for investments into R&D and innovation activities.
- Interest rate subsidies on loans to firms from financial institutions.

In addition, there is a range of measures to improve the situation of financing innovation by private investors. For example, regulatory measures, such as changes in the fiscal and legal environment may be used to channel funds towards financing innovations and start-ups. Intermediation between financiers and innovative enterprises may be important when private money seems plentiful but is not allocated sufficiently to innovation activities. Intermediation implies the development of structures and actions to improve the links and understanding between investors and entrepreneurs, for example, through the development of Business Angel Networks (European Commission 2001).

All three types of support are important policies for fostering innovation. This paper focuses on direct financial support for innovative forest holdings in Central European countries.

2.3 Method

The EFI PC INNOFORCE carried out research on innovation and entrepreneurship in eight Central European countries (Austria, Czech Republic, Germany, Hungary, Italy (Trento province), Slovakia, Slovenia and Switzerland) with a focus on the actual situation of innovation and entrepreneurship and the institutional system determining the frame conditions for innovations in forestry. As far as feasible, three separate surveys were conducted per country: a comprehensive forest holdings survey, institutional level surveys, and case study analyses. The forest holdings surveys were conducted nationally in seven Central European countries, Austria, Germany, Czech Republic, Hungary, Italy (Trento province), Slovakia and Slovenia, based on a common master questionnaire (Rametsteiner et

al. 2005). Over 70, mostly face to face, interviews with actors of the national level and more than 200 interviews on provincial level were conducted in six countries using standardised and semi standardised questionnaires. In six Central European countries (Austria, Switzerland, Germany, Czech Republic, Slovenia and Slovakia) 32 case studies of successful innovations were conducted. The analysis comprised 18 cases of product innovations (ten wood and non-wood products, of which six on bioenergy, eight cases of services, of which three on nature conservation) and 14 cases of process innovations. The analysis focused on the actors and interactions involved, which functions were fulfilled by which type of Innovation System (SIS or RIS) and which factors were impeding or supporting the successful implementation.

3. Public financial support for innovations in CE forestry

3.1 Actual situation of innovation in forestry

The surveys on innovation and entrepreneurship in seven Central European Countries show that the level of innovation activities in forestry is quite low compared to other sectors. On average, 9% of the forest owners and managers in Central European countries have introduced one or more product or process innovations in the years 1999–2001. However, there are large differences between forest holdings of different size classes. Of the forest holdings larger than 500 ha about 56% of the forest holdings have introduced some innovations during this period. Thus, forest holdings larger than 500 ha are as innovative as small and medium-sized enterprises in the EU manufacturing sectors, while small forest holding – representing the majority of forest owners – innovate much less. This clearly shows the difficulties that small forest holdings face in their innovation efforts (Rametsteiner et al. 2005).

Looking at the type of innovations introduced, the results show that organisational innovations dominate (39% of all innovations), followed by service innovations (29%), product innovations (18%) and technological innovations (14%). However, all innovations introduced by forest holdings were new to the firm but were not new to the sector or the market. Thus, in forestry no really new ideas or concepts are developed for the sector (Rametsteiner et al. 2005).

3.2 Financial incentives and disincentives for forest owners

In general, the context and conditions within which forest management is performed in Central Europe are not supportive to innovations. Among these hindering frame conditions several are related to financial incentives. First, the prevailing goal of forest owners is to maintain capital. Increasing profit, on the other side, is not a primary goal of forest owners in all size classes. About 10% of the owners of very small forest holdings and around 40% of the owners of forest holdings larger than 100 ha named increasing profit as their main goal. In contrast, about two thirds of very small forest holdings manage their forests in a way to maintain capital. Even in quite large holdings more owners or managers manage for capital maintenance than for increasing profit. This shows that economic incentives for innovation stand back conservative business goals (Rametsteiner et al. 2005).

Second, there is hardly full-time employment in forest management and forest management is mostly done by family members. Hence, income from forests is not the main income source for forest owners. The smaller the property size the lower the percentage of income from forestry. In

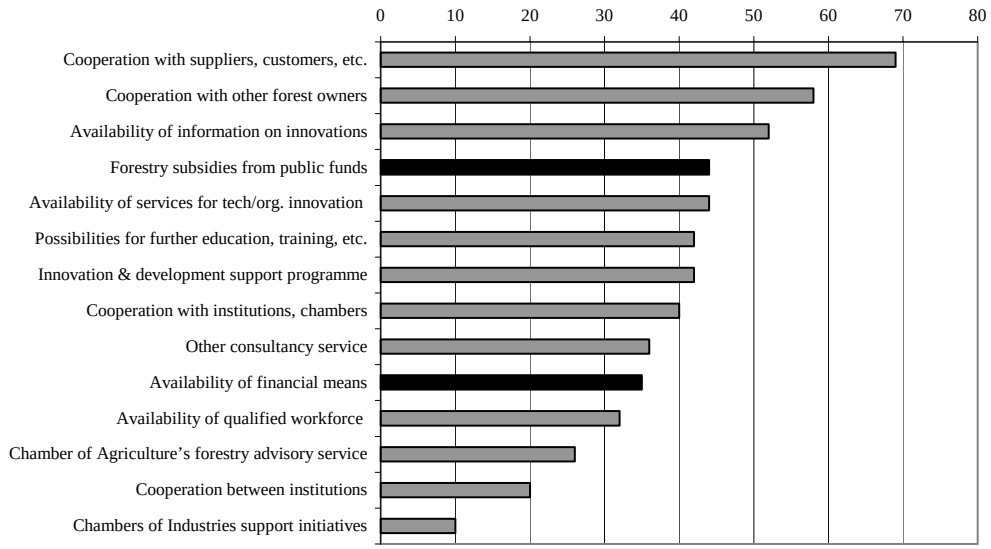


Figure 1: The importance of a list of pre-selected fostering factors as seen by innovative forest holdings in Central Europe (Slovakia not included). Source: Rametsteiner et al. 2005.

Austria, for example, the share of income from forestry in an average private forest holding of around 11 ha is usually less than 10% of the total income of a forest owner. Forest holdings of sizes over 500 ha generate only about 50% on average of the total income from forestry. The remaining part is to a good deal from income sources other than the primary sector. There is little indication that this situation is much different for private forest owners in other countries (Rametsteiner and Weiss 2004). Pecuniary incentives such as increasing profit and income by strengthening competitiveness are thus less relevant for the forest sector.

Other financial incentives play, indeed, an important role in the innovation decisions of forest owners and managers. In the surveys, forest owners or managers were asked to state fostering and impeding factors through open and closed questions. Innovative forest owners were asked to state fostering factors. The questions concerning impeding factors were addressed to those who had successfully introduced innovations during the last three years, as well as to those who had not. Both open and closed questions on fostering factors reveal that external financial support is crucial for the successful introduction of innovations beside co-ordination and information aspects.

Around 45% of Central European forest owners and managers named forestry subsidies from public funds as one of the most influential factors for innovation activities (see Figure 1). The studies showed great divergences between countries. While in Slovenia and Italy (Trento province) only 17% of the forest owners and managers named financial support as a major fostering factor, in Hungary up to 83% of forest owners perceived financial support as highly important (Austria 51%, Czech Republic 53%). It is assumed that these divergencies may rather reflect the actual supply of public funding than differences in the needs or preferences of forest owners and managers. In addition, these divergencies result from different ownership structures in the countries. In the Trento province, for example, the

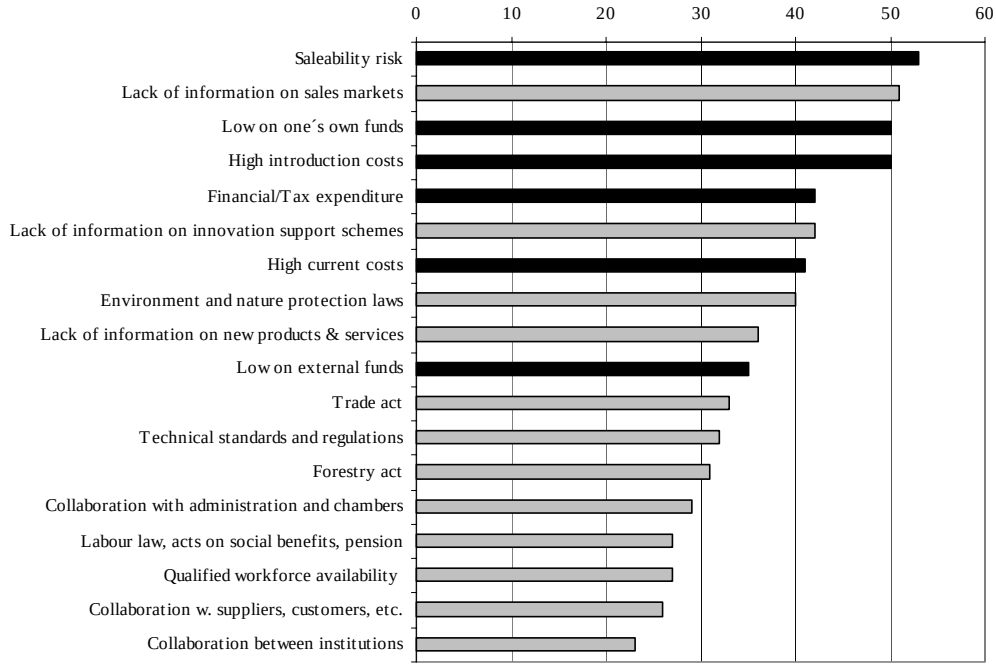


Figure 2: The importance of a list of pre-selected impeding factors for innovative forest holdings in Central Europe (Slovakia not included). Source: Rametsteiner et al. 2005.

majority of forests are public forests. Compared to other fostering factors it becomes clear that although financial support is important it is not the most important factor. Vertical and horizontal cooperation as well as the availability of information rank higher in the list of fostering factors for innovative forest owners.

On the other side, impeding factors are very often related to problems of financing innovation (see Figure 2). Among the strongest concerns of innovative forest owners were saleability risks (named by around 53% of forest owners), low own funds (~ 51%), and high introduction costs (50%). Further concerns related to the financing situation were high current costs (41%) and low external funds (35%). Financial concerns are on average percieved as hindering as the lack of information.

Among non-innovators on average across countries more than two thirds identify low own funds as a main hindering factor. Other barriers to innovation are high introduction costs (~60%), saleability risk (~50%), high current costs (~49%) and low external funds (~38%) (Rametsteiner et al. 2005).

Compared to the results of the Community Innovation Survey 3 (CIS 3) the results from INNOFORCE show that forest holdings face stronger financial constraints than small enterprises in the European Union in general. In CIS 3, 31% of small enterprises without innovation activities named high introduction costs as a main hampering factor (compared to 60% of forest owners) and only 19% stated that the lack of appropriate resources is a main hindering factor (European Communities 2004).

3.3 Funding programmes for innovations in forestry

Insights on the chracteristics and design of funding programmes for forestry are derived from the case studies conducted in the course of PC INNOFORCE 2001–2003. In 15 of the investigated 32 cases, public funding was identified by forest owners as an important fostering factor for the innovation activity analysed. The main sources of funding were support programmes by the national and regional forestry administration, EU programmes such as EU programmes for rural development and the SAPARD (Special Accession Programm for Agriculture and Rural Development) programme for accession countries. The vast majority of financial support was given in form of subsidies for specific activities, followed by grants. Soft loans for innovation projects were hardly provided.

In the Central European countries with economies in transition generally less public funding is available. Due to cuts in public budgets over the transition period, the state forest and nature conservation policies rely on traditional legal restrictions rather than financial incentives, assistance and compensation. Cases indicate that the EU structural funds (SAPARD) provided an impulse for innovation and entrepreneurship in these countries.

Most of the funding programmes in the investigated countries were not targeted at supporting innovation in general, rather they provided subsidies for specific activities. For example, in Austria specific funding of innovations in forestry exist for forest pedagogical activities, especially offers for school children, forest owners' co-operations, especially of small/farm forest holdings, and joint bioenergy projects by farm forest holdings. Cases, collected in these areas, show that the forest innovation programmes typically are diffusion programmes. Especially for the case of biomass-based district heating plants this finding is striking as the development of the innovation was largely supported by institutions and funds from other sectors, but the diffusion itself is strongly supported by forestry agencies and new specific funds.

As the cases show, there is hardly any financial support for pioneer innovations from sectoral programmes. If concerned with innovations, such programmes typically are designed to support the diffusion of specific innovations that have been identified as promising future markets. Consequently, innovations supported are only innovations new to the firm but not new to forestry. This means that there is a lack of financial means for the development of new ideas, of innovations that are new to the sector and for risky projects. As mentioned, pioneer innovations, for example in the field of biomass district heating, were generally supported by programmes from outside the sector. However, a main problem seems to be that forest owners and forest agencies hardly know about programmes that lie outside the responsibility of forestry administration, but have a stronger focus on innovation and regional development, like the EU-programme "Leader+" or SME programmes in general. Hence, a considerable financing potential of non-forestry funding sources is actually hardly tapped by forest owners. Their range is broad, including national and supra-national technology funds, national and supra-national support policies for regional development, etc. While agricultural programmes and institutions are often known and also used for forest-related projects (as most forest owners are farmers), EU structural funds and their respective agencies or other programmes and bureaus for regional development are disregarded. Such programmes and institutions are highly relevant for the sector: The most successful cases that developed innovations, which were new to the sector, were significantly supported by non-forestry entities or programmes.

A further observation about the design of funding programmes is that funding was only seldom restricted to the starting or implementation phase of a project. Often funding was provided also after the starting phase and often forest owners and managers considered this funding as necessary for the continuation of the project.

Case studies have shown that funding programmes in forestry are hardly oriented along innovation support principles. Incentives are designed for improving the situation in specific

areas and not within a wider innovation support policy. The incentive design often disregards basic principles of more coherent innovation support programmes. Two such principles are to systematically support new and risky projects and to limit the support to the starting phase. Today, considerable incentives are provided for the diffusion of already known and pre-selected technologies or organisational rearrangements, but only little incentives are provided for the development and pilot-testing of new ones. It is only seldom that the grant of support is restricted to the starting phase of a certain project, or the stage of introduction of an innovation in the sector. For new ideas, it is difficult to find support by forestry funds.

3.4 Is the incentive function of Sectoral Innovation Systems fulfilled?

The orientation of forestry funding programmes on the diffusion of innovations reflects the situation that comprehensive innovation policies for the forestry sector are missing in the Central European countries. Although representatives of the forestry institutional system mostly regard the topic of innovation as highly important for the development of the sector, there are no corresponding and comprehensive policies, strategies or programmes. Innovation aspects are handled in diverse operational policies for specific issues, but are not dealt with in a coherent form.

Further, the forestry Sectoral Innovation Systems in Central European countries usually consist of very few actors and have strong boundaries to other sectors. Although forestry is very close to agriculture and many forest owners are often farmers in the first place, links between the two sectors are rather weak in most institutions such as legal regulation, public administration, interest groups, education and research. Even less interactions take place with other sectors such as tourism, energy production, etc. Within the sectoral innovation system for forestry, innovation does not receive a high level of attention. In the countries with economies in transition innovations in forestry are even less supported. Until recently they have been regarded as the sole responsibility of private actors (Rametsteiner et al. 2005).

Innovation policies in general and financial incentives in particular focus on the diffusion of selected innovations but neglect support for developments that are new to the sector. The sectoral innovation policies follow a top-down approach with a selective support of the diffusion of specific products, services or procedural innovations. Thus, the Sectoral Innovation Systems fulfil the function of providing pecuniary incentives only in supporting diffusion, but do not provide incentives for the early phases of the innovation process, the search for and testing of new ideas. The funding of the diffusion of innovations is important, however the focus on selected innovation projects runs the danger of fostering overinvestment in a limited number of ideas, while an overall supporting environment for innovation in the sector is missing.

4. Conclusions and Recommendations

Innovation activity in forestry correlates with the size of the forest holdings. While the innovativeness of larger forest holdings (>500 ha) in terms of number of innovations is on the same level with SME's of the manufacturing sector in Europe, smaller forest holdings innovate much less. However, innovations are practically limited to innovations that are new to the firm, while innovations new to the sector or market are lacking.

Funding programmes play an important role in supporting innovations. Forest owners and managers considered financial support as one main fostering factor for innovation activities,

while on the other side the lack of financial resources was perceived as a main hindering factor. However, funding programmes for forestry generally disregard innovation support principles. They provide support for the diffusion of ideas but not for the development of new ideas and their support is often not limited to the starting phase. Major shortcomings of the sectoral innovation system and the forestry innovation policies were identified. First, no comprehensive innovation policies are formulated for the forestry sector. Second, there is a lack of interaction with other sectors and third, the support of new and risky projects is missing.

Following from these analysis results, the most important recommendation for forestry policy-makers would be to develop comprehensive innovation policies for the sector. Financial measures would be one pillar of such an innovation policy. Other pillars would include informational means and co-ordination efforts. Funding programmes to foster innovation activities in forestry should be re-designed along innovation support principles, such as the following:

1. Support seed financing: If financial means are provided to foster innovation, they should be granted on the basis of the principle of "seed funding". This means that a successful innovation should be able to survive without further financial support after the implementation stage.
2. Support the development of new ideas and pilot projects: For innovations that are new to the sector a range of pilot projects should be supported from which only some may turn out fruitful. This implies a stronger risk-orientation of funds and prizes. Specific innovation funds would be oriented towards new and risky ideas.
3. Support product and services rather than process innovation: While process innovations usually aim at cutting production costs, product and service innovations react to changing demands and conditions.
4. Support human resources development: Knowledge and learning are crucial factors for the development of new ideas and the implementation of innovations.
5. Support interaction: Innovations depend on information flows between different actors. Interaction between research institutes and firms, between firms and public administration, between companies along the production chain or across sectors may generate new ideas.

Better cross-sectoral interlinkage might, among others, result in better knowledge of funding opportunities for innovation projects in forestry, also from non-forestry, or non-rural development funds.

References

Breschi, S. and Malerba, F. 1997. Sectoral innovation systems: technological regimes, Schumpeterian dynamics and spatial boundaries. In: Edquist, C. and Johnson, B. (eds.). Systems of innovation. technologies, institutions and organizations. Pinter, London and Washington. Pp. 130–156.

Edquist, C. 1997. Systems of innovation: technologies, institutions and organizations. 432 p.

Edquist, C. and Johnson, B. 1997. Institutions and organizations in systems of innovation. In: Edquist, C. (ed.). Systems of innovation. Technologies, institutions and organizations. Pinter, London and Washington. Pp. 41–63.

European Commission 2001. Innovation finance. Office for Official Publications of the European Communities, Luxembourg.

European Communities 2004. Innovation in Europe: results for the EU, Iceland and Norway. Office for Official Publications of the European Communities, Luxembourg.

Lundvall, B.-Å., Johnson, B., Andersen, E. S. and Dalum, B. 2002. National systems of production, innovation and competence building. Research Policy 31: 213–231.

OECD (eds.) 2004. Financing innovative SMEs in a global economy. Background paper for the 2nd OECD conference of ministers responsible for small and medium-sized enterprises (SMEs): promoting entrepreneurship and innovative SMEs in a global economy. Istanbul, Turkey.

O'Sullivan, M. 2003. Finance and innovation. Teari Working Paper No. 9.

Rametsteiner et al. 2005. Innovation and entrepreneurship in forestry in Central Europe. EFI Research Report 19. Brill.
Rametsteiner, E. and Weiss, G. (eds.) 2004. Innovation and entrepreneurship in forestry in Central Europe. Paper for the international conference Sustain Life, Secure Survival II. Czech University of Agriculture, Prague.

The Objectives of Funding of Forestry in Europe

Svantje Ziegenspeck

Institute of Forest and Environmental Policy, University of Freiburg, Germany

Abstract

In recent decades the discussion about "correct" funding has significantly increased, e.g. the discussion about the objectives forest policy should "really" pursue. Beside considerations about the "right" amount of funding, the question of the "right" purpose or objective is another focus.

When looking at forest funding programmes in Europe it becomes obvious that formal objectives are generally formulated rather vaguely and do not relate to quantitative goals. The purpose of this study was to develop a method that allows a cross country analysis of the objectives of forest funding programmes, and to apply this method to different European countries. The method consists of three steps: first, an identification and clarification of the objectives of forest funding programmes, second, a categorisation of the programmes and the respective funding volumes according to the Pan-European Criteria of Sustainable Forest Management and, third, a comparative interpretation of the relative importance of economic, ecological and social objectives of forest funding.

Preliminary results of the cross country analysis show that in some countries the funding programmes and the respective funding volumes largely comply with the Pan-European criteria. It is concluded that these countries aim at promoting a multifunctional forestry. In other countries there seems to be a tendency towards strengthening economic efficiency of timber production whereas in a third type of countries forest funding primarily serves ecological or social objectives.

These results are discussed in the light of the economic, ecological, and social importance of forests that may differ significantly among the countries included in the study. The analysis helps to improve the understanding of different forest funding policies in Europe.

Keywords: objectives of forest funding, Pan European criteria of Sustainable Forest Management, cross country analysis, forest funding in Europe.

Heikki Pajuoja, Ludek Sisak and Krzysztof Kaczmarek (eds.)
Evaluating Forestry Incentive and Assistance Programmes in Europe – Challenges to Improve Policy Effectiveness
EFI Proceedings No. 54, 2005

1. Introduction

The detailed accounts required for the allocation of subsidies, as well as the numerous subsidised activities obscure the actual aims of the forest subsidy policy. A clear description of the aims – which would go beyond the general objectives of the laws and guidelines – is generally lacking (compare Krott 2001; different authors in Ottitsch et al. 2002). The formulations lack precise definitions of the funding purpose and usually do not include quantifiable goals. Most of the formulations can be classified as non-operational (Gröbner 1983; Volz 1989; Thoroe 1995). Consequently it is difficult to evaluate whether or not the aims were actually achieved, and if the 'right' amount of money was spent on the 'right cause' in an 'optimal way'. The question about the 'right' objectives is gaining more and more importance (Buwal 2004).

Financing forestry is a powerful tool to induce significant changes in forestry. Objectives play a major role in policy models (and in real-world policies); they influence real-world policies via administrations. As financial resources of the public bodies decline, the demand for efficient and effective use of these resources increases. With the ongoing Europeanisation there is a growing need for comparative analysis to reveal if forestry funds are distributed equally. But the assessment of funding policies is limited mostly because of the vague and unspecific objectives (compare for example Volz 1989; Thoroe 1994).

2. Goal of this study and research question

The purpose of this study was to develop a method that allows a cross country analysis of the objectives of forest funding programmes, and to apply this method to different European countries.

The central research question focuses on the vagueness of formal objectives: If the objectives of funding forestry are not precisely defined by the legal framework, how can it be examined to what extent a forest policy serves a certain purpose or objective in different countries? The question aims to reveal, if it is possible to comment on the actually achieved objectives (implemented funding policy) although formal objectives are missing.

The study aims at developing a practicable, operational method that enables someone to carefully analyse different direct funding policies in Europe. The analysis will improve the understanding of such different forest funding policies.

3. Methodology and data

3.1 Methodology

The method consists of three steps: first, an identification and clarification of the objectives of forest funding programmes, second, a categorisation of the programmes and the respective funding volumes according to the Pan-European Criteria of Sustainable Forest Management and, third, a comparative interpretation.

Identification and clarification of the objectives of funding programmes

In the first step of the developed procedure the objectives of forest funding programmes were identified and clarified.

Table 1. Pan-European Criteria of Sustainable Forest Management.

No.	Criteria
1	Maintenance and appropriate enhancement of forest resources and their contribution to global carbon cycles
2	Maintenance of forest ecosystem health and vitality
3	Maintenance and encouragement of productive functions of forests (wood and non-wood)
4	Maintenance, conservation and appropriate enhancement of biological diversity in forest ecosystems
5	Maintenance and appropriate enhancement of the protective functions (notably soil and water)
6	Maintenance of other socio-economic functions and conditions

It was analysed, if the formal legal texts included any quantitative formulations. Also, the degree of vagueness/preciseness of the formal texts was examined. The qualitative statements were analysed with regard to preciseness of the objectives, i.e. which objectives are explicitly mentioned and which are rather implicit.

The interpretation of the results aimed at identifying the main goal of a certain funding programme.

Categorisation of the programmes and funding volumes according to the Pan-European criteria

The second step concentrated on the categorisation of the programmes and the respective funding volumes according to the Pan-European Criteria of Sustainable Forest Management.

For the assessment of funding policies criteria are missing. Most of the formal objectives are formulated vaguely, so that they can hardly be transformed into criteria. Therefore, the Pan-European set of Sustainable Forest Management (SFM) criteria was used (see Table 1).

The programmes and the amount spent on them in the period from 1990 to 1999 were in compliance with the Pan-European Criteria. Matching the programmes with the Pan-European Criteria was done by putting one single programme to one specific criterion. The programmes were categorised according to the most appropriate/accurate criterion even though certain programmes met different criteria, including social, economic and ecological aspects. This means, the categorisation focused on the main objective of the programme.

Comparative interpretation

Third, a comparative interpretation of the relative importance of economic, ecological and social objectives of forest funding was carried out. Therefore, additional data about the general and/or forestry related situation of a country was included, for example the population density, the proportion of privately owned forests, the forest area and the contribution of forestry to the GDP. Based on these data different distributions of programmes and funds could be analysed and interpreted comparatively.

3.2 Data basis

The comparative analysis is applied at the programme level, i.e. forest funding programmes. This is due to the fact, that data at other levels, for example outputs/effects of funding

programmes, are usually not available or unreliable (compare Kurki 1991; Zimmermann; Schmithüsen and Portier 1993).

Only direct funding programmes were selected. Direct funding instruments are payments that are given for specific programmes for private or public forest owners. Indirect funding covers for example special insurance grants, special taxation rules or extension services and consultancy activities. No indirect programmes were considered because of frequently fragmentary or missing data.

The time frame covers the period from 1990 until 1999.

4. Analysis and results: some case-studies

4.1 Germany

In Germany approx. 1,139 million € were spent on direct programmes between 1990 and 1999 (so-called ‘federal‘ funding).

Most of the five funded programmes in Germany complied with the third criterion. The fact that no programme was assigned to the category of criterion no. five is due to the categorisation procedure. All of the programmes complied better with another criterion when matching the content of its formal legal objectives with the indicators/specification, e.g. either the ’protective function’ was not considered to be as important as other functions or it was expressed and relied on in a rather indirect way.

In Germany, in the period from 1990 to1999 the largest amounts, altogether 34% of the total funds, were spent on two programmes meeting criterion six.. It is important to point out that all of those 34% were spent on storm damage compensation.

It can be derived that funding of forestry in Germany is related to various topics, based on the idea of multifunctional forestry. At the programme level multifunctional forestry is the major principle reflected by the funding policy. The number of programmes and funds is widely spread across the different Pan-European criteria.

This result can be put in relation to the overall situation and the meaning of forestry in Germany. Forests and forestry fulfil several functions, which can be strengthened by funding policy accordingly. Although the primary sector contributes only 0.1% to the GDP, forests of certain ownership categories are of economic importance in particular areas. Forestry also generates employment and income, especially in rural areas. As Germany is a densely populated country with 81.8 million inhabitants (230 inhabitants per km²) and huge industrial regions, the aesthetic and recreational value of forests is important to the population. The ratio of forest area per inhabitant is 0.13 ha. As Germany is partly mountainous, the need for protection forests to prevent erosions and landslides is of minor significance. However, the risk of floods is increasing and forestry is often needed to minimise this risk. In total, the general situation in Germany shows that there is great interest in multifunctional forestry. Very different forest functions must be preserved (productive, protective, recreational, ecological) which is taken into account by the funding system.

4.1.1 Baden-Wuerttemberg

Since funding policy is mainly the task of the federal states in Germany, it is also necessary to analyse the situation at this level. Baden-Wuerttemberg will serve as an example.

In Baden-Wuerttemberg approximately 299 million € were spent on direct funding programmes in the period from 1990 until 1999.

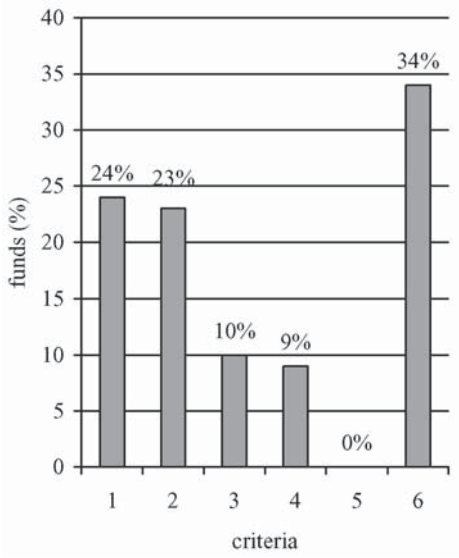


Figure 1. Allocation of funds in Germany ('federal' level).

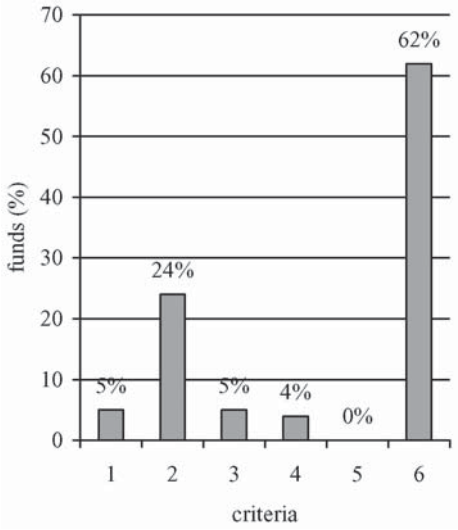


Figure 2. Allocation of funds in Baden-Wuerttemberg.

Seven programmes matched with criterion two and another six programmes complied with criterion number three.

In the period of 1990–1999 the biggest amounts of funds were spent on programmes meeting criterion six (62%) and followed by those in compliance with criterion two (24%).

In total, forestry in Baden-Wuerttemberg focused on the specific needs of the state. A special state programme in Baden-Wuerttemberg, the so-called 'forest compensation payment programme' for farm foresters, contributed especially to the high amount of money spent on the category of criterion six. Again it must be pointed out, that the funding concentrates on storm damage compensation. This reveals the seeming power of the agricultural/farmers'

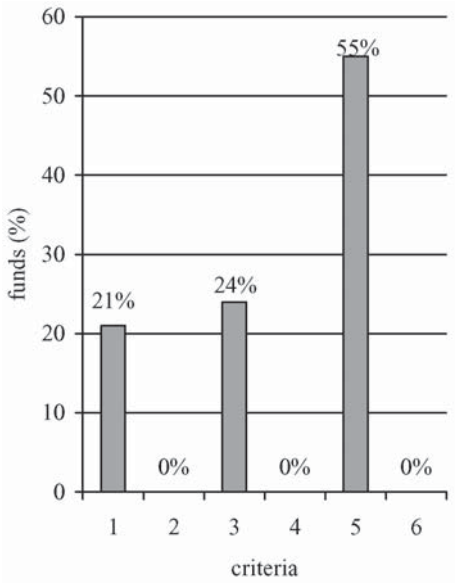


Figure 3. Allocation of funds in Switzerland.

lobby in Baden-Wuerttemberg. As Baden-Wuerttemberg can be characterised as a typical 'rural' state of Germany, this type of programme meets the needs of the region.

Programmes matching with the second criterion received 24% of the funds. Within this category most of the money was spent on programmes dealing with new forest damage. The category of criterion three especially supports programmes aimed at the tending of young stands. This is most likely due to the situation of many hectares of young untended stands in Baden-Wuerttemberg at the beginning of the 90s.

4.2 Switzerland

Approximately 1,458 million € were spent on direct measures in Switzerland in the period of 1990–1999, not including protection measures and installation works (= 467.5 million €). None of the existing funding programmes are related to a specific forest ownership category. All of the programmes can be implemented in each type of forest, bearing in mind, that 27% of the forest area is owned by private forest owners and that the share of state owned forest is only about 5%.

In Switzerland, four programmes belong to the category of the fifth criterion, which accounts for the largest amount, 55% of the total allocated funds. Three programmes match with the third criterion, receiving 24% of the total funds. Two programmes comply with criterion number one, to which 21% of the funds are allocated.

According to the number of allocated measures and the amounts of the funds, criterion five by far refers to the most important topic of Swiss forest policy. However, criteria three and one are also important.

In Switzerland especially the protective functions and the economic functions of the forest seem to be very important funding policy components. Historically, the protective function has always been of great importance in the region of the Alps. Today, the protective function of the forests in the Alps is even more important due to the higher population density and the

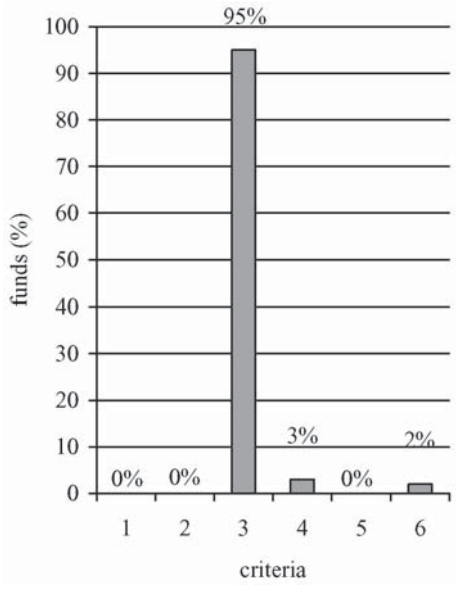


Figure 4. Allocation of funds in Estonia.

infrastructure (roads, villages etc.). There does not exist a nation-wide survey of protection forests in Switzerland (Limacher et al. 1999). According to a study by the UN-ECE/FAO (2000) the level of importance of Swiss forests as protection against natural hazards is high in 35% of the forested area, medium in 50% and low in the remaining15% of the Swiss forest area.

One explanation for the comparatively high amounts of funding for measures focussing on the economic function (sale, access, etc.) of the forestry sector is the discussions about the forest die-back in the 1980s. These discussions resulted in two federal resolutions: in 1984 to protect the forest against damage and the Federal resolution for the preservation of the forests in 1988.

4.3 Estonia

In Estonia between 1990 and 1999 roughly 1.8 million € were spend on direct programmes. There do not exist any programmes which support public forests. One has to keep in mind, that in the given period Estonia had a much lower economic power than most of the other European countries.

There are only three programmes altogether: one matched with criterion three, one with four and one complied with criterion number six. The remaining criteria were not chiefly met by any programmes.

The biggest amount was spent on the programme belonging to the category of criterion three, ‘introduction of silvicultural management plans’.

From these initial results it can be concluded, that especially the funding policy primarily supports the economic/production function of forests. As there are no funds for public forests in Estonia (100% of the funds are allocated to private forests), strengthening private forest enterprises is one major aim of the national forest policy.

Altogether 24% of the total forest are privately owned and another 38% have been privatised or restored. Therefore, private forestry is indeed important within the forestry

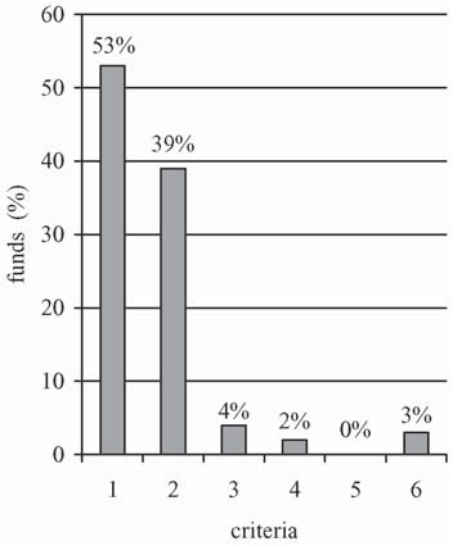


Figure 5. Allocation of funds in Poland.

sector in Estonia. Even if only 1.4% of the working population are employed in the forestry sector, it is still a comparatively high number within Europe.

Forestry contributed 2.7% to the GDP in 1999, which is a high figure compared with other European countries.

Estonia has 1.4 million inhabitants (31 inhabitants per km²) and a ratio of forest area per inhabitant of 1.5 ha. Consequently, the recreational aspect does not seem to be of great significance yet. Funding policy rather seems to follow the new spirit of gaining profit and puts emphasis on training and planning programmes.

4.4 Poland

Poland spent about 119 million € on direct programmes in the period 1990–1999. The greater part (83%) of the country's forests is owned by public authorities, mostly managed by State Forest Holdings.

Of the total funds 89.9% were spent on public forest programmes.

Two programmes were assigned to criterion one, whereas no programmes matched criterion five. In the case of the remaining criteria one programme complied with each criterion.

In the period from 1990 to 1999 more than half of the total, namely 53%, was spent on a programme matching the first criterion. This is followed by the programme, which is in accordance with criterion two, amounting to 39%. The rest of the criteria each accounted for less than 5% of the total funds.

According to the allocation of funds according to the Pan-European criteria, Poland's funding strategy seems to be based on the principle of multifunctional forestry. But, the distribution of the funds according to the different criteria rather focuses on only a few objectives (criteria one and two).

Both programmes which comply with the first criterion concentrate on afforestation. Funding of afforestation in Poland is of importance because of the high proportion of marginal agricultural land and to compensate for decreasing agricultural subsidies.

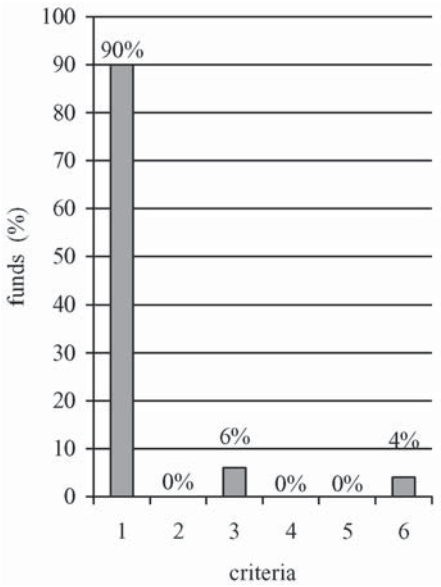


Figure 6. Allocation of funds in Belgium.

The 'stand conversion' programme (assigned to criterion 2) was implemented in the 90s to counteract, compensate or prevent forest damage.

The primary sector accounts for 0.4% of the country's GDP, accordingly forests are of minor economic importance. Of the Polish working population 0.4% are employed in the forestry sector. The proportion of 17% of private forest ownership stresses that the important role of state forestry in Poland.

With 38.7 million inhabitants (123 inhabitants per km²) the aesthetic and recreational value of forests can be interpreted as important to the population. The ratio of forest area per inhabitant is 0.23 ha.

4.5 Belgium

Between the years 1990 and 1999 approx. 67 million € were spent on direct programmes in Belgium.

Most of the programmes, altogether four, were matched with the third criterion. Three programmes were assigned to criterion number one and six.

There were no programmes which mainly complied with the criteria two, four and five.

By far the largest amounts were spent on programmes belonging to the category of criterion one (90% of the total funds). Three of the four Belgian programmes matching with criterion one aim at the expansion of forested land: 'afforestation of agricultural land 2080/92', 'afforestation and reforestation' and 'purchasing new (forest) land'. This issue is of significance to Belgium (especially Flanders) as it does not have a lot of forest area. There is a need for afforestation and the preservation of already existing forests. As reforestation and afforestation programmes are very costly at the beginning, it can be assumed, that it is the purpose of the government to support private forest owners, as well as public owners who would not be able to carry out such programmes otherwise.

As the share of small-scale private forest owners is considerably high in Belgium, there is a focus on optimising forestry within this forest ownership category by funding alliances and building forest roads. The great majority of private owners possess only a few acres to a few hectares. The Belgian forest is extremely fragmented. In Flanders 70% of the fragments extend over less than 10 ha and 14% even less than 1 ha. Due to the numerous private owners, the average area of a private forest in Wallonia is 2.7 ha per owner. However, more than half of the private properties cover less than 1 ha.

Belgium has 10.3 million inhabitants with a population density of 339 inhabitants per km², which is very high. The capital region is the most densely populated, with 6,147 inhabitants per km² followed by the Flemish region with 443 inhabitants per km² and the Walloon region with 200 inhabitants per km². The total forest area in Flanders is about only 14,6000 ha. Recreational forest areas are limited. Moreover, 70% of the forests were privately owned in the period 1990–1999 and inaccessible for recreation (a Forest Decree of the year 1999 aimed at changing the right of access to forests, but so far no private forests have been made accessible to the public). It is unclear how much of the remaining public forests (about 44,000 ha) are open to the public. A lot of the state forests are military property.

The general situation shows, that programmes dealing with recreation and afforestation play a significant role in Belgium.

In the period 1990–1999 there were no programmes which complied with the criteria two, four and five. Only recently programmes, which focus on the ecological function, also receive funds. There is no funding for programmes with an emphasis on the protective function yet. This may partly be due to a shortage of public resources in general. Also, for most of these functions there are certain regulations.

4.6 France

In France approximately 2,510 million € were spent on direct programmes between the years 1990 and 1999. In general, the French state controls the forest sector more rigidly than other countries (where state control over communal and private forests may be less important). To compensate for the high degree of control and the obligations, the state elaborated an extended set of financial assistance.

Most of the programmes (eight) were assigned to criterion three.

By far the biggest amounts were spent on programmes matching with criterion six. Roughly 1,435 million € of the total were given to programmes dealing with storm damage.

Because of the geographical conditions, there is also a great need for protection programmes in France, for example protection against forest fires and maintaining forests with protective functions. Mountain forests are very important in France. This explains, why approx. 541 million € were spent on programmes, which can be assigned to criterion five.

The contribution of the forest products to the GDP is around 0.2% throughout the whole period. In the forestry sector employment amounted to 2.12% in 1997 (475,469 employees in total). It should be emphasised that most of these jobs are found in rural areas. This underlines the importance of the timber sector both in a general context of employment policy and in the context of regional development policy. This explains why authorities and economic agencies pay so much attention to forestry: in order to guarantee the continued existence of economic conditions favourable to the sustainable management of French forests. Any possible shift or reorientation of forest policy must take into account the impact it may have on employment.

In 1999 France had 58.5 million inhabitants. The population density is around 106 inhabitants per km² and there are 0.26 ha of forest area per inhabitant. This ratio is slightly

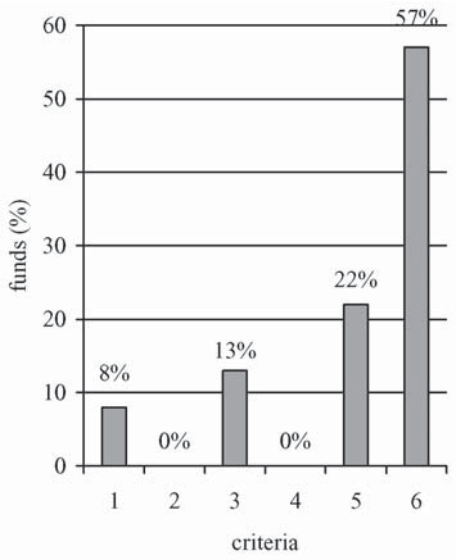


Figure 7. Allocation of funds in France.

below the European average, which is 0.30 ha per inhabitant. The funding policy reflects that there is a need for improving recreational functions of forests in France.

The general funding situation in France shows that there is a great interest in multifunctional forestry. The funding system meets the great need for protecting the different forest functions (productive, protective, recreational, ecological).

4.7 Finland

Approximately 1,188 million € of national and EU funds were spent on direct programmes in the period 1990–1999 (in 1999 prices, cost-of-living index).

In Finland programmes complying with the criteria one, three and four were granted almost equal funds, each receiving approx. 30% of the total.

Of all programmes, eight were assigned to criterion four and seven to the first criteria. Altogether five programmes matched criterion number three.

Smaller funds were given to the two programmes assigned to criterion six. A single programme complied with each the second and fifth criterion. These two received the lowest amount of money (in relation to the other programmes the amount was so little, that it is not marked in figure 8). Programmes often have overlapping objectives, which cannot be separated from available data. For instance, criterion one includes tasks, which could also apply to criteria two and five: Reforestation after storm damage belongs to criterion two and forest planning includes ecological mapping, which would match with criterion five.

Productive functions of forests are important in Finland due to the great contribution of forestry (2.4% of GDP; 1% of employment) and wood-based industries (5.2% of GDP, 3% of employment) to the Finnish economy. Recreation in forests is ‘everybody’s right’, which does not require any private or public financing. Still, public supply of recreation areas with good infrastructure is seen as an important additional service to the general public. At the same time, natural conditions in Finland are harsh, especially in the cases of forests on peatlands

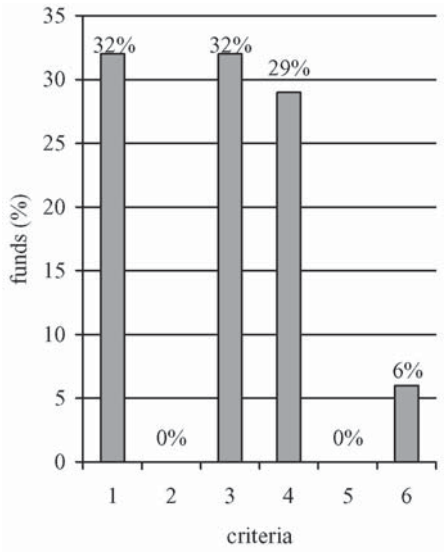


Figure 8. Allocation of funds in Finland.

and in the northern parts of the country. This is seen in both criteria one and three. In agriculture, afforestation is mostly understood as a tool to reduce agricultural production, but a very poor tool to promote rural development and employment.

In Finland large funds are allocated to nature conservation. This is due to the vast amount of forests in the country (66% production forest), the large number of non-industrial private ownership (61%) of production forests and the high timber and land values of the conserved sites, which must be compensated for. This complies with criterion four. Even the supported traditional rural biotopes connected to agriculture contain 60% of wooded land used as pasture, the rest being meadows etc.

The low level of funding for programmes matching with criterion two is because of the acidification and air pollution, which are not general problems in Finland but are geographically very restricted. At the same time, forestlands suffer from nutritional imbalance especially on drained peatlands and afforestations on former fields.

5. Discussion

5.1 Discussion of the method

Weaknesses

- Not all of the programmes could be included into the analysis. Example: In Germany, only the federal direct funding programmes were considered, as data about programmes at the state level was not available in an appropriate quality. The results may be altered strongly by omitting important programmes due to missing data.
- Only direct funding programmes were taken into consideration. The results would be different if, for example, tax concessions were included.

- Only formal or legal objectives were taken into account. Nevertheless financing policy is likely to be influenced by informal policy goals.
- This study made use of a generalising subsuming classification system, because the complex field of funding policies demands abstract and simplified scientific procedures. Subsuming is based on certain indicators. It is difficult to say, whether the indicators lead to reliable results, as there may be some unknown important factors, that fell out of the scheme of indicators by choosing a subsuming approach.
- The programmes were only assigned to the various criteria according to a definite categorisation, meaning that one programme and its funding volume referred to one specific criterion. The results may have been different if a weighted categorisation had been carried out, meaning that one programme and its funding volume could comply with more than one criterion. A definite categorisation is difficult, as most of the funding programmes match with different criteria at the same time. Example: the afforestation programmes have effects on the income of the owner, the reduction of agricultural surplus, the change of scenery, the growing stock, the CO_2 sequestration, the greenhouse effect, the genetic pool, the payment of subsidies in agriculture, erosion, water balance and evaporation.
- There are 'special programmes' which receive very high amounts of funding. These programmes have a great influence on the results. This can be illustrated by analysing the situation in Germany by including of leaving out the programme 'coverage of storm damage'. This programme was granted the largest amounts and was assigned to criterion no. six. Thereby, this particular criterion becomes very significant, although it is only represented by one single programme due to a very specific event (storm).

Strengths

- The Pan-European criteria seem to fulfil the needs of the research because they encompass ecological, economic and social issues, which are often included in funding policies. Originally used for the assessment of sustainability, in this research the SFM criteria are used as a reliable system of criteria. The 'Pan-European criteria and indicators' are a result of the MCPFE-process, which does not necessarily reflect EU-interests. But it is possible to make use of the criteria for an inner European comparison, because the EU itself (e.g. 'EU Forest Strategy') uses MCPFE-C&I and other documents. The Pan-European criteria can be applied to different economic and institutional conditions and are suitable for implementations at the national level (BUWAL 1999).
- This is a simplified approach to provide an impression of different funding objectives in real funding policy. The approach presented in this paper makes it possible to compare different implemented funding systems. The aim was to identify a rather simple approach to a rather complex matter. The procedure combines qualitative elements (the formal objectives and its interpretation) with quantitative elements (amount of funds, number of direct programmes) in an operational way. The transparent methodological framework leads to statements about the real world situation, which can be discussed in a broad scientific and practicable way, even though the data basis is sub-optimal.

  The results of this procedure serve as a basis for hypotheses rather than for testing certain theories. In any case, the methodological framework makes the procedure and its outcome very transparent.
- It becomes clear, which goals were funded to what extent. Therefore, such an approach may help policy decision makers to control the funding of forestry. Funding policy of a specific country is mainly based on the fact that the amount of funds is simply maintained

in the following yearly budgets, without defining superior objectives or strategies. Nevertheless, the focus on different funding policies can be made transparent by using the categorisation procedure presented in this study. The aforementioned figures show the objectives, even if there was not a formal prioritisation.

- The procedure is suitable for an inner-European comparison, without homogenising. The analysis is based on little but primary data (formal objectives, funds, direct funding programmes) at the programme level, the level which provides comparable and reliable data . The approach presented in this study makes it possible to compare different countries, which have almost complete overviews of their direct funding programmes, according to the quality and priorities of their funding policies.
- The analysis enables further research for example by suggesting alternatives. It would be possible to assign the direct programmes not only to one criterion but also to split it up and assign it to several criteria, for instance, or to split the amount of funding among more than one criterion or indicator. 'Weighted' variants could be developed and the results could be compared with the 'single category' procedure.

  Matching the programmes with the criteria is crucial for the results of this study. They can be categorised by making use of the Delphi-method or an Expert-hearing process. Instead of assigning the programmes to the Pan-European criteria and indicators by taking the existing formal objectives of the programmes into account, expert hearings or the Delphi procedure could have been used.

5.2 Discussion of the results

By identifying, how many programmes belong to which criteria in each country and how much money is spent a first insight into which criterion is favoured by forest policy practice can be gained. Preliminary results show that in Germany and Switzerland the funding programmes and its funding volumes are more or less equally distributed according to the Pan-European criteria or cover at least most of the criteria. They emphasise multifunctional forestry. In Estonia there is a tendency towards supporting private forestry, hence a focus on creating profits becomes apparent. In France there is an emphasis especially on the environmental, recreational and protective functions of the forest. In-between these different superior funding goals (multifunctional forestry, economisation, environmental and recreational tasks), there are countries that do not have a clear focus, for example Poland, which supports different objectives unevenly.

These results must be put into the specific context of each country, for example, different societal needs, different topography or special circumstances (such as forest fires). These can help to better understand the implemented policy practice in the field of funding. Forest policy decisions are made within the context of each country and may help to understand similarities and differences with regard to the development and design of forest funding programmes.

Different countries have different needs, for example:

1. the need/desire to strengthen the economic/production function of the forest (for example Estonia);
2. the need/desire to strengthen the socio-economic function of the forest in terms of preserving (small-scale) forest enterprises and the number of employees especially in farm-forestry (for example Germany);
3. the need/desire to strengthen the recreational and public welfare function of the forest (for example Belgium);
4. the need/desire to strengthen the protective function of the forest (for example Switzerland and France).

6. Conclusions, recommendations, further research needs

A rather 'open' interpretation of the results is feasible. On the basis of the presented approach certain funding patterns can be carefully interpreted against the background of different characteristics of forests and forestry (economic and social relevance of public and private forests). Partly a comparative analysis of the different priorities of funding forestry can be done, if the necessary data is available and (almost) complete.

The definition of clear objectives that comply with forest policy seems to be necessary to improve the effectiveness and efficiency of funding.

For identifying these objectives, the following questions must be discussed and/or should be subject to further research:

- Which goals should be achieved in a specific country/a specific region? (for example: maintenance of the cultural landscape, profit-oriented forestry, etc.)
- Who can/should/wants to carry out these programmes? Which objectives can serve different types of forest owners? How can different forest owners be motivated, and how can their motivation, their skills and knowledge be taken into account when trying to achieve certain objectives?
- What should be paid for (for example: compensation payments, which pay for the costs that arise due to the right of access to forests, or payments that aim at achieving sustainable forestry, including biological diversity)?
- When are state interventions in forestry justified?

Acknowledgement

The author likes to thank Mrs. Priska Baur for inspiring discussions about the design of the methodological approach.

References

Agrarian reports of the Federal State of Germany for the years 1990–1999. http://www.verbraucherministerium.de.

Baruffol, U., Baur, P. T. et al. 2003. Evaluating Financing of Forestry in Europe. Country Report Switzerland. EU-Project. Birmensdorf, Federal Institute of Forest, Snow and Landscape Research (WSL)**.** 121 p.

BUWAL 1999.). Sustainability Assessment of Swiss Forest Policy. Background Report. Bundesamt für Umwelt, Wald und Landschaft (BUWAL); Swiss Agency for the Environment, Forests and Landscape (SAEFL). Environmental Documentation No. 120. Bern. 194 p.

BUWAL 2004. Forstliche Förderung in der europäischen Union. Basler & Hofmann. Zürich 2004.

Deutscher Bundestag (ed.) (2002). Rahmenplan der Gemeinschaftsaufgabe "'Verbesserung der Agrarstruktur und des Küstenschutzes'' für den Zeitraum 2002–2005. Drucksache 14/9009, 14. Wahlperiode, 06. 05. 2002. 128 p.

Gesetz über die Gemeinschaftsaufgabe ''Verbesserung der Agrarstruktur und des Küstenschutzes'' vom 3. September 1969 (BGBl. I. p. 1573), i.d.F. der Bek. vom 21. Juli 1988 (BGBl. I p. 1055), zuletzt geändert durch Gesetz vom 11. November 1993 (BGBl. I p. 1863).

Gröbner, B. 1983. Subventionen – eine kritische Analyse. Göttingen: Vandenhoek & Ruprecht. 368 p.

Krott, M. 2001. Politikfeldanalyse Forstwirtschaft: Eine Einführung für Studium und Praxis. Parey Buchverlag. Berlin. 254 p.

Kurki, M. 1991. Untersuchungen zur Förderung der Forstwirtschaft in Baden-Württemberg. Mitteilungen der Forstlichen Versuchs- und Forschungsanstalt Baden-Württemberg No. 155.

Limacher, S., Kübler, D., Kissling-Näf, I. and Zimmermann, W. 1999. Sustainability Assessment of Swiss Forest Policy, Background report, Swiss Agency for the Environment, Forests and Landscape (ed.), Environmental Documentation No.120, Bern.

MCPFE 1998. Pan European Criteria and Indicators for Sustainable Forest Management. Annex 1 of the Resolution L2. Third Ministerial Conference on the Protection of Forests in Europe, Lisbon/ Portugal.

Ottitsch, A., Tikkanen, I. and Riera, P. (eds.). 2002. Financial instruments of forest policy. EFI Proceedings 42. European Forest Institute. Pp. 139–150.
Thoroe, C. 1994. Förderung des Kleinprivatwaldes. Allgemeine Forstzeitschrift 50(17): 914–917.
Thoroe, C. 1995. Forstliche Förderung und Marktwirtschaft. In: Private Marktwirtschaft – Chancen und Herausforderungen für die mittel- und osteuropäischen Länder. Mitteilungen der Forstlichen Versuchs- und Forschungsanstalt Baden-Württemberg no. 186. Freiburg. Pp. 121–131.
UN-ECE/FAO 2000. Forest Resources of Europe, CIS, North America, Australia, Japan and New Zealand (Industrialized Temperate/Boreal Countries) UN-ECE/FAO Contribution in the Global Forest Resources Assessment 2000: Main Report. 468 p.
Volz, K.-R. 1989. Die Förderung der Forstwirtschaft – Konzepte und Perspektiven. In: Forstwissenschaftliches Centralblatt 108(2): 83–95.
Zimmermann, W., Schmithüsen, F. and Portier, L. 1993. Untersuchung staatlicher Fördermaßnahmen auf dem Gebiete des Forstwesens in der Schweiz, im benachbarten Ausland und in der EG. Forstwissenschaftliche Beiträge der Professur Forstpolitik und Forstökonomie. Eidgenössische Technische Hochschule, Zürich. 198 p.

European Forestry Incentive and Assistance Measures

Olga Zyrina and Krzysztof Kaczmarek

European Forest Institute

Abstract

Assessing domestic and international impacts of government support measures requires transparency and comparability of the reporting systems at national and international level. In the EFFE-project, data has been collected according to a specially designed questionnaire. Applying uniform data-collection format revealed several limitations in the availability and comparability of programme monitoring and evaluation information. Within the scope of the study there have been both EU and national forestry assistance and extension programmes, directed to private forest owners as well as financing of projects implemented in public forests. The data covering the period of 1990–1999 was gathered by project partners representing thirteen European countries. This information has also been documented in the Internet based database. In this paper we present the project results related to the data collection outcomes. This involves an overview on the types of activities supported, the economic instruments used, the level of financing, beneficiaries, and outputs of forestry incentive and assistance programmes in Europe.

Keywords: forestry incentives, forestry assistance, programme monitoring.

1. Introduction

This paper introduces an overview of European forestry assistance and incentive programmes of the 1990s. The overview is based on the data collected within the research project titled Evaluating Financing of Forestry in Europe (EFFE). The project was carried out from December 2000 to November 2004 with the financial support from the Commission of the European Communities (DG Research – Quality of Life and Management of Living Resources Programme, contract number QLK5-CT-2000-01228). The EFFE research consortium included sixteen organisations representing thirteen European countries (Belgium,

Heikki Pajuoja, Ludek Sisak and Krzysztof Kaczmarek (eds.)
Evaluating Forestry Incentive and Assistance Programmes in Europe – Challenges to Improve Policy Effectiveness
EFI Proceedings No. 54, 2005

Czech Republic, Estonia, Finland, France, Germany, Netherlands, Norway, Poland, Portugal, Slovenia, Spain and Switzerland):

- European Forest Institute (project co-ordinator)
- Czech University of Agriculture
- Estonian Agricultural University
- Finnish Forest Research Institute
- Bundesforschungsanstalt fuer Forst- und Holzwirtschaft (Hamburg)
- Alterra BV - Institute for Forestry and Nature Research
- University of Ljubljana
- Centre Tecnològic Forestal de Catalunya
- Professur Forstpolitik und Forstökonomie ETH Zûrich
- University of Ghent
- University of Joensuu
- Albert-Ludwigs-University of Freiburg
- Forest Research Institute of Warsaw
- Universidade Católica Portuguesa – Centro Regional do Porto
- Agricultural University of Norway

The first project year was devoted to the development of adequate data collection framework based on the survey of programme evaluation methods and forestry funding measures. The project research strategy was presented and discussed at the project led International Conference in Rovaniemi, Finland (17–20 June 2001). In 2002, the EFFE partners carried out data collection at national levels, which has then been reported in country level reports. The third and fourth project years were dedicated to data analyses, including programme efficiency and equity, effectiveness and implementation analysis. The preliminary project results were discussed with forest policy experts at International Workshop in Geneva (10 May 2004), whose comments are to be included in the research report. The project results were then presented and discussed at the International Conference organised by the European Forest Institute and Forest Research Institute in Warsaw ('Evaluating Forestry Incentive and Assistance Programmes in Europe – challenges to improve policy effectiveness', Warsaw, 10–12 October 2004). The dissemination of results takes form of final research report together with its extended executive summary, conference proceedings, scientific articles, and project website with Internet based database.

In the following chapters, we first present the objectives of the EFFE research project, explain data collection and documentation methods as well as review major limitations of the study. Next, we present data collection outcomes with regard to types of forestry activities supported and economic instruments applied, the level of financing, programme beneficiaries, and outputs. This review is then followed by the project led proposal for building up comprehensive and internationally comparable information system on government support to forestry.

2. Project objectives

The main objectives of the EFFE project were to assess European forestry funding mechanisms, provide information for designing public intervention policies as well as to contribute to the development of related evaluation tools. There have been studied EU and national forestry assistance and extension programmes of 1990–1999, implemented both in private and public forest sector.

The assessments addressed two main purposes of programme evaluation: (1) improving programme implementation and management, and (2) identifying its actual effects or revealing the 'value' of a programme (accountability or transparency needs).

The assessments that focused on enhancement of programme implementation (formative evaluations) were mostly confined to initial programme achievements (outputs). Screening of the programme implementation mainly relied on the information provided by monitoring systems. Where the intended effects could not be fully measured at the mid-term stage of programme implementation (i.e., particular indicators couldn't be quantified), the assessments tried at least to verify the extent to which the initial steps of the delivery mechanisms have been engaged by the programme. Such a situation is, in fact, characteristic of public intervention programmes in forestry, which often will not produce their expected effects in the short or even in the medium term.

While formative evaluations are of direct interest to programme managers, the so-called summative evaluations are also conducted for the benefits of those, who are not directly involved in the management of a programme. By producing judgements on programmes' accomplishments, summative evaluations help to enhance accountability and transparency. They are thus of interest to a broad group of stakeholders including programme supporters and opponents as well as ordinary citizens. Such evaluations typically examine programme impacts, economic efficiency, effectiveness, cost-effectiveness, and other associated issues such as equity aspects.

As regards the accountability purpose, the EFFE project focused on programme effectiveness (the degree to which programmes produce their desired outcomes), economic efficiency and equity aspects as well as cost-effectiveness (public versus private actions to achieve forest policy goals). The evaluations of the effects of forestry related funding policies took into account economic, social and environmental sustainability criteria. The findings should allow decision-makers to arrive at judgements about programmes' value (accountability) and also, more generally, provide information about programmes within their own specific contexts. The assessments of economic efficiency can help to improve allocation of financial resources by informing decisions about transfer of resources away from inefficient or ineffective programmes towards programmes, which are more efficient and more in tune with the evolving societal aims and objectives, both at national and EU levels.

3. Material and methods

3.1 Data collection framework

In the thirteen European countries studied, the data at national level has been collected using uniform questionnaire. The questionnaire was designed with a view to the subsequent analyses, i.e. effectiveness, efficiency and implementation analysis. In general, evaluation of government support measures was based on 1) the assessments of the intervention costs to government, and 2) the evaluation of the intervention effects on society.

The data collection questionnaire contained separate tables for private and public forest owners. The tables for private forest ownership were designed according to the types of policy instruments used: financial means (grants, compensations), tax concessions and technical assistance instruments (extension services, assistance in kind). The examined variables involved programme objectives, beneficiaries, inputs and outputs. The information collected for public forests included costs of management of publicly owned forests,

especially costs related to actions, which deviated from market behaviour (e.g.: supporting activities in case of catastrophic events) as well as their outputs.

The main data sources used by project partners were the administrative records, such as programme documents and monitoring systems (the so-called secondary data, i.e. the data that did exist already). These sources have often provided sufficient data (financial information about the inputs as well as information about the outputs) for mid-term effectiveness evaluation and for economic efficiency analysis (cost-benefit analysis). It is therefore important to have a well-designed monitoring system. Other secondary data included relevant legislation, national statistics, surveys and previous programme evaluations. The legislative documents were often used to identify policy and programme objectives. National statistics provided information concerning contextual situation for a certain area (country/region) or type of activity supported. Previous evaluations and scientific literature proved to be very useful in identifying information such as coefficients used in transforming of available monitoring information into result/impact indicators. Based on the exiting evaluation and research results, project partners developed data analysis frameworks ('guidelines'), which have then been employed in identification and quantification of economic, environmental and social effects (medium- and long-term programme impacts). The *ad hoc* collection of primary data has been carried out for implementation analysis, externalities and forest owners' objectives. Here, the data collection methods included questionnaires and interviews.

3.2 Data documentation

The data documentation generally consisted of three separate collections: 1) country level reports, 2) Internet based database, and 3) final project report. The objective for organising and documenting the data collected for the case studies was to make it readily retrievable for later inspection or research. The main components of the database are tabular materials, mostly numerical data as well as brief descriptive information. The evidence collected for the case studies can be both reviewed directly in the database and in the written reports. The database records are linked to the country level reports, which are also available in the Internet. The country level reports present case study evidence in the form of tabular materials and narratives. The documents and data sources of country level reports are listed in their references, so that other persons could retrieve them efficiently. The final report still involves enough data, so as to allow the readers to draw independent conclusions about the study.

The database contains the information on the costs and outputs of forestry assistance and incentive programmes implemented in the countries studied in the 1990s. This database was developed with a view to provide an Internet based information service. Its user interface consists of two sets of queries providing general and more detailed information. The first set of queries displays a list of forest management activities addressed by forest policy, such as afforestation, stand improvement or forest protection to choose from. By selecting one of these activities, there can be extracted some general information on programme objectives, legal reference and eligible target groups concerning different types of economic policy instruments contained in this database and used in this area of forest policy. The other set of queries gives more in-depth information regarding the following programme variables: inputs (administrative, private and net financial costs), target groups (number and characteristics of beneficiaries), and outputs (type and quantity of goods and services produced by a programme).

The project database has a potential for further development into regularly updated information service constituting part of European forestry funding information system. This issue is discussed in more detail in Chapter 5.

3.3 Limits of the study

Applying uniform data-collection questionnaire has revealed several limitations in the availability and comparability of programme monitoring and evaluation information. In addition, as observed at national level, the complexity of public support measures implemented over the years through a variety of administrative channels significantly reduces transparency and straightforward quantification and assessment of their multiple impacts.

Regarding limitations in the availability of programme monitoring data, there have been observed, *inter alia*, the absence of detailed information on financial and administrative inputs broken down into types of activities supported and beneficiaries categories, lack of comprehensive records on output indicators and numbers of beneficiaries. Furthermore, the information was sometimes available only at local or regional level, without being aggregated at national level. It would thus be seen essential, both for reporting and assessment of government forestry intervention programmes, to set up comprehensive monitoring systems similar to those implemented by the European Commission (EU-DG Agriculture, 2002). Apart from pure monitoring indicators, there could also be arranged additional indicators that would gather information facilitating ex-post programme evaluations.

At an international level, data collection and analysis problems have been compounded by the diversity of institutional settings, including different forms of subsidy schemes (grants, tax allowances, assistance in kind) and the absence of common measurements of absolute and relative amounts of public support (gross government expenditures or net costs). These considerations emphasise the need for systems of information, which are based on common reporting and accounting principles, so as to allow international comparisons.

4. Results

The EFFE team was able to collect the information on 287 programmes in 12 countries, which was presented in EFFE Country Reports and will be summarised in the project Final Report. Norway joined the project late in the project lifetime, and at the time of writing this summary, their report was not yet available. Also, 33 of the programmes related to taxation instruments are not being analysed and presented here, but will be included into the final project report.

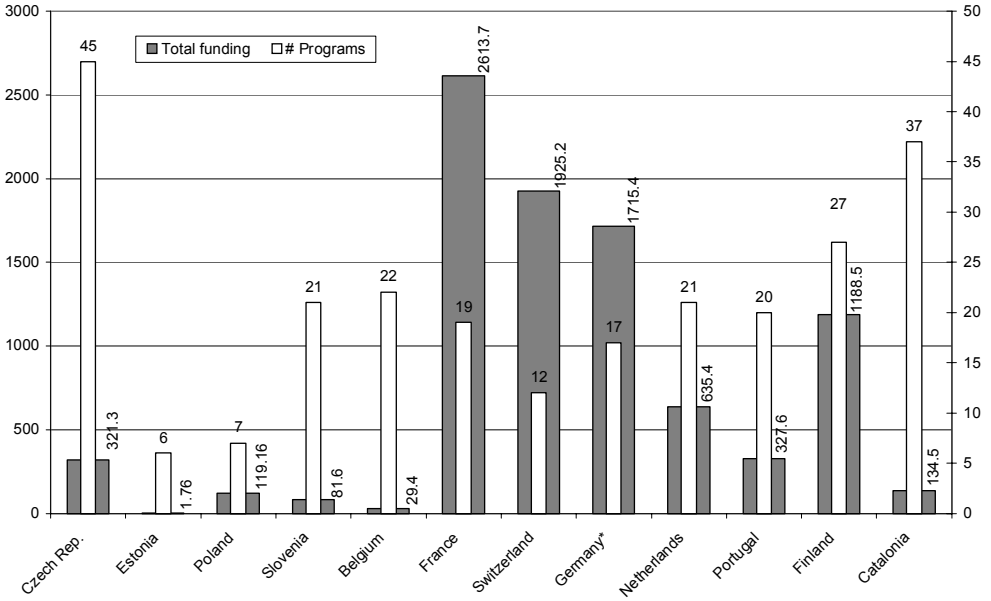
The German program of ‘Special agricultural social insurance system’, in which the Federal State pays grants to the respective agrarian insurance companies, and the insurance companies in turn reduce the contributions for the actively insured persons with help of the public support (effective incidence), was excluded from the following summaries. This program constitutes more than a half of all the forestry related funding in Germany and even by itself is much greater than total forestry funding in many other European countries.

Without the German social insurance program, the number of programs included in further summaries varied from 6 in Estonia to more than 40 in Czech Republic.

It would be also important to mention, that it was impossible to cover every single programme of forestry financing, but the data collected is the first such comprehensive attempt on the European scale.

4.1 Inputs

The inputs consisted of administrative costs, private cost (share), and net financial cost. Collecting the data on administrative costs and private share of costs presented considerable



* - Germany's social insurance program is not included here, as it is not comparable to other countries (also in the amount of funds involved)

Figure 1. Funding and number of programs 1990–1999, mill. euro (tax concession and exemption programs are not included).

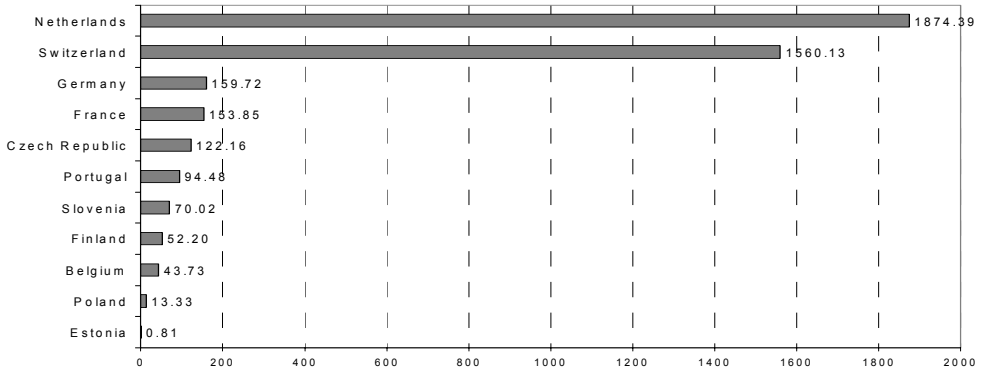


Figure 2. Financing per hectare of forest 1990–1999, euro/ha.

difficulties in many countries, and in numerous cases no estimates for them were found. This section presents the amount of funding spent in each EFFE country, its sources, and allocation to beneficiaries.

The total forestry funding during the period of 1990–99 varied from 1.76 million euro in Estonia to 2.6 billion euro in France (Figure 1).

Relating the EFFE data with the forest and other wooded land area of the TBFRA 2000 Report (United Nations 2000), gives an estimate of the average financing in euro per ha of forest (Figure 2).

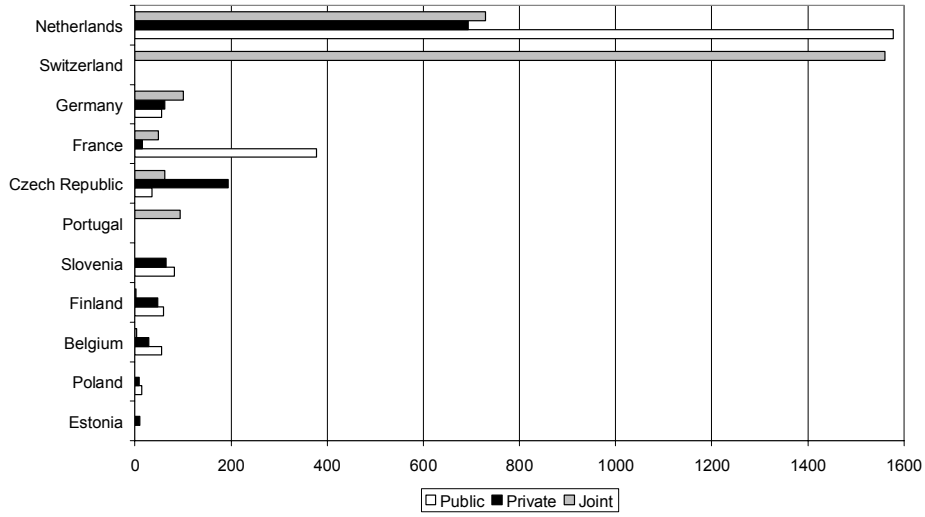
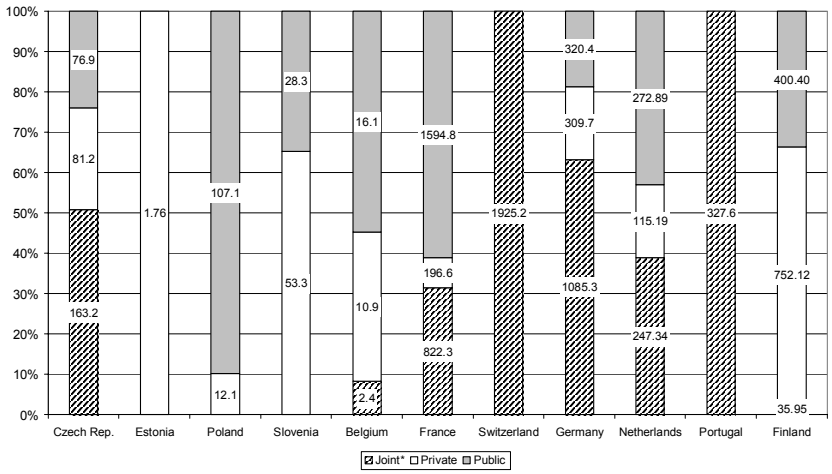


Figure 3. Financing per hectare of forest for private, public and joint categories of beneficiaries, euro/ha.



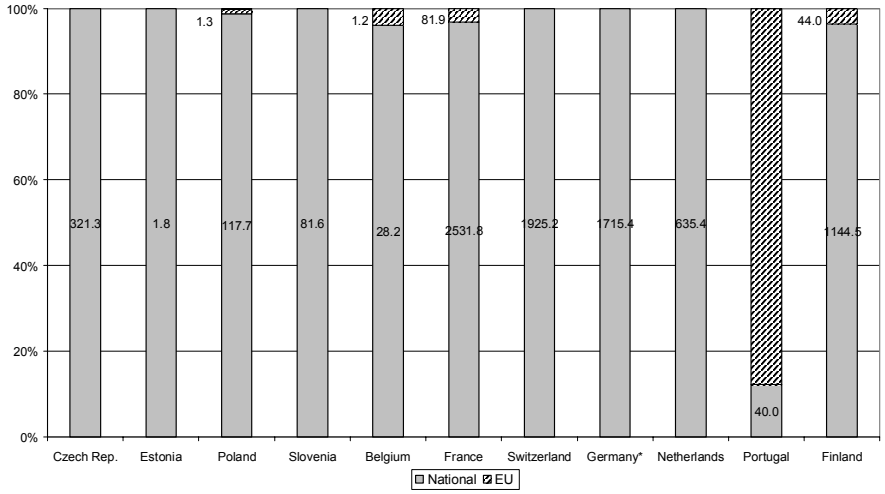
* - Joint programs are directed on both public and private forest owners

Figure 4. Distribution of funding (1990–1999) by ownership type supported.

The financing greatly varied from an average of 0.81 euro/ha in Estonia to 1560.13 euro/ha in Switzerland and 1874.39 euro/ha in the Netherlands.

Having the information on the financing to private or public beneficiaries, we also estimated how financing varies between those groups. For these calculations we used private and public forest and other wooded area meanings from the TBFRA report (United Nations 2000), and for the joint category, which includes both public and private beneficiaries, the total forest area was used (Figure 3).

Among the variables collected, the EFFE database included information on the distribution of financing by the ownership types supported (Figure 4).



* - EU funding in Germany is given through Laender

Figure 5. Distribution of funding 1990–1999 by source of financing, mill. euro, %.

Most of the programmes were specifying what type of beneficiaries they are directed to, however in Portugal and Switzerland, all programmes were intended to all types of forest owners and tracing how much funding was given to each ownership category at the aggregate or national level was not possible.

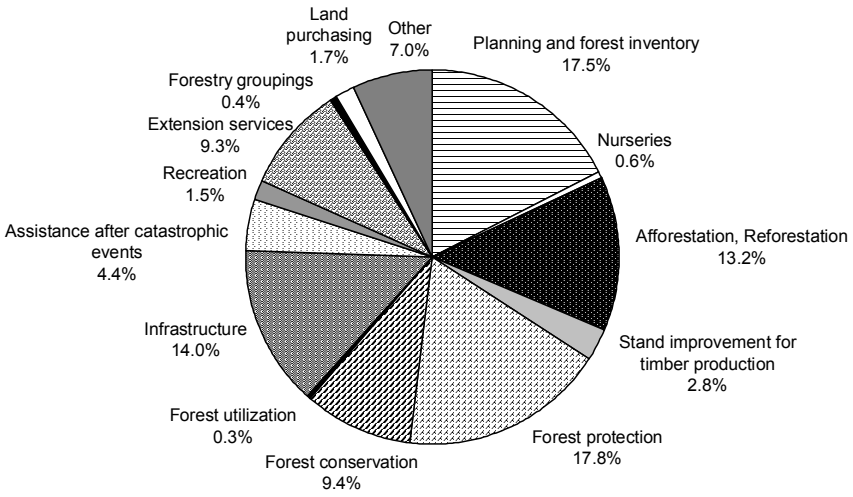
The source of financing was another important point in data collection. To make a picture more clear, we divided all sources of financing into 3 groups: national, EU, and international (Figure 5).

It should be noted that in Germany (federal country), the EU funds were distributed through the states (Laender) and were not recorded at the federal level. As an example of international funding, there can be mentioned forestry financing received from the World Bank in Poland for the ecological education programme.

4.2 Types of activities supported

Within the EFFE project, the list of the following supported measures was developed:

1. Planning and forest inventory (programmes supporting development of forest management plans, definition of annual allowable cuts, and of silvicultural and forest protection measures);
2. Nurseries (seed production from seed orchards, provision of seeds and planting material);
3. Afforestation (including Regulation 2080/92);
4. Reforestation (natural and artificial regeneration);
5. Stand improvement for timber production (pruning, thinning, conversion of coppices);
6. Forest protection (before and during the disturbance like fire, disease, insects, floods, soil erosion, game, avalanches, snow, wind, air pollution / mitigation by fertilizer);
7. Forest conservation (wildlife, biodiversity, carbon sequestration, stand stability, protective forests);



* - no Portugal, Spain, Norway

Figure 6. Distribution of funding (1990–1999) by measures for 10 EFFE countries.

8. Forest utilization (timber cutting and transport, non-timber products, marketing, certification);
9. Infrastructure (roads, tracks, dams, reservoirs, irrigation canals, drainage, buildings);
10. Assistance after catastrophic events (wood storage after storm damage, reafforestation after forest damage, salvage logging);
11. Recreation (provision of recreational services, recreational equipment, accessibility of forests for recreation);
12. Extension services, training, informal education and technical advice
13. Forestry groupings (financing of forest cooperatives, associations, organizations, and support to them etc.);
14. Land purchasing (purchase of land for afforestation, nature protection);
15. Other

The category 'Other' included programmes with very broad objectives, such as 'Silviculture A' programme in Switzerland, in which confederation and cantons allocated financial support within a set term for measures such as tending of forests, harvesting and hauling, when the total costs incurred are not covered or exceptionally high for reasons to do with the nature protection. The measure category 'Other' also included programs, which could not be allocated to the rest of the categories, with the examples being such programmes as 'Investments support', or 'Support of forest running in the military forests'.

The allocation of programmes into single measure category was often complicated by their multiple objectives, however, it was possible for most of the analysed programmes, and the results of this are presented in Figure 6. Four measure categories received more than a half of all the financing for 10 countries during the 1990–99 period:

- forest protection (17.8%);
- planning and forest inventory (17.5%);
- infrastructure (14%); and
- afforestation and reforestation (13.2%).

The distribution of financing by measure categories for each country is presented in Table 1, with the measure category receiving most financing in each country being outlined. Some general trends can be observed here, which can be explained by natural conditions, ecological situation or by forest policy course of the countries.

During the study period, forest protection and infrastructure development measures were of great importance in Switzerland with many of its forests being located in mountain areas. In the Czech Republic and Poland, large areas of forests were damaged by industrial pollution, and measures of protecting these forests from further die-out and their restoration were given a special priority.

In Estonia, the passing of the Forest Act in 1993 committed the state budget to cover the expenses of preparing the forest management plans in private forests. This programme comprises the biggest share (94.95%) of financing in Estonia with the amount of 1.67 million euro during the 1994–1999 period. In France, the great majority of funds was allocated to the programs 'Forest regime' in state and other public forests, in which National Forestry Board provided management plans and various management activities (1353 million euro or 51.9% during 1990–1999). Forest planning is also included as one of the important activities into Slovenian forest policy, which is implemented through 2 programmes concerning forest management planning and 2 programmes on silvicultural planning in public and private forests.

Programmes on forest area enlargement through afforestation of agricultural lands received large shares of financing in Belgium, Poland, Germany, and Netherlands, with EU countries being financed by the EU regulation 2080/92, and in Poland through the National Programme for Expanding of Forest Cover.

Forest conservation was an important issue in the 'Management of nature areas' programme in the Netherlands with the objectives for this part of the government funding to safeguard nature areas and reserves by financing the management of these areas by the national forest service "Staatsbosbeheer". During the period of 1990–1999, this programme involved 195.06 million euro.

Forest biodiversity and nature conservation on privately owned forest lands were among the key topics in Finland, with large amounts of funds allocated to compensations for establishing private conservation areas according to Nature Conservation Act and traditional rural biotopes management.

Programmes providing extension services to private and cooperative forest owners were offered by the Laender forest administration and/or the agricultural chamber in Germany, and included lectures, dissemination of information about the state of timber market, field trips, training courses, and advisory or supervisory activities. Funding for these programmes amounted to 575.88 million euro during the 1990–1999 period, being distributed almost evenly between all years.

4.3 Programme beneficiaries

The information on beneficiaries was collected about their characteristics (or who was eligible for receiving funds from the program) and on their number (number of granted applications & number of actual beneficiaries per application (e.g. in case of joint ownership, or group applications)).

Identifying the number of beneficiaries was not possible for many forestry programmes, and in many cases, the whole regional or even country population was considered as beneficiaries of projects implemented in public forests. Other programmes were related to specific number of applicants receiving financing. An example from Belgium shows that afforestation programme reached 285 private forest owners, the program afforestation of agricultural land 343 private

Table 1. Share of funding (1990–1999) by measure categories within EFFE countries.

	Measures funded*, million euro (% of the total funding within each country)														
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	Total
Czech Rep.	**9.4**		**18.4**		**146.0**	**2.0**		**25.4**	**0.2**	**0.2**	**10.7**	**0.2**		**108.8**	**321.3**
	2.9%		5.7%		45.4%	0.6%		7.9%	0.1%	0.1%	3.3%	0.1%		33.9%	100%
Switzerland	**54.0**	**6.2**			**785.2**	**2.7**		**730.9**						**346.1**	**1925.2**
	2.8%	0.3%			40.8%	0.1%		38.0%						18.0%	100%
Slovenia	**20.2**	**0.5**	**3.3**	**23.9**		**3.0**		**27.3**			**3.4**				**81.6**
	24.7%	0.6%	4.0%	29.3%	0.0%	3.7%		33.4%			4.2%				100%
France	**1355.2**	**9.7**	**273.1**	**31.9**	**548.7**		**28.2**	**114.6**	**0.6**	**81.4**	**155.5**	**10.2**	**4.8**		**2613.7**
	51.8%	0.4%	10.4%	1.2%	21.0%	0.0%	1.1%	4.4%	0.0%	3.1%	6.0%	0.4%	0.2%		100%
Estonia	**1.7**					**0.1**					**0.0**				**1.8**
	94.9%					3.2%					1.9%				100%
Belgium			**22.6**	**0.7**				**2.7**		**0.6**	**2.4**	**0.3**			**29.4**
			76.9%	2.4%				9.4%		2.0%	8.2%	1.2%			100%
Poland	**5.1**		**61.5**		**46.0**	**2.2**					**3.1**		**1.4**		**119.2**
	4.2%		51.6%		38.6%	1.9%					2.6%		1.1%		100%
Germany			**366.2**	**57.7**		**217.9**		**94.7**	**381.2**		**575.9**	**21.9**			**1715.4**
			21.3%	3.4%		12.7%		5.5%	22.2%		33.6%	1.3%			100%
Netherlands	**2.5**		**161.6**	**2.2**	**7.2**	**234.3**				**0.1**		**3.7**	**144.2**	**79.7**	**635.4**
	0.4%		25.4%	0.3%	1.1%	36.9%				0.0%		0.6%	22.7%	12.5%	100%
Finland	**65.5**	**35.9**	**232.7**	**122.5**	**1.8**	**352.5**		**209.3**		**49.8**	**49.0**			**69.3**	**1188.5**
	5.5%	3.0%	19.6%	10.3%	0.2%	29.7%		17.6%		4.2%	4.1%			5.8%	100%

* - (1) Planning and forest inventory; (2) Nurseries; (3) Afforestation, reforestation; (4) Stand improvement; (5) Forest protection; (6) Forest conservation; (7) Forest utilization; (8) Infrastructure; (9) Assistance after catastrophic events; (10) Recreation; (11) Extension; (12) Forestry groupings; (13) Land purchasing; (14) Other

forest owners and 85 public forest owners, and the reforestation programme – 1832 private forest owners. However, comparing these numbers to the total estimated number of private forest owners of 80,000 may suggest the low success of these programmes.

Many programmes were directed at specific groups of beneficiaries. For example, programmes of 'Forest management guidelines' and 'Licensed forest professionals' in Czech Republic were limited to forest owners whose forests do not exceed 50 hectares. In Poland, the programme of afforestation of agricultural lands of private property has been directed to landowners, whose lands are of low productive value and are designated for afforestation in the local spatial management plans.

In Switzerland, on the other hand, there were no distinction made between public and private forest owners, but at the same time it was not possible to establish who benefited and how much.

4.4 Outputs

For outputs, the information was collected on type and quantity of programme output, initial programme target, and actual programme achievement (as % of initial target).

Programme outputs largely depended on set objectives and they were easier to identify for programmes with more concrete and narrow goals, with one example being programmes directed on afforestation of agricultural lands. The outputs in hectares afforested are known for all 8 countries, where afforestation programmes were implemented (no such programme in Estonia or Switzerland). In Belgium, such programme resulted in afforestation of 1.13 thousand ha from 1991 to 2000. In Poland in the period of 1992–1999, the total area of afforested lands amounted to 115.6 thousand ha, including 74.8 thousand ha of public and 40.8 thousand ha of private lands. In the Czech Republic, as a result of the programme 'Afforestation of agricultural lands including their protection' (1996–1999), 2.2 thousand ha of marginal agricultural lands were afforested. In Slovenia, the programme was rather directed on reforestation, and resulted in similar area being regenerated in private (4.38 thousand ha) and public forests (4.44 thousand ha) between 1994 and 1999, or on average 731 ha and 741 ha annually. In Finland, forestry investments have been carried out on 19.0 thousand hectares of field afforestation 2080/92 and 76.0 thousand hectares of previous national field afforestation programme. In France, afforestation and reforestation were parts of one programme, with the output of the total area of (re)afforested lands amounted to 232.86 thousand ha in the period of 1990–1998. The afforestation part of the German GAK program resulted in 37.86 thousand ha of afforestation from 1990 to 1999.

Other measures, such as extension and education, produced outputs, which varied from the number of training events (595 in Slovenia between 1995 and 1999) to the number of visitors to the forest museum (7000 yearly in the period of 1998-2003 in Belgium) and forest friendly playing course (370 in 1999 to 1515 students in 2003 in Belgium), or the number of hectares where licensed forest professionals were providing extension services (during 1996–1999: 340 thousand hectares annually in Czech Republic).

4.5 Financial instruments

For practical purpose of presentation and discussion of the EFFE project results, there has been developed a classification of financial instruments, which is presented below:

1. Direct financial assistance (appearing in the accounts of targeted beneficiaries)
   - grants (direct, unrequited payments; input-oriented or output-related quid-pro-quo contracts)

2. Indirect financial assistance (third-party involvement by offering cheap loans)
   - soft loans
   - loan guarantees
3. Tax-related subsidies
   - tax concessions
   - tax exemptions
4. Technical Assistance
   - Extension services (advisory services, training courses)
   - Forest management planning
5. Assistance in kind (supply of infrastructure, machinery, plantings etc.)
6. Compensations (Compensation payments based on the contractual agreements)

Almost half of the programmes (139) summarised in this review, have been financed through grant schemes. The majority of other programmes have been financed through the following 6 types of instruments:

- extension services (20 programmes)
- tax exemptions (17)
- compensations (16)
- tax concessions (16)
- planning assistance (12)

Besides using one economic instrument, some programmes were implemented by combinations of instruments, with examples of:

- grant, extension services (13)
- grants, soft loans (7)
- grants, compensation (7)

On example of such programme is 'Protection of private forests' in Slovenia, where grants in the amount of 20 and 90% (depending on type of measure and level of intensity of ecological and social functions) were provided for forest protection activities together with extension services, such as formulation of programme of protection works; monitoring, undertaking and financial settlement of forest protection works, and prognostic and diagnostic service.

5. Towards forestry funding information system

Building comprehensive and internationally comparable information system on forestry aid measures raises, as also experienced in the EFFE-project, the following conceptual and practical issues:

- common classification of forestry assistance measures
- setting up monitoring and evaluation indicators for multiple (economic, social and environmental) long-term effects of different forestry assistance programmes
- transparency of domestic public support (especially important in countries with various levels of governments, such as federal-type nation states)
- quantification of subsidy elements contained in various government support schemes (gross or net budgetary costs)
- complementarity and/or substitutability between assistance schemes and regulatory, fiscal and social-security schemes in which the economies operate (problem of both measurement of subsidies and efficiency within a given political and economic environment).

Such information system could be based on common monitoring and evaluation indicator tables accompanied by explanatory guidelines for their completion. The information could be stored and updated using interactive database. The system would rely on voluntary contributions by data providers and it could also work on the principle of distributed databases (data stay with the provider). Furthermore, arrangement of specialised visualisation tools would facilitate user-defined data processing and display (Figures 7a and 7b). The information system would thus allow compilation, processing, analysis, presentation and dissemination of programme monitoring and evaluation information on international, national and regional level.

The maps use EFIDAS database information (EFI 2000) on Forest Resources of Europe; CIS; North America; Australia; Japan and New Zealand: Main Report 2000.

The development of the Internet based information system could build on experiences gained in the EFFE research project as well as results from other studies and evaluations, including relevant programme monitoring and evaluation activities of the European Commission. In addition, consistency would also be sought with the work undertaken by international organisations including:

- FAO/UNFF 'CPF Sourcebook on Funding for Sustainable Forest Management' (FAO 2004),
- OECD/EEA 'Database on Economic Instruments Used in Environmental Policy' (OECD/EEA 2003),
- The European Commission 'European Forestry Information and Communication System' (EFICS) and its prototype 'European Forest Information System' (EFIS) (EFI 2002),
- IUFRO 'Global Forest Information Service' (GFIS) (IUFRO 2002).

One particular option for utilisation of such information system could be to link it as a thematic module to the EFICS/EFIS and GFIS information systems. The intended users of such information system include:

- policy-makers and decision-makers – regional, national and EU administrations (the Commission, the European Parliament, the Council)
- programme and evaluation sponsors – the relevant units or services, which are responsible for initiating, funding of the programmes and their evaluations
- programme management – organisations responsible for overseeing and co-ordinating the programme implementation
- programme beneficiaries – persons or groups who receive the goods and services provided by the programme being evaluated, including organisations which represent their interest
- other interest groups and the scientific community – organisations, groups or individuals having a general or scientific interest in the programmes and their evaluation, including environmental and social NGOs.

6. Conclusions

The EFFE project has compiled the information on the financing of forestry in 13 European countries for the period of 1990–1999, which will be summarised in the project final report and presented in the form of the Internet based database. Significant variation in the level of financing between countries was found. The differences observed in the magnitude of government assistance and incentive programmes could be, broadly speaking, explained by the diversity of socio-economic, natural and policy contexts. Regarding the priority areas of public

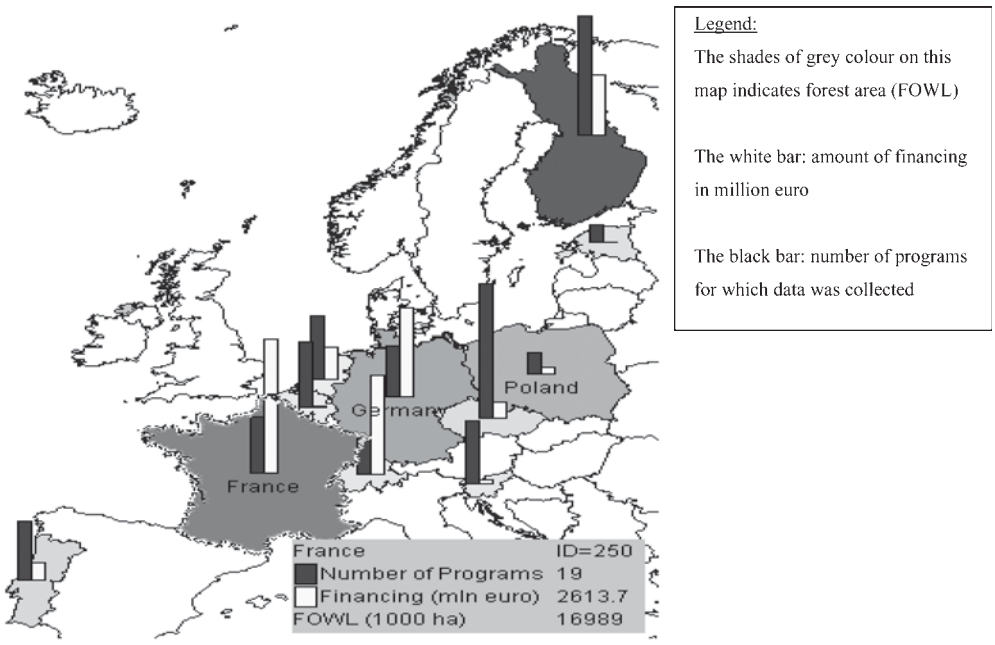


Figure 7a. Data visualisation: total amount of financing and number of forestry assistance and extension programmes in European countries studied (1990–1999).

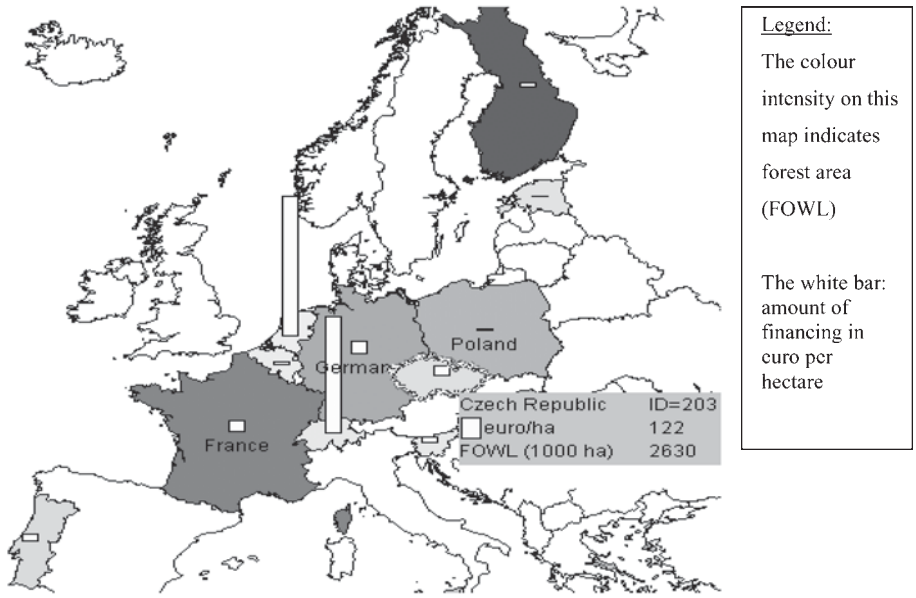


Figure 7b. Data visualisation: forestry assistance and extension programmes in European countries studied - financing per ha of forest (1990–1999).

support to forestry in the decade of the 1990s, the findings show that forest protection measures and forest management planning alone received more than one third of total financing.

It should also be noted that in the course of the EFFE research project, there were found several limitations in the availability of programme monitoring data at national level. Adequate reporting and subsequent assessments of government forestry intervention programmes would require improvements in the existing monitoring systems. The possibilities for international comparisons, on the other hand, could be enhanced through establishment of comprehensive and internationally comparable systems of information. Such systems would need to be based on common reporting and accounting principles that would facilitate dealing with the diversity of institutional settings, such as various forms of subsidy schemes as well as different measurements of absolute and relative amounts of public support. The future information system on forestry funding, as proposed by the project consortium, would allow compilation, processing, analysis, presentation, and dissemination of related programme monitoring and evaluation data on international, national, and regional levels.

Acknowledgements

The authors of this paper would like to thank Dr. Sjur Baardsen for his excellent scientific and administrative project co-ordination on the part of the European Commission (DG Research). We would also like to thank the EFFE Partners for their committed and effective participation in this challenging international research project. The overview presented in this paper would not have been possible without extensive data sets and descriptive materials compiled by project Partners. We thank them for all their efforts. We extend our special thanks to Mr. Ilpo Tikkanen and Dr. Andreas Ottitsch from the European Forest Institute for their valuable contribution to scientific progress of this study as well as helpful project management advice.

References

EFI 2000. EFIDAS Database. EFI, Joensuu, Finland. http://www.efi.fi/efidas/

EFI 2001. EFFE project web-site. EFI, Joensuu, Finland. http://www.efi.fi/projects/effe/

EFI 2002. EFICS/EFIS information system. EFI, Joensuu, Finland. http://www.efi.fi/efidas/efis/

EU-DG Agriculture 2002. Common indicators for monitoring rural development programming 2000–2006. European Commission, Brussels, Belgium. http://europa.eu.int/comm/agriculture/rur/eval/guide_en.pdf

FAO 2004. Sourcebook on funding for sustainable forest management. Collaborative Partnership on Forests. Rome, Italy. http://www.fao.org/forestry/site/7148/en

IUFRO 2002. Global Forest Information Service (GFIS). IUFRO, Vienna, Austria. http://www.gfis.net/

OECD/EEA 2003. Database on economic instruments and voluntary approaches used in environmental policy and natural resources management. OECD, Paris, France. http://www1.oecd.org/scripts/env/ecoInst/index.htm

Ottitsch, A., Tikkanen, I., Riera, P. (eds.). 2002. Financial Instruments of Forest Policy. EFI Proceedings 42. European Forest Institute. 220 p.

United Nations 2000. Main Report: Forest Resources of Europe, CIS, North America, Australia, Japan and New Zealand. United Nations Publication. 62 p.

Theoretical and Methodological Aspects of Policy Analysis and Evaluation

An Efficiency and Distributional Cost-Benefit Analysis of an Afforestation Programme in Poland

T. Nájera[1], A. Kaliszewski[2] and P. Riera[3,4]

[1]Monterrey Institute of Technology campus Chihuahua, Mexico
[2]Forest Research Institute, Poland
[3]Autonomous University of Barcelona, Spain
[4]Forest Technological Center of Catalonia, Spain

Abstract

From an economics perspective, forest policy can be evaluated using an efficiency criterion, but also from a distributional perspective. An instrument that can combine both – the efficiency and distributional cost-benefit analysis – is presented. The traditional social cost-benefit matrix is extended with a matrix showing changes in the distribution of income in the population. A third matrix is also included, combining efficiency and distributional estimators in an abbreviated social welfare functions manner. The procedure is applied to the Polish programme of afforestation of agricultural lands in the 1990s. The study refers to afforestation financed from national public funds on lands of both public and private ownership. The results show improvements in both the income distribution and the social welfare due to the afforestation programme.

Introduction

As currently practised, cost-benefit analysis (CBA) does not incorporate the differences in the income distribution of the affected population. The unequal distribution of income has at least two possible effects on CBA. One is the different impact on utility of an additional unit of income if it goes to an individual with lower or higher wealth. The other is the change in people's utility derived from the knowledge of the income distribution effects triggered by the project under scrutiny.

So far, some research has been focused on the former and the implementation of some distributional weights has been proposed (see Litle and Mirless 1991; McGuire and Garn 1969; Weisbrod 1968, among others). However, the later has been neglected in the literature.

Heikki Pajuoja, Ludek Sisak and Krzysztof Kaczmarek (eds.)
Evaluating Forestry Incentive and Assistance Programmes in Europe – Challenges to Improve Policy Effectiveness
EFI Proceedings No. 54, 2005

Najera (2003) proposes to extend the traditional efficiency based CBA to a triple matrix system, the Efficiency and Distributional Cost Benefit Analysis, in which separately and later jointly both the efficiency and the distributive effects of a project are considered.

Such a system allows the social decisor to analyse separately if a project is efficient in the use of the resources and/or if the project has any equity implications. Also, the third matrix of the methodology allows to combine both results into a single indicator, expressed in monetary units summarising the results of the social desirability of the project.

This paper shows the results of applying the EDCBA system to afforestation programmes in Poland. The rest of the paper is structured as follows: The EDCBA methodology is briefly presented in Chapter 2, a brief description of the polish afforestation programmes as presented in Chapter 3 and the results and their discussion are introduced in Chapter 4. Finally, Chapter 5 concludes the paper.

The EDCBA Methodology

EDCBA provides an extension of the classical CBA to take distributional effects into consideration. It implies a triple matrix system: the traditional CBA matrix (efficiency based), a distributional matrix (reflecting changes in income distribution), and an overall welfare matrix (integrating the previous two).

Basic Assumptions

Consider a society which income $\boldsymbol{X}$ is distributed among its n individuals, such that y_i denotes the income of individual i and

$$\boldsymbol{X} = \sum_{i=1}^{n} y_i$$

A CBA can be applied to a project that affects the above society, with $k = 1,2,\ldots k$ variables and $t = 0,1,\ldots,T$ relevant periods (say years), being 0 the present period. These variables can either be costs (which reduce income) or benefits (resulting in an increase of income), and alter the earnings of individuals.

When the income distribution is not influenced by the investment to be evaluated, $\boldsymbol{X}$ is denoted $\boldsymbol{X}_{SQ,t}$ reflecting the *status quo* or *do-nothing* (*no project*) situation in period t, such that $y_{i,SQ,t}$ denotes the individual income of person (or household) i in period t if the project is not undertaken. The income distribution would be:

$$\boldsymbol{X}_{SQ,t} = \left(y_{1,SQ,t}, y_{2,SQ,t}, \ldots, y_{n,SQ,t}\right)$$

Let $P_{i,j,t}$ denote the change individual i will experiment in period t (compared to her income in t-1) due to the effect of variable j in this period. Therefore, the new income of individual i at the end of period t due to the investment would be

$$y_{i,t} = y_{i,t-1} + \sum_{j=1}^{k} P_{i,j,t}\,, \qquad [2.1]$$

and

$$\boldsymbol{X}_t = \sum_{i=1}^{n} y_{i,t} \, . \qquad [2.2]$$

Distributional Measurement

The variation of the left hand side of equation [2.2], comparing the project situation with the no project one, is what typically constitutes the Net Present Value result of a cost-benefit matrix. The distributional matrix proposed here is concerned with the changes on the individual incomes reflected in the right hand side of the equation. The usual way to measure the income distribution changes, and thus the gain or loss of equality, is by indices of inequality.

Once the appropriate inequality index has been chosen (see Najera 2003), it is calculated for the income distribution of each period. In this way, the gain or loss of equality due to the project investment in each period *t* can be expressed as the difference of the inequality index at period *t*-1 and the inequality at period *t*. This difference is known as the redistributive effect in the inequality literature (see Lambert 1993, among others). This measure constitutes an estimation of the "aggregated" gain or loss in equality in the proposed distributional (DCBA) matrix.

In short notation, let $I_{SQ,t}$ denote the index measuring the status quo inequality level of the income distribution at period *t*; $I_{j,t}$ the inequality level of the income distribution at period *t* originated by the income changes from variable (or income source) *j*; and I_t the level of the overall inequality distribution index at period *t* if the investment is undertaken. Furthermore, the measure of the accumulated redistributive effect (the gain or loss of equality) of the project at period *t* will be denoted as

$$\begin{aligned} REP_t &= I_{SQ} - I_t \quad \text{for } t=0 \\ REP_t &= I_{t-1} - I_t \quad \text{for } t=1,..,T \end{aligned} \qquad [2.3]$$

If the sign of the correspondent *REP* is positive, it reflects an overall gain of equality (an "equity benefit"), and a loss ("equity cost") if it is negative.

Decomposition of the Inequality Measure

There might be improvements in the income distribution due to a variable that increases the overall income (benefit, in terms of traditional CBA) or reduces it (cost). Likewise, a cost or a benefit in income level terms can induce a worsening of the income distribution. As discussed in Najera (2003), inequality indices can be decomposed by income factors (sources, or variables). This property makes it easier to estimate the distributional impact of given affected variables and the overall redistributive effects of the investment.

In this way, $y_{i,t}$ can be decomposed into *k+1* sources. The contribution (*S*) of each of these *k+1* income factors to the gain or loss in equality can be obtained from the inequality decomposition by income factors, such that

$$I_t = \sum_{j=1}^{k+1} S_j \, , \qquad [2.4]$$

where S_j is the contribution of income factor *j* to total inequality, and the $k+1^{st}$ income source is $\boldsymbol{X}_{t-1.}$ Substituting [2.4] into [2.3] and operating, [2.5] is obtained.

$$REP_t = I_{t-1} - I_t = (\Delta S_{1,t}) + (\Delta S_{2,t}) + \ldots + (\Delta S_{k+1,t}), \qquad [2.5]$$

where $\Delta S_{j,t}=S_{j,t-1}-S_{j,t}$ are the contributions of each of the variables to the total gain or loss of equality.

Aggregation Over Time

A decomposition similar to the one for *j* can be applied to *t*. The overall gain or loss of inequality as measured by the indices can be seen as an aggregation over time of the effects in each relevant period in relation to the previous one. Thus, the total redistributive effect (gain or loss of equality) of a project, accumulated over the periods of study, is

$$REP_T = \sum_{t=0}^{T} REP_t$$

This expression is based on the total accumulated redistributive effect, which would be

$$REP_T = I_{SQ,0} - I_T. \qquad [2.6]$$

Operating [2.6], it can be seen that

$$REP_T = I_{SQ,0} - I_T = REP_0 + REP_1 + \ldots + REP_T$$
$$= (I_{SQ,0} - I_0) + (I_0 - I_1) + \ldots + (I_{T-1} - I_T).$$

The elements on the right hand side show the yearly gain or loss of equality (ΔI_t). If discounting over time for inequality indices is to be considered, the above expressions ought to be adapted.

The overall aggregated index (REP_T) would be the evaluation measure of the inequality effects of the investment. In this sense, it is the counterpart of the net present value (NPV) in the traditional CBA.

Relationship Between Inequality and Efficiency Measures

Once the equity matrix is completed, a new matrix can be introduced to the approach, the efficiency and distributional cost benefit analysis (EDCBA) matrix, to combine the results of efficiency (CBA) and inequality (DCBA). This aggregation can be based on the abbreviated (or reduced) social welfare functions (ASWF). These functions (Lambert 1990) combine an efficiency measure with an inequality value. In general,

$$v(x) = V(\mu, I)$$

where $v(x)$ is the aggregated welfare measure, μ is the efficiency value and I the relevant inequality indicator. The efficiency measure takes often the form of mean income (or income per capita), and can be interpreted as a "social good", whereas the inequality would be considered a "social bad" (Lambert 1990). The function reflects the trade-off society faces when willing to give up efficiency for a gain in equity (Sheshinski 1972; Okun 1975).

Several properties are usually demanded to an ASWF (see Dutta and Esteban 1992; Ruiz-Castillo 1995). The component $v(x)$ has to be symmetrical, increasing, and allow for transfers; and $V(\mu,I)$ has to be increasing with respect to the first argument and decreasing with respect to the second. This implies that I has to be symmetrical and meet the principle of

transfer, which is the case for the Gini, Atkinson, and generalised entropy indices (Blackorby and Donaldson 1978; Lambert 1993). Furthermore, an inequality index is said to be consistent with a social evaluation function if for any two distributions ***M*** and ***Y*** with the same mean, $I(m) \geq I(y) \Leftrightarrow V(m) \leq V(y)$ (Ruiz-Castillo 1995; Salas 1996).

The most common functional form of the ASWF is V(μ,I) = μ(1-I). Researchers have developed this functional form for the most common indices of inequality. For detail on this and other functional forms, see Sheshinski (1972), Blackorby and Donaldson (1978), Shorrocks (1988), Salas (1996), Tomas and Villar (1993), Lambert (1993), and Ruiz-Castillo (1995; 1998) among others. The result is expressed in monetary units, and it can be interpreted as the weighted gain in welfare when inequality is also taken into account. This could be interpreted as a "corrected" NPV of the project.

Considering time, let WP_t be the welfare level at period *t*, such that $WP_t = \boldsymbol{X}_t(1-I_t)$, where $\boldsymbol{X}_t$ is final income at period *t*. To estimate the welfare effects of an investment project, it is necessary to find the differences between the status quo situation (the situation without the investment) and the welfare level reached by the project investment. Let $\Delta WP_t = WP_t - WP_{t-1}$ be the welfare change from period (*t*-1) to period *t*, or

$$\Delta WP_t = \boldsymbol{X}_t(1-I_t) - \boldsymbol{X}_{t-1}(1-I_{t-1}). \qquad [2.7]$$

The welfare effect of a project investment at period *t* can be written as

$$\Delta WP_t = \left(\sum_{j=1}^{k} P_{j,t}\right) + \mathbf{X}_{t-1}(REP_t) - I_t\left(\sum_{j=1}^{k} P_{j,t}\right), \qquad [2.8]$$

and the accumulated welfare change due to an investment project up to period *T* can be stated as

$$\Delta WP_T = \sum_{t=0}^{T}\sum_{j=1}^{k} P_{j,t} + \mathbf{X}_{SQ,0}(REP_T) - I_T\left(\sum_{t=0}^{T}\sum_{j=1}^{k} P_{j,t}\right). \qquad [2.9]$$

Operating in [2.7],

$$\Delta WP_t = (\boldsymbol{X}_t - \boldsymbol{X}_{t-1}) + \boldsymbol{X}_{t-1}(I_{t-1} - I_t) - I_t(\boldsymbol{X}_t - \boldsymbol{X}_{t-1}).$$

By [2.3], it is known that $I_{t-1} - I_t = REP_t$. For simplicity, suppose that k=1. Using [2.4],

$$\boldsymbol{X}_t = \boldsymbol{X}_{t-1} + P_t.$$

Then,

$$\boldsymbol{X}_t - \boldsymbol{X}_{t-1} = P_t,$$

And therefore,

$$\Delta WP_t = (P_t) + \boldsymbol{X}_{t-1}(REP_t) - I_t(P_t).$$

In the case of the accumulated welfare effect,

$$\Delta WP_T = (WP_T - WP_{T-1}) + (WP_{T-1} - WP_{T-2}) + \ldots + (WP_1 - WP_{SQ}) = WP_T - WP_{SQ}.$$

Using [2.3], and [2.9] in the expression above, ΔWP_T can be rewritten as

$$\Delta WP_T = \sum_{t=0}^{T}\sum_{j=1}^{k} P_{j,t} + \mathbf{X}_{SQ,0}(REP_T) - I_T\left(\sum_{t=0}^{T}\sum_{j=1}^{k} P_{j,t}\right)$$

The first term on the right hand side of [2.8] can be interpreted as the efficiency effect, in money metrics, of the project investment and the variations non-related to the project. The second term would be the gain or loss of welfare due to the more or less egalitarian income distribution at period *t* with respect to period *t*-1. The third term can be seen as an error term for the combined effect of the efficiency and the equality.

Similarly, the right hand side terms of [2.9] can be interpreted as the sum of the accumulated efficiency contribution to social welfare, the accumulated effect on social welfare due to the improvement of the income distribution and the total effect of the error term, respectively.

It is possible to divide [2.10] into *k+1* income sources:

$$\Delta WP_t = P_{1,t}(1 - I_t) + P_{2,t}(1 - I_t) + \ldots + P_{k,t}(1 - I_t) + \mathbf{X}_{t-1}(REP_t). \qquad [2.12]$$

These would be the elements of the third matrix. They are expressed in monetary units and represent the welfare effects relative to the changes in the income caused by the investment and the status quo variation weighted by the inequality level and the welfare effect of the gain or loss of equality in period *t* as a proportion of the income of period *t*-1.

Finally, a "corrected" IRR can be estimated for the yearly welfare variation (ΔWP_t). It is of similar interpretation of the usual IRR of the CBA, but would be "corrected" by the equity implications of the project under consideration.

Forest Policies

Afforestation of abandoned and marginal agricultural lands as well as other suitable lands has been policy goal in Poland since 1918. It has been connected with a low share of forests in the country, amounting to only 23.1% after the Great War, and 20.8% after the Second World War. Afforestation efforts in the period of 1947–1990 resulted in substantial increase of forest cover, i.e. by 1.2 million hectares, and up to 27.8% of the country's area.

Economic and social transformations ongoing in Poland after 1989 have caused that significant amount of land used for agricultural purposes has been left fallow. This process has widely occurred at a different scale in many regions of the country. In general, huge areas of public fields, meadows and pastures have been abandoned in northern and western Poland, while in southern and eastern part of the country the process covered mainly lands of private property. Currently, the total area of marginal agricultural lands amounts to 3.3 million hectares, at which 1.5 million hectares are estimated to be suitable for afforestation, and thus afforestation of those lands has become one of the major goals of the agricultural and forest policies.

The current share of forests in Poland amounts to 28.6% of the total area (2003), which is less than the average in the European Union. It is assumed that from the point of view of the land-use and landscape structure, the share of forest cover in Poland should be about 33–34%.

In 1995, the Polish government adopted the National Program for Expanding of Forest Cover (KPZL), which is targeted at afforestation of 700 000 hectares of marginal agricultural lands, both private and public ones, till the year 2020. If the programme was successfully

implemented, the country's forest cover should expand by 2%, to reach in 2020 some 30% of the total country's area. Nevertheless, afforestation of agricultural lands has been carried out - with various intensity - incessantly since the end of the Second World War.

Since 1992 the way of afforestation of abandoned agricultural lands, including its financing, has been defined in the Act on Forest (Dz.U. 1991.101.444). The Act introduced a diverse system of financing and supporting afforestation efforts on public and private lands. In general, public lands are being afforested by the State Forests National Forest Holding - a state, self-dependent economic entity, having no legal personality and representing the State Treasury where the management of assets is concerned, but acting on a self-financing basis. In that case afforestation activities are fully financed by the State budget and their extent is significantly dependent on the amount of money provided every year for this purpose in the State budget. Since 1998 the State budget covers also costs of tending and protection of the newly established young tree stands. The afforestation is carried out on lands which were managed by former State Agricultural Holdings, closed down at the beginning of the 1990s.

Afforestation of private agricultural lands is a voluntary activity of land owners and its extent depends on factors which may encourage private owners to establish a new forest. According to the Act on Forests costs of afforestation of private agricultural lands may be covered fully or in part or by the State budget, providing that lands given over to afforestation have been designated in the local spatial management plans. Apart from the financial support from the State budget, afforestation of private lands is also financed by the Regional Funds for Environmental Protection and Water Management, utilising the financial means received from penalties and fees for the use of environment, and – since 1998 – also from the forest fund (an internal compensatory fund of the State Forests Holding). However, in practice the financial support covers only costs of seedlings production (carried out by the State Forests), which comprises some 1/3 of the total costs of afforestation. The rest of the costs (soil preparation, planting etc.) are covered by landowners in kind (Chrempinska 2003; Zaleski 2003).

Afforestation between 1992 and 1999 covered altogether 115 603 hectares of marginal agricultural lands, including 40 850 hectares of private and 74 753 hectares of public lands. The estimated number of private landowners involved in the Programme amounts to 48 100. Afforestation on public lands were financed from domestic funds, while private land owners were funded, apart from the aforementioned sources, also by the European Union PHARE Fund, with the sum of money amounted to about 18% of the total financial support.

Results

The EDCBA methodology was applied to private and public lands programmes. The Gini index was used in the estimation of the redistributive effects, because of its facility to be decomposed by income sources and its widespread utilisation as an inequality index. However, the Atkinson inequality index and the Entropy index could also be employed.

Distributional Assumptions

The costs and benefits considered were

- private investment,
- land opportunity cost,
- thinning and cutting,

- specific taxes cost,
- commercial wood products,
- commercial non-wood products,
- subsidies received,
- transaction costs, and
- the balance between positive and negative externalities.

Taxes and subsidies were explicitly considered because even though they are "neutral" in traditional CBA, their distribution might have a considerable impact in distributional terms.

The variables affecting mainly forest owners were distributed according to income distribution proportionally to their income. In other words, farmers' income was taken as a proxy variable for forest owners' income.

For the net externalities, two cases were studied. First, assuming that they benefited all the population equally without regard of their income (income elasticity = 0). Second, assuming that the benefit of the externality is used proportionally to the income distribution (income elasticity = 1).

Finally, the subsidies received/paid to the farmers were assumed to be domestic funds. In other words, the sources of these funds were distributed among taxpayers accordingly to their incomes shares.

Programmes' Comparison

There are two main differences in the two programmes considered. In the first place, the Private lands Programme includes the analysis for 40 850 hectares from 1992 to 1999, while Public lands Programme affects 74 753 hectares. The second difference is given by thinning and cutting and protective measures protective measures. Table 1 summarises the differences.

The investment is of 7 020 000€ for the Private lands Programme and 54 280 000€ for the Public lands Programme.

Private lands Programme

This scenario had a Net Present Value (NPV) of 74 457 403€ (1 822.7 €/ha), and an Internal Rate of Return (IRR) of 14.37%.

With respect to the distributional effects, the analysis was undertaken for two different assumptions:

- Net externalities benefits are distributed proportionally among the whole population (unitary income elasticity).
- Net externalities benefits are distributed equally among the whole population without regard of their incomes (zero income elasticity).

Results are shown in table 2. Distributional effects are positive under the zero income elasticity assumption, whereas they are negative under the unitary income elasticity assumption. This change in the sign of the results is given by the importance of the net externalities, being the biggest variable involved in the study. The unitary income elasticity assumption implies that the Gini index of the net externalities distribution is the same than the initial income inequality level for Poland. As a result, income inequality is not reduced with the project, since the largest benefit (net externalities) is positively affecting the higher income level individuals in a greater proportion than to lower income individuals.

Table 1. Differences in variables for the two programmes evaluated.

	Private lands Programme	Public lands Programme
Weeding, thinning and cutting	From year 25 to 47 From year 50 to 57 From year 65 to 72 From year 80 to 87 From year 100 to 107	From year 1 to 47 From year 50 to 57 From year 65 to 72 From year 80 to 87 From year 100 to 107
Protective measures	From year 2 to 10 From year 15 to 22 From year 60 to 67	From year 2 to 22 From year 33 to 40 From year 60 to 67

Table 2. Distributional and Efficiency results for the Programme 1.

	Unitary income elasticity for net externalities	Zero income elasticity for net externalities
Efficiency Effect (CBA)	74 457 403€	74 457 403€
IRR (Efficiency only)	14.37%	14.37%
Total Redistributive Effect (DCBA)	-0.0029%	0.0430%
Total Welfare Change (EDCBA)	50 597 839€	71 876 396€
IRR (Efficiency and equity)	10.521%	17.263%

As shown in table 2, the combination of the distributional effects and the efficiency results (NPV) of the project results in a total welfare change of 71.2 million euro for the zero income elasticity case, and of 50.5 million for the unitary income elasticity assumption. Notice, too that the total welfare change Internal Rate of Return (17.26%) is higher for the zero income elasticity case than the traditional efficiency based IRR of 14.37%.

Public lands Programme

The Public lands programme includes the effects of the afforestation programme for 74 753 hectares. This is 34 000 has more than for the Private lands programme. This implies that the investment made by the State through the State Forests Holding, as well as the subsidies received and the benefits were higher. However, the CBA results show that the NPV of the program is of only 43 197 653€ (577.8 €/ha). Table 3 shows the results for this programme.

Results are consistent in the sense that the zero income elasticity assumption gives the best results with a positive redistributive effect and a higher overall welfare change.

Public lands programme has the highest positive redistributive effect under both income elasticity assumptions. The main factor explaining this result is the distribution of the private investment. This variable is zero in the public lands programme, since all the investment is realised by the state.

Table 3. Distributional and Efficiency results for the Programme 2.

	Unitary income elasticity for net externalities	Zero income elasticity for net externalities
Efficiency Effect (CBA)	44 477 354€	44 477 354€
IRR (Efficiency only)	5.5%	5.5%
Total Redistributive Effect (DCBA)	-0.0257%	0.0585%
Total Welfare Change (EDCBA)	61 188 948€	100 216 310€
IRR (Efficiency and equity)	4.49%	9.02%

Conclusions

Efficiency and equity effects of public projects evaluation have not been traditionally considered altogether. This paper introduces a methodology that integrates both criteria into the process of public projects evaluation.

It is proposed to incorporate equity (or equality) effects of public projects into the well-known CBA methodology, by adding two matrices of a similar structure in the analysis, the EDCBA.

The first of this triple matrix system is the efficiency based typical CBA. While the second and third matrices constitute innovations in the public projects evaluation.

The second matrix, the DCBA, fits in the effects in the income distribution of the public policies. It is expressed in terms of redistributive effects, which are decomposed by income sources (of variables of the project under consideration).

The third matrix, called EDCBA, combines the results of the previous CBA and DCBA matrices into a single indicator of the change in social welfare. The objective of this matrix is to provide social decisors of a unique indicator of the social desirability of a project in which both efficiency and equity concepts are combined.

EDCBA makes explicit the social judgements behind equality values. This allows to better understand the results, their limitations and their implications.

An application to Polish afforestation programmes was undertaken. The two projects were evaluated using the three matrices of the methodology. Results show that both projects (private lands and public lands) increased social welfare when it is assumed that the net externalities benefits are valued equally by all members of the society increasing the IRR of both projects when it is corrected by the equity criteria. If it is assumed that the externalities benefits are valued according to the incomes of individuals (unitary income elasticity) the projects are profitable from the efficiency point of view, but fail when the equity criterion is incorporated. This remarks the importance of the distribution of the costs and the benefits of the projects (something that is not relevant for the traditional CBA).

References

Blackorby, C. and Donaldson, D. 1978. Measures of relative equality and their mean in terms of social welfare. Journal of Economic Theory 18:59–80.

Chrempinska, Z. 2003. Afforestation – scale and importance of the problem, current state and programme execution. In: Afforestation in Europe – experiences and prospects. Prace Instytutu Badawczego Lesnictwa. Problemy Wspolczesnego Lesnictwa 1:21–25.

Dutta, B. and Esteban, J. 1992. Social welfare and equity. Social Choice and Welfare 50:49–68.
Lambert, P. J. 1990. The Equity-Efficiency Trade-Off: Breit Reconsidered. Oxford Economic Papers 42:91–104.
Lambert, P. J. 1993. The Distribution and Redistribution of Income. Manchester: Manchester University Press.
Litle, I. M. D. and Mirless, J. 1991. Project Appraisal and Planning Twenty Years On. In: Proceedings of the World Bank Annual Conference on Development Economics 1990. Fischer, S., de Tray, D. and Shah, S. (eds.). The World Bank.
McGuire, M. and Garn, H. 1969. The integration of equity and efficiency criteria in public project selection. The Economic Journal. Pp. 882–893.
Najera, T. 2003. Integrating Equity and Efficiency Considerations in the Evaluation of Public Decisions. Doctoral Dissertation. Autonomous University of Barcelona. September, 2003.
Okun, A. 1975. Equality and Efficiency. Washington: Brookings Institution.
Ruiz-Castillo, J. 1995. Income distribution and social welfare: A review essay. Investigaciones Económicas 19:3–34.
Ruiz-Castillo, J. 1998. A simplified model for social welfare analysis: an application to Spain, 1973–74 to 1980–81. Review of Income and Wealth 44:123–141.
Salas, R. 1996. Fundamentos de bienestar de los índices de desigualdad pertenecientes a la clase de la entropía generalizada. Investigaciones Económicas 20:403–409.
Sheshinski, E. 1972. Relation Between a Social Welfare Function and the Gini Index of Income Inequality. Journal of Economic Theory 4:98–100.
Shorrocks, A. 1988. Aggregation Issues in Inequality Measurement. In: Measurement in Economics: Theory and Applications of Economic Indices. Eichhorn, W. (ed.). Heidelberg: Physica-Verlag.
Tomas, J.M. and Villar, A. 1993. La medición del bienestar mediante indicadores de renta real: caracterización de un índice de bienestar tipo Theil. Investigaciones Económicas 17:165–173.
Weisbrod, B. A. 1968. Income Redistribution Effects and Benefit-Cost Analysis. In: Problems in Public Expenditure Analysis. Chase Jr., S.B. (ed.). New York: The Brookings Institution. Pp. 177–209.
Zaleski, J. 2003. Afforestation in the State Forests. In: Afforestation in Europe – experiences and prospects. Prace Instytutu Badawczego Lesnictwa. Problemy Wspolczesnego Lesnictwa 1:26–34.

Forest Owners' Acceptance of Incentive Based Policy Instruments in Forest Biodiversity Conservation – A Choice Experiment Based Approach

Paula Horne

Finnish Forest Research Institute, Vantaa Research Centre
Finland

Finland has launched a new policy programme to encourage conservation of forest biodiversity, based on economic incentives and voluntarism on the part of non-industrial private forest owners. In order to achieve conservation goals in the long run, the social sustainability of the forest conservation policy should be assessed. One aspect of social sustainability is the general acceptance of the goals, impacts and implementation of the policy. The so-called non-industrial private forest (NIPF) owners own 61 per cent of forests in Finland, and almost 75 per cent in the southern part of the country. Hence, the economic and social implications of forest protection fall predominantly on this sector of society.

This study examined the factors that affect the acceptability of biodiversity conservation contracts and the amount of compensation needed in private forests, using the choice experiment method. Data were collected by surveying 3 000 Finnish private forest owners. Analysing separately those respondents who were willing to enter into a conservation contract allowed an assessment of the impact of forest owners' heterogeneity on compensation amount.

The results show how the welfare of forest owners shifts when the contract terms are changed. The base scenario was selected to have the forest owner as the initiator of the contract, the contract binds a new as well as the present forest owners, small patches are protected and the duration of contract is 10 years. In this base scenario the impact on forest owners welfare is -224 € per hectare annually when using all data. So at least this amount should be paid to a forest owner on average as compensation for biodiversity conservation services to hold his or her welfare constant. However, the welfare impact for the same contract but estimated using the "Nae sayer excluded" model results in a positive figure of +62 € per hectare annually. Thus these forest owners would have a positive welfare impact of the described contract. In other words, these forest owners would be made better off with the introduction of the contract to the extent of 62 € per hectare per annum.

For a conservation policy to be socially accepted and cost effective for both the government and the forest owner, the heterogeneity in forest owners' preferences and goals for the forest holding should be taken into account. Instead of using a top down approach of

Heikki Pajuoja, Ludek Sisak and Krzysztof Kaczmarek (eds.)
Evaluating Forestry Incentive and Assistance Programmes in Europe – Challenges to Improve Policy Effectiveness
EFI Proceedings No. 54, 2005

imposing a conservation status on a NIPF holding, those forest owners willing to protect parts of their forest should be allowed to enter voluntarily into contracts with environmental officials of the state. This would result in a more cost-effective option.

The goal of nature conservation is to secure the protection of nature values in situ. Strict nature reserves provide a secure core for conservation networks and present a low risk level in the stability of conservation status. Considering only ecological values, the acquisition of forestland by the state for strict biodiversity conservation purposes would seem like an attractive option. However, the optimal choice of conservation policy and implementation mechanism is a complex matter of trade-offs between ecological values and socio-economic considerations. Tailoring the policy mechanisms to suit the ecological requirements in a cost-effective and socially acceptable manner is a challenging task for the policy makers.

Evaluation of Financial Means in Swiss Forest Policy

Kurt Bisang and Willi Zimmermann

Swiss Institute of Technology, Department of Environmental Science, Chair of Forest Policy and Forest Economics
Zurich, Switzerland

Abstract

Financial instruments became one of the core elements in many national and international forest policy programmes in the last 20 years. However, little is known about the objectives, mechanisms, the implementation, the effects and the total costs, of this policy instrument. Given the growing budgetary restraints on all state levels, the effectiveness and efficiency of financial means could increasingly be challenged by politicians in the future. This paper argues that financial means in forest policy should not only be evaluated by economists, but also by programme evaluators. It illustrates the important additional benefits of including current concepts and methods used in scientifically based programme evaluation. The paper concludes with an outline of the EFFE project data and programme evaluation approaches can support future evaluation studies of forestry incentives and assistance programmes in Switzerland and both Central and Western Europe.

Keywords: programme evaluation, forest policy, financial incentives, Switzerland.

1. Introduction

Forest administration uses a multitude of financial means in order to influence the behaviour of forest owners and users. Among financial means, examples include financial incentives, compensations, tax reductions, tax exemptions, loans, etc. In comparison to other instruments of public policy (e.g. regulation, direct services), financial means became one of the core elements in many national and international forest policy programmes in the last 20 years. In spite of the increasing importance of financial means in forest policy, not much is known about the objectives, the rationale, the mechanisms, the implementation, the effects, and the total costs of this policy instrument. In this paper, we clarify how approaches of programme evaluation could

Heikki Pajuoja, Ludek Sisak and Krzysztof Kaczmarek (eds.)
Evaluating Forestry Incentive and Assistance Programmes in Europe – Challenges to Improve Policy Effectiveness
EFI Proceedings No. 54, 2005

help provide much needed insights into the manner in which financial means are implemented in forest policy and how they do (or do not) influence the behaviour of target groups (mainly forest owners) and the state of forests, landscapes, rural communities, etc.

There are a number of reasons why programme evaluation should be kept in mind when studying the policy effectiveness of forestry incentives and assistance programmes. First of all, programme evaluation has become a widespread activity in many nation states. The right to mandate evaluations is usually given to parliaments and controlling authorities. With concepts such as the New Public Management (NPM), it is particularly important for parliaments and/or governments to control the performance of more autonomous administrations by observing the effects of their programmes. In addition, programme evaluation gains in importance as a result of budgetary restraints on more or less all-governmental levels. On the other hand, if programme evaluations manage to show the effectiveness of policy measures, they may provide an important argument against cutbacks. The contrary is also possible: programme evaluations can be utilised to downsize or even terminate inefficient or ineffective programmes. Policy makers are tempted to curtail financial means as the potential savings are particularly tangible. Finally, programme evaluations are also used in order to make government activities more transparent and make authorities more accountable for their (in-)action. In this context, programme evaluation can substantially contribute to a higher legitimacy of governmental activities.

This paper points out some of the important additional benefits of applying approaches used in programme evaluation to the field of forestry incentives and financial assistance programmes. As an example, programme evaluations can help us understand whether or not the effectiveness of financial means is limited as a result of unclear objectives, wrong selection of political instruments, problems in implementation, false assumptions about the motives of target groups, or other causes. The paper discusses existing evaluations of financial means in Swiss forest policy conducted in the context of storm damage management. It also highlights the possible contribution of general findings from the Swiss EFFE project for systematically evaluating the benefits and shortcomings of financial means in Swiss forest policy. In this respect, the paper has to be seen as a complement to the presentation of Baruffol and Baur in the conference.

2. The increasing importance of financial means in Swiss forest policy

In Switzerland, different layers of government enjoy far-reaching authority in policy-making. However, compared to many other policy fields, the federal state plays an increasing and rather significant role in forest policy (Von Arb and Zimmermann 2004). The federal state enacted regulation in order to protect mountain forests from extensive or harmful use starting in the late 19th century (compare Kissling and Zimmermann 1996; Schmithüsen and Zimmermann 1999). Among others, the federal state banned clearing, clear-cutting and some harmful uses of forests for livestock farming. In addition, the federal state made approval by a public authority mandatory for lumbering. Cantons often lacked the financial and human resources to implement this regulation. As a result, the federal state financed the formation and public employment of forestry engineers and supported forestry projects for reforestation. With the latter policy instrument, the federal state no longer relied on regulatory instruments and public services provisions, but instead used an effective financial mean. In the 1950s, the federal state created additional financial means for forestry policy, such as financial support for forest roads and other forestry infrastructure, as well as measures aiming at improving forest property structures. Public finances – besides regulatory and persuasive instruments -

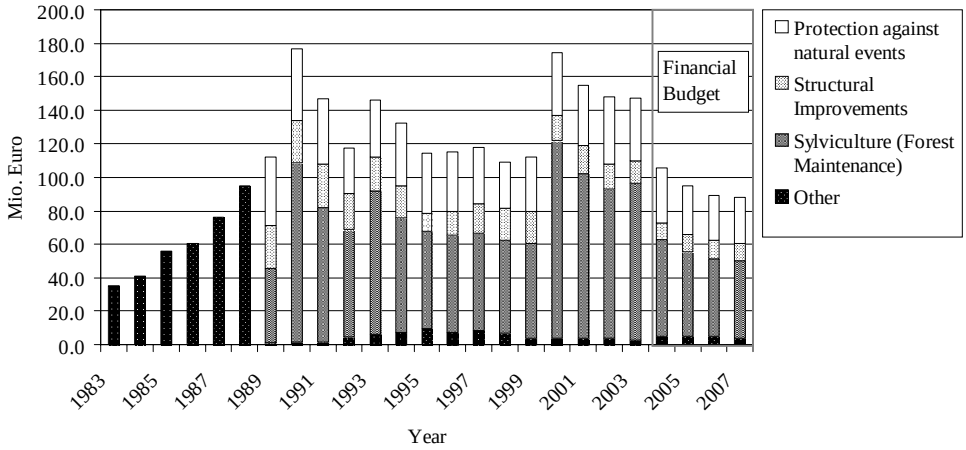


Figure 1. Financial contributions of the federal state for forestry 1983–2003 and provisions for 2004–2007 (in mill. €).

became one of the three main pillars of public forest policy in Switzerland. One of the most important aims of federal spending for forestry, however, covered and still continues to cover projects aimed at protecting people and infrastructure against natural calamities such as avalanches and landslides. The relevant financial instrument can be regarded as the constant in Swiss forest policy.

Financial means had been strongly expanded in the 1980s (Figure 1). Lumbering no longer generated financial benefits due to low timber prices, high wages and other costs caused by different factors (such as the extremely fragmented property structure). Triggered by the phenomenon of the so-called 'Waldsterben' (or: new forest damages), the federal state strongly increased its expenses for the forestry sector (to about € 100,000,000/year). Through financial means, the federal state began to support the so called silvicultural measures (i.e. cleaning and tree selection). This was the first time, the authorities directly supported timber production by public finances. Even though the forest damage did not prove to be as devastating as predicted, these financial contributions were institutionalized by law and expanded in both total amount and with respect to the supported measures. The forestry community supported these public payments as they allowed them to maintain lumbering and silvicultural measures that were no longer generating benefits. In addition to these new types of public finances and the traditional payments for afforestations and forest infrastructure, the Swiss forest policy also introduced financial means to promote the creation and maintenance of forest reserves. The urbanized population increasingly supported environmentalism and nature protection in forests. The financial means foreseen for forest reserves have been created as a concession to environmentalists who complained that the newly created financial means only supported traditional silvicultural or timber production measures (Bisang 2001).

As a result, the current Swiss forest policy establishes as its main objectives forest maintenance, the promotion of the multifunctionality of Swiss forests and the perpetuation of Swiss forestry. It uses a rich mix of instruments, such as regulations, direct provisions of public goods, financial incentives, procedures and persuasion. As shown in Figure 1 financial means had strongly expanded during the 1980s and have been highest in times of storm damage clean ups (Vivian in 1990 and Lothar in 1999). In the future, however, spending for forest policy is likely to be decreased. The federal legislature discussed reducing or even

stopping the funding of silvicultural measures like tree selection in most forests. In addition, the federal administration was urged to propose savings, and forest policy has been a field where proposed savings are particularly high. As a result, the budgetary predictions suggest that the rather high level of spending of the 1990s will no longer be maintained in the near future. This high pressure on public finances in general, and on the financial means for forestry measures in particular will undoubtedly necessitate a more efficient and effective use of the public financial means in forestry. In this context, it is particularly important to know more about the mechanisms and effects of financial means in Swiss forest policy in order to make efficient and effective proposals for budget cuts. In other words: The time for a systematic evaluation of financial means has come.

3. Programme evaluation: definition and core concepts

Based on two previous short surveys executed in the framework of the Swiss EFFE project in cantonal and federal forest administrations we observed that there exist a) only little experience and expertise in and b) little knowledge about the possible aims and intentions of programme evaluation. On both counts it was found that additional knowledge and training is needed. In this respect, an overview on some core elements and concepts of programme evaluation may be helpful. Programme evaluation can be defined as '*(…) the systematic assessment of the operation and/or the outcomes of a program or policy, compared to a set of explicit or implicit standards, as a means of contributing to the improvement of the program or policy*' (Weiss 1997: 4). Programme evaluation has evolved into an important discipline of applied social sciences with its own scientific journals and textbooks (among others Chelimsky and Shadish 1997; Clarke and Dawson 1999; Owen and Rogers 1999; Patton 1997; Rossi et al 2003; Scriven 1980). In addition, programme evaluators are members of specialised organisations (such as the European Evaluation Society) and follow standards provided by the professional evaluation community (for example, DeGEval 2001). Programme evaluation includes a number of approaches and aims at assessing various questions related to policy programmes. For example, programme evaluation analyses if the content of policy programmes is logically coherent or if the defined functions of the policy programme are being carried out in the intended way (compare 'assessment of the programme theory' and 'assessment of the programme process' in Rossi et al 2003). At the core of programme evaluations, however, is the so-called impact or outcome evaluation: The impact evaluation gauges the effects of a policy programme on the social, economic or ecological reality. It tries to answer key questions such as how a situation actually looks as opposed to how it would look in the absence of the measures taken. The outcome evaluation, however, is focussed on the assessment of the reaction of target groups towards suggested or enforced political programmes.

In programme evaluation, the term '*effectiveness*' is used when describing the extent to which the intended and desired effects of a policy programme are achieved. In addition, impact evaluations study other desired and undesired effects, in particular the unintended negative side-effects of policy programmes. In order to link a policy programme to impacts, impact evaluations usually study the degree of implementation of the programme and the effects on target groups. It then tries to link the behavioural changes among target groups to the resulting changes in the social, economic or ecological reality. By doing this, the impact evaluation also provides important information for a cost-benefit analysis. The quotient of costs and benefits, compared to alternative policy programmes, defines the degree of *efficiency* of the policy programme in question (GAO 1991). In the context of evaluating

financial means, it is particularly important to assess both effectiveness and efficiency of policy programmes.

The evaluation literature distinguishes between summative and formative evaluations (Scriven 1980). *Summative evaluations* are usually ex-post-evaluations of programme elements which are carried out to assess the overall performance (and justification) of these elements. Summative evaluations are mostly commissioned by politicians and strongly rely on quantitative research methods. In contrast, *formative evaluations* aim at fine-tuning policy programmes during the implementation. They are more often commissioned by public authorities and, as the objects to be evaluated are processes, are more open to qualitative research methods (Weiss 1997: 31–3). Overall, impact evaluations are open to different research methods of social sciences, which is an important contrast to economic studies. The main advantage of this openness is the fact that programme evaluation also manages to derive recommendations for topics that can usually not be subjected to quantitative analysis (such as procedural aspects of the implementation or logical incoherence in the programme). However, experience shows that the likelihood that the results of an evaluation will enter the political area increases with clearly quantified measures of impacts. It is also necessary to opt at least for some quantitative research methods when evaluating the effects of financial means.

4. Evaluation of financial means in Swiss forest policy: an example

In the case of Swiss forest policy, a small number of programme evaluations have already been conducted. Among other things, these studies concentrated on assessing the effects of financial means (for an overview compare Bisang et al. 2004). One study evaluated the short term measures used for coping with the damage arising from storm Lothar in different cantons (Hammer et al. 2003). This study was based on four case studies carried out in the cantons of Berne, Vaud, Lucerne and Argovia. The cases were selected on the basis of how much the cantons were affected by the storm, the geographical position, the percentage of private forest ownership and the varying general strategies adopted in dealing with the storm damage. This design facilitated the comparison of the impacts of divergent short-term measures. The study, conducted by one of the largest private companies specialising in environmental and social research, concentrated on the short-term effects of the cantonal measures. The authors argued that a comprehensive evaluation or cost-benefit analysis was not possible due to the long-term effects on forest such as stability, ecology, and the forestry sector. The authors used the data and expertise to assess impacts on short-term forest damage and on the preservation of forests in general. One of the main findings of the study was that the short-term results with regard to the stripping of timber, damaged by the storm, were similar, despite the fact that the cantons differed significantly in terms of the forest protection measures they adopted. In other words, the more expensive measures adopted by some cantons did not prove more effective in preserving forests and preventing forest damage in the short term, than did other much less costly approaches. This result corresponds, in general, to findings of a comparison of the strategies adopted in France, Germany, and Switzerland (Zimmermann et al. 2003).

Many forest owners made their decision to strip timber independent of the financial incentives set by cantons. On the other hand, the impacts of cantonal strategies on forest owners and the forestry sector varied strongly. Forest owners spent more of their own money coping with storm damages in the two cantons that provided minimal financial support. In the case of the canton with the most far-reaching financial incentives (Vaud), forest owners did not have to cover their own costs. Vaud more successfully managed the marketing of stripped

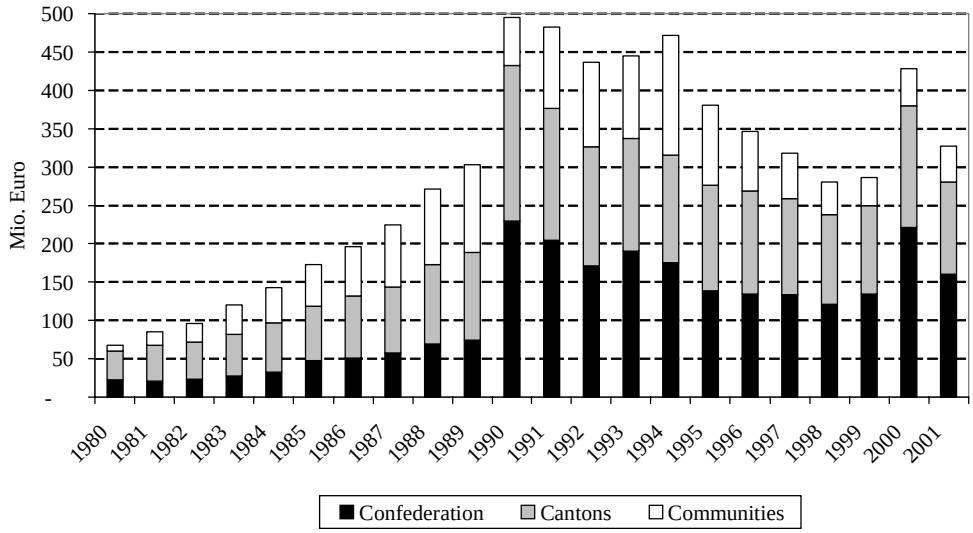


Figure 2. Public expenditure on forestry by the federal, cantonal, and local levels of government in Switzerland, 1980–2001 (in mill. €).

timber; in contrast to the two cantons that relied more strongly on market mechanisms. Overall, the two different strategies of the cantons had important effects for forest owners and public spending, but not forest health. In addition, the study evaluated strategies for preventing accidents associated with storm damages and provided a number of recommendations for cantons as well as the federal state to cope with future storms. The study illustrates that programme evaluations can contribute to the overall understanding of the effectiveness and efficiency of policy measures by concentrating on the behavioural changes of the target groups and the subsequent consequences for the economic and social reality.

5. Questions (not) answered by Swiss EFFE project

It is important to stress the contribution of the many EFFE projects conducted in the various participating countries. For example, the Swiss EFFE project, for the first time, systematically analysed all financial means of forest policy, distributed between the different layers of government. In this respect, Figure 2 compares the public expenditures for forestry of the federal, cantonal and local actors. Among other findings, the project also calculated the net financial burden of public households and showed which actors profited (or did not profit) from increasing net financing (Baruffol and Baur 2004). Table 1 lists a number of research questions outlined at the beginning of the Swiss EFFE project. This project, presented by Ueli Baruffol in these proceedings, contributed to a large number of the descriptive research questions in this list. The project was particularly strong into identifying the providers and recipients of financial means. In addition, the project contributed to gaining new insights into which activities were supported and how the finances were distributed.

Some of the questions, however, have only partially been answered or have remained thus far unanswered. It may be possible to study which activities have been supported in a more detailed

Table 1. Contribution of Swiss EFFE project toward answering research questions.

Research questions	Contribution of EFFE
Who provides the financial means?	✓
Who receives the financial means?	✓
What are the goals and how are the financial means justified?	(✓)
Which activities are supported?	✓
How are finances distributed?	✓
How do the financial means influence the behaviour of the recipients?	-
What are the effects on forests and society?	-
Are the measures taken producing the effects efficiently?	-

manner, for example, through a survey using even more detailed categories than those available for the EFFE project. It would also be possible to study the manner in which finances are distributed by focussing on dimensions of the process. In this case, it would be necessary to add qualitative research approaches describing the methods of implementation of the existing procedures on the cantonal and communal levels. The goals and justifiability of financial means could be further studied using comprehensive document analysis or surveys among the providers of financial means. So far, the data assembled in EFFE only allows for indirect conclusions to be drawn regarding goals of financial means via observing the quantities given for different activities. These data are a *conditio sine qua non* for a systematic evaluation of the effectiveness and efficiency of public financial means. The Swiss EFFE project, thus, provides the basis for a programme evaluation, but is not yet an evaluation itself.

Furthermore, we believe that it will also be necessary to assess the effectiveness and efficiency of financial means. The Swiss EFFE project does not yet provide new insights into how financial means influence the behaviour of recipients. Future studies should focus on this question, in order to tackle the above listed crucial questions about the effects of financial means on forests and societies and about the efficiency of the public money invested into forestry measures. In the future, it will only be possible to legitimise substantial financial means in Swiss forest policy if the relevant forest policy actors, especially the forest administrations succeed in showing evidences of the effectiveness and efficiency of these measures.

6. Conclusions

Both the EFFE action and the Swiss EFFE project have significantly improved our knowledge of the mechanisms and outputs of financial means in forest policy. The Swiss EFFE project collected data on public expenditures in a systematic and detailed manner that was thus far unprecedented. Together with the many other EFFE projects, it is now possible to compare the levels, measures, amounts, recipients etc. of public spending for forestry in a large number of European countries. Questions about outcomes and impacts of the financial means, however, remain, to a large extent, unanswered. We argued that approaches used in programme evaluation are particularly well suited to tackle these further key questions. Programme evaluations focus on programme consistency, on the process of implementation of financial means, on behavioural changes of target groups (i.e. recipients), on the effects on forests and society, and on the efficiency with which public financial means produce such effects. Within the given time and resource frame completed with the weak and complicated data basis, these essential research

questions could not be answered by the Swiss and many other EFFE projects. Based on the data prepared by the EFFE projects, it is now much easier to conduct comprehensive programme evaluation studies then before the start of the EFFE project.

In addition, the Swiss EFFE project showed that so far, experience with programme evaluation in Swiss forest policy is limited. Our impression is that the same holds true for other European countries. The existing studies, however, illustrate some of the potential uses – but also the limits – of programme evaluation in forest policy. In the future, programme evaluations should be conducted for those financial measures that are particularly cost-intensive, or that are subject to significant changes in the level of spending. In this respect, national authorities such as forest administrations or auditing offices will probably be the main actors to mandate evaluation studies. In addition, scholars of forest policy could try to develop their competencies in the emerging discipline of programme evaluation through either a programme of the European Commission or other funding agencies such as COST. But one has to keep in mind that conducting scientific programme evaluation should be accepted by forest administrations. Through this, programme evaluators will gain access to data and the forthcoming results will be more likely to be implemented. Forest administrations will thus play a key role in future evaluation studies of forest policy means as well as in the continuation of the EFFE project both on international national levels.

Acknowledgements

The authors would like to thank the participants of the international symposium in Warsaw, 10–12 October for discussing a draft paper and Susan Cox and Carl Shneider for proof-reading.

References

Baruffol, U. and Baur, P. 2004. Financing of goods and services of Swiss forests. Paper for the international conference ‘Evaluating Forestry Incentive and Assistance Programmes in Europe. Challenges to improve policy effectiveness’ 10–12 October, 2004, Warsaw.

Bisang, K., Stocker, C. and Zimmermann, W. 2004. General concepts and methods for the evaluation of forest policy means: state of the art of theory and conclusions from the forest practice in Switzerland. Paper presented at the international symposium ‘The evaluation of forest policies and programmes’, 27 June – 3 July, Epinal, France. 12 p.

Bisang, K. 2001. Historische Entwicklung der institutionellen Regime des Waldes zwischen 1870 und 2000. In: Knoepfel, P. et al. (eds.): Institutionelle Regime für natürliche Ressourcen: Boden, Wasser und Wald im Vergleich. Helbing and Lichtenhahn, Basel, Geneva and Munich. Pp. 141-182.

Chelimsky, E. and Shadish, W. (eds.). 1997. Evaluation for the 21st century: A handbook. Thousand Oaks, Sage. 556 p.

Clarke, A. and Dawson, R. 1999. Evaluation Research. An Introduction to Principles, Methods and Practice. Sage, London. 224 p.

DeGEval (ed.) 2001. Standards für Evaluation. Deutsche Gesellschaft für Evaluation e.V., Köln. 50 p.

GAO. 1991. Designing Evaluations. GAO/PEMD-10.1.4..United States General Accounting Office-Program Evaluation and Methodology Division, Washington D.C. 94 p.

Hammer, S., Schmidt, N. and Iten, R. 2003. LOTHAR Zwischenevaluation der kantonalen Strategien zur Bewältigung von Lothar am Beispiel der Kantone Bern, Waadt, Luzern und Aargau. Umwelt-Materialien Nr. 154. Bundesamt für Umwelt, Wald und Landschaft, Bern. 114 p.

Kissling, I. and Zimmermann, W. 1996. Aufgaben- und Instrumentenwandel dargestellt am Beispiel der schweizerischen Forstpolitik. Schweizerische Zeitschrift für politische Wissenschaft 2(2): 47–79.

Owen, J. M. and Rogers, P.J. 1999. Program Evaluation. Forms and Approaches. Sage, London. 312 p.

Patton, M. 1997. Utilization-Focused Evaluation: The New Century Text. 3rd edition. Thousand Oaks, Sage. 448 p.

Rossi, P. H., Freeman, H.F. and Lipsey, M.W. 2003. Evaluation: a systematic approach. 7th ed. Thousand Oaks, Sage. 480 p.

Schmithüsen, F. and Zimmermann, W. 1999. Forestry Case Study Switzerland. In: Pelkonen, P. et al. (eds.): Forestry in changing societies in Europe. Information for teaching module Silva Network Part II. University Press, Joenssu. Pp. 415–441.
Scriven, M. S. 1980. The Logic of Evaluation. Edgepress, Inverness.
Von Arb, C. and Zimmermann, W. 2004. Federalism. A characteristic element of Swiss forest policy. Swiss Federal Institute of Technology, Zurich. 48 p.
Weiss, C. H. 1997. Evaluation. Second edition. Prentice Hall, Upper Saddle River. 372 p.
Zimmermann, W., Hänsli, C., Keel, A. and Kissling-Näf, I. 2003. LOTHAR Krisenbewältigung: Internationaler Vergleich Schweiz, Deutschland, Frankreich. Umwelt-Materialien Nr. 159. Bundesamt für Umwelt, Wald und Landschaft, Bern. 93 p.

Application of Numerical Stand-Level Models in Evaluating Public Support

Kari Hyytiäinen

Finnish Forest Research Institute
Vantaa Research Centre, Finland

Abstract

Numerical forestry models can be used as a tool in evaluating the efficiency and effectiveness of public support projects. This study focuses on giving an overview of stand-level optimization models and elaborating their potential applications in policy analysis. Private forest owner's timber management problem is formulated in cases of bare and forested land. The data needs for numerical solution of the problem are elaborated. Three types of stand growth models are presented: 1) a whole stand model, 2) a stage-structured model, and 3) an individual-tree model. Application of stand-level optimization models in analysis of public support of field afforestation, silvicultural activities and road construction are considered.

Keywords: optimization, growth and yield models, public support

1. Introduction

Numerical forestry models can be used as a tool in evaluating the efficiency and effectiveness of public support projects. A forest stand is the smallest operational unit, and thus serves as an appropriate level for investigating the economics of stand management and public support. A stand-level model can be used to simulate cash flow from a forest stand in response to a chain of stand management activities consisting of stand establishment, silvicultural activities, and harvesting. Cash flow is needed to compute the private forest owner's economic surplus as well as net benefits for the society. When linked to an optimization algorithm and making some of the stand management activities endogenous, it is possible to search for the chain of activities that gives the highest economic or social outcome.

Stand models combine biological description of forest growth with description of harvesting technology and economic data. Forest stand growth models developed by forest

Heikki Pajuoja, Ludek Sisak and Krzysztof Kaczmarek (eds.)
Evaluating Forestry Incentive and Assistance Programmes in Europe – Challenges to Improve Policy Effectiveness
EFI Proceedings No. 54, 2005

ecologists or growth and yield researchers are employed to project development of stand structure and timber yields over time and as response to various activities. There is large variation in data requirement and complexity of stand growth models applied in economic research of forestry. Simpler model settings may be relevant when investigating e.g. complex economic problems. However, detailed specification of stand growth dynamics and internal structure of trees are needed in analyzing, for example, economics of stand management activities that are aimed to improve timber quality. Detailed description of harvesting technology is needed because stumpage revenues depend heavily on stand characteristics.

There is expanding literature focusing on the economics of timber production and other forest uses using numerical stand-level models (for review see e.g. Valsta 1993, Hyytiäinen 2003). Numerical models have great, but so far little utilized potential also in policy analysis. This study attempts at giving an overview of stand-level optimization models and elaborating their potential applications in policy analysis. The analysis is limited to benefits from timber production, but the models can be also extended to include other forest benefits (see e.g. Hartmann 1976).

The second section formulates the forest owner's decision problem and lists data needs required in numerical solution of the problem. The decision problem is formulated from the point of view of private forest owner, but can as well be modified as the problem of social planner. The third section presents three types of stand growth models in increasing order of complexity: 1) a whole stand model, 2) a stage-structured model, and 3) an individual-tree model. The fourth section elaborates some ideas how numerical models could be applied in policy analysis.

2. Problem formulation

Private forest owner's economic objective is to maximize the net present value of future cash flow from forest stands. This can be done by timing and scaling endogenous stand management activities in a manner that gives forestland the highest possible value. If forestland is initially bare, $t_0=0$, the value of land under given chain of stand management activities, J_b, can be computed by extending the Faustmann-formula (Faustmann 1848) to account for all revenues and costs pertaining to management and ownership of a forest stand.

$$\max_{\substack{t_i,\ i=1,\ldots,n \\ h_i,\ i=1,\ldots,n\text{-}1 \\ n}} J_b = (1-\tau)\left\{\frac{-\sum_{u=1}^{k} w_u e^{-rt_u} + \sum_{i=1}^{n}\left[\sum_{j=1}^{m} p_{ij}\left(\mathbf{Z}_{t_i}\right) g_{ij}\left(\mathbf{Z}_{t_i}, h_i\right) - C_i\left(\mathbf{Z}_{t_i}, h_i\right)\right] e^{-rt_i}}{\left(1-e^{-rt_n}\right)} - \frac{T}{r}\right\}. \qquad [1]$$

The prototype formulation of stand management problem presented in [1] is suited for even-aged management, when timing of harvests and thinning intensity are endogenous. All future revenues and costs are discounted to the present by using the rate of interest r. The rate of interest as well as prices and cost parameters are expressed as real values. Long-run averages of post-tax market rates of interest serve as appropriate levels in the analysis of both private landowners and the whole society as far as land ownership rights are properly defined and there exists markets for forestland and capital.

Stand establishment costs are denoted by w_u, $u=1,\ldots,k$. The chain of activities may consist of soil preparation, planting or seeding, weeding, slashing and a number of other activities needed for establishing a new generation of trees and for improving their quality and vigor. Public support directed for different stand establishment activities must be subtracted from the cost.

Harvesting revenues are obtained by multiplying harvested volumes g_{ij} (m^3/ha) by roadside prices of timber p_{ij} (€/m^3) for each harvest $i=1,...,n$ ($i=1$, first thinning, $i=2$, second thinning,..., $i=n$, clearcutting). Prices and harvest removals are given separately for different roundwood categories, $j=1,...,m$. For most species, harvested timber of commercial value is divided at least to sawlogs and pulpwood.

Roundwood prices and harvest removals depend on state of stand, which is described by a matrix $\mathbf{Z}_{t_i}$ consisting of a number of state variables. The number and type of state variables is specific for the growth and yield model applied. Roundwood prices tend to be higher for higher-dimension or better-quality timber.

Harvest removal depend also on harvesting rate which is denoted by a scalar $h_i \in]0,1[, i = 1,...,n-1, h_n = 1$. In this formulation, the same proportion of trees is assumed to be removed from all size classes. However, this assumption can be relaxed in stage-structured and individual-tree models that explicitly account for the stand structure.

The logging costs, C_i, $i,....,n$, are subtracted from gross harvest revenues at roadside. The logging costs depend on stand state and removal rate. There are various ways to describe the dependence of logging cost on stand characteristics. In the most detailed specifications, harvesting is divided into several phases, such as felling and on-site transport, and each phase is specified a time consumption function (see e.g. Cao et al. 2004). Logging cost is attained by multiplying time consumption of each phase by its unit price and summing over all phases.

The annual management costs T include fixed annual costs such as silvicultural fees or road maintenance costs that cannot be allocated to individual stands. In Finland, profit tax (τ=0.28) is subtracted from net revenues.

Development of stand structure between harvests is given by:

$$\mathbf{Z}_{t_i} = f\left(\mathbf{Z}_{t_{i-1}}, \mathbf{h}_{i-1}, t_i - t_{i-1}\right), \qquad i = 1,..., j, \qquad [2]$$

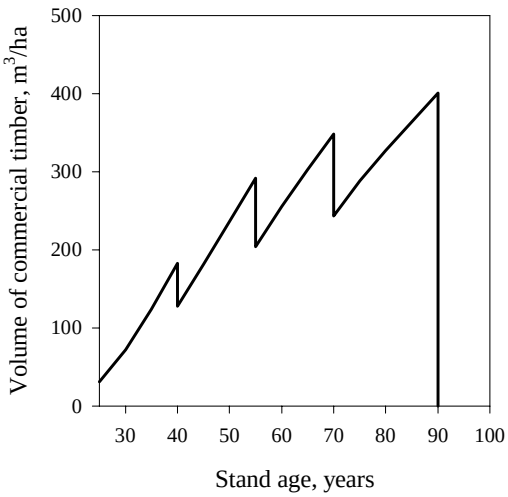
and is provided directly by the applied growth model. It suffices to project net revenues for one production cycle only, if similar cycles can be repeated infinitely. Then the net harvest revenues from the first rotation are generalized for infinite series of infinite rotation periods by divided the net revenues from one rotation by the term $(1-e^{-rtn})$.

Application of model [1]-[2] is limited to the case when subsequent rotations are similar with respect to stand development and management. However, initial state is seldom bare land and it may fall outside the optimal path initiated at bare land. In this case, net revenues have to be computed separately for the first, ongoing, rotation and the subsequent rotations. Equation [3] can be used for computing the net revenues for forested stands ($t_0>0$), where stand establishment activities have already been completed:

$$\max_{\substack{t_i, i=1,....,n \\ h_i, i=1,....,n-1 \\ n}} J_f = (1-\tau)\left\{\sum_{i=1}^{n}\left[\sum_{j=1}^{m} p_{ij}\left(\mathbf{Z}_{t_i}\right) g_{ij}\left(\mathbf{Z}_{t_i}, \mathbf{h}_i\right) - C_i\left(\mathbf{Z}_{t_i}, \mathbf{h}_i\right)\right] e^{-r(t_i - t_0)} - T\frac{e^{r(t_j - t_0)} - 1}{re^{r(t_j - t_0)}}\right\} + J_b^* e^{-r(t_n - t_0)}. \qquad [3]$$

The maximized bare land value, J^*_b following the first clearcutting is obtained from [1] and is discounted from the end of the first rotation period.

An optimization algorithm can be connected to stand models, where stand dynamics and all other components are described in mathematical form. Optimization algorithm is employed to find out the stand management chain, which gives the highest possible economic outcome from a large, or an infinite number of alternatives. There are several numerical methods for solving stand management problem numerically. Frequently applied methods include dynamic programming (see e.g. Haight et al. 1985), Hooke-Jeeves direct search method (see e.g. Valsta 1992) and Tabu search (see e.g. Wikström 2001). Detailed discussion of benefits, disadvantages, and plausible applications of various optimization methods can be found in Yoshimoto et al. (1990), Valsta (1993), and Eriksson (1994).



Harvest removals, m^3

	Sawlog	Pulpwood
1st thinning	0	52.1
2nd thinning	37.1	49.2
3rd thinning	76.9	26.8
clearcutting	372.3	27.3

Figure 1. A whole stand model describing the development of stand volume and yields by timber category (Figures are obtained from growth and yield tables by Vuokila and Väliaho (1980, p. 118) for Norway spruce site H_{100}=27.

3. Forest stand growth models

There are various ways to describe forest stand structure ($\boldsymbol{Z}_{ti}$ in [2]) and its development over time. Forest stand growth models can be sorted according to whether they describe (a) whole stand, (b) the average tree within each diameter class or (c) each individual tree in a sample or the whole stand. Outcomes per hectare are provided directly by the whole stand model and are obtained in the other model types by summing the yields over diameter classes or individual trees. Different stand growth and yield models are described in detail in Getz and Haight (1989) and Davis et al. (2001) and are briefly presented here. The benefits and shortcomings of different models from the point of view of economic analysis are highlighted.

Whole stand models

Whole stand models are presented in terms of growth tables or equations. Stand development is described using a few state variables such as stand basal area, volume or number of stems. Figure 1 shows an example of a whole-stand model describing stand development and yields for a given thinning regime and 90-year rotation for Norway spruce stand growing on a typical site in southern Finland.

Growth tables are tractable tools in the economic analysis because they are readily available for many species and vegetation zones. Their main shortcoming is that the number of alternative chains of stand development is limited. It can't be known *a priori* how good are the economic outcomes of a few simulated management alternatives in comparison to maximized economic outcome.

Some whole stand models are expressed also as equations. Such models can be used to predict development of established stands and timber yields in response to various harvesting alternatives. Such models enable determination of optimum timing, number, and intensity of thinnings along with optimum rotation (see e.g. Brodie et al. 1978; Hyytiäinen and Tahvonen

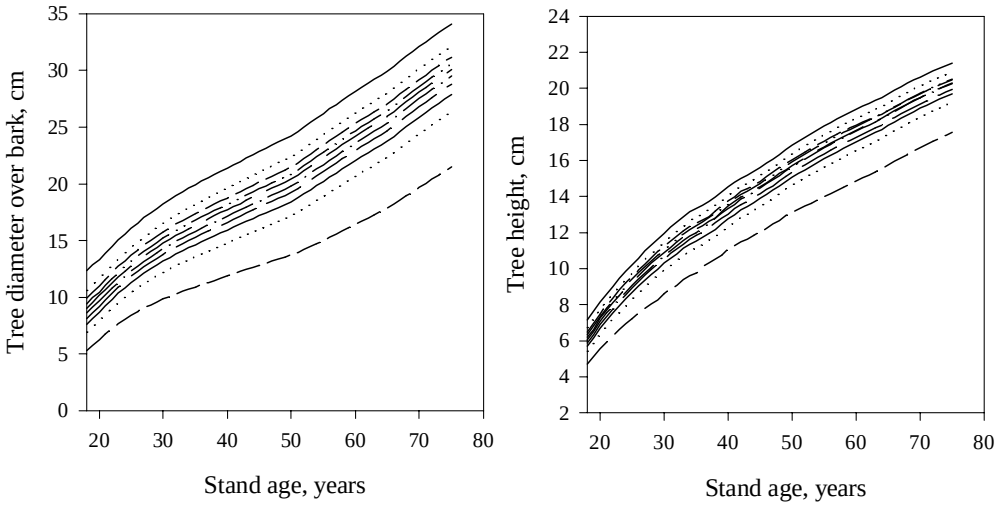


Figure 2. Predicted development of tree diameter and height for 10 mean trees describing a Scots pine stand (material is obtained from Hyytiäinen et al. 2004).

2002). Whole stand models have been used extensively in forest economics research over the past three decades. Recently, they have been extended to study, for example, the effects of stochastic prices (e.g. Brazee and Bulte 2000), growth (Gong 1998), and natural hazards (Thorsen and Helles 1998). The main shortcoming is that development of tree size distribution and other stand structure characteristics are difficult to accommodate in whole stand models.

Stage-structure models

In stage-structured models stand state is described by tree size distribution. Trees are classified in discrete size classes, typically characterized by tree diameter measured at breast height. Each class is represented by average tree volume, tree height, and number of trees. Growth is described as the transition from one predefined class to another at discrete time intervals. Recruitment and survival functions define in-growth and mortality. Size class attributes are added up to obtain stand characteristics, such as stand basal area or volume.

The effects of in-growth and selective harvests on stand structure can be explicitly accounted for in stage-structured models. This is a favorable feature e.g. when describing the development of uneven-aged stands. Stage-structured models have proved highly useful in analyzing both uneven-aged and even-aged stand management (see e.g. Riitters 1982; Haight 1987; Solberg and Haight 1991). The main limitation of stage-structured models is that tree size is not always a valid representation of its development stage.

Individual-tree models

Individual-tree (or single tree) models describe a forest stand using a list of tree records. Each tree is characterized by a number of state variables reflecting its current dimensions (diameter, height, crown ratio etc.). The tree vectors evolve over time due to growth,

mortality, and harvesting. Figure 2 illustrates the development of tree height and diameter for 10 mean trees over rotation period.

With distance-independent individual-tree models, growth and mortality are specified as functions of stand density variables. Each tree in the list is assigned an additional state variable representing the number of its kind in the stand. With distance-dependent (or spatial) individual-tree models, in contrast, growth depends explicitly on a tree's location and size relative to its neighbors.

Individual-tree models are the most detailed specifications of stand growth currently used in stand-level optimization. They enable one to explicitly account for the effects of with-in stand competition and harvesting on stand structure and growth of individual trees. Moreover, the number of trees, which describe the stand structure, can be very high.

Distance-independent (see e.g. Roise 1986; Haight and Monserud 1990; Valsta 1992; Eriksson 1994; Wikström 2001; Hyytiäinen et al. 2004) and distance-dependent (see e.g. Pukkala and Miina 1998) individual-tree models have gained increasing popularity during the last 10–15 years. Vastly increased computational capacity, recent developments in growth and yield research, and availability of powerful solution algorithms have greatly contributed to this trend.

4. Possible applications of numerical models in policy analysis

Numerical forestry models offer highly promising, but so far underutilized, possibilities to study efficiency and effectiveness of forest policy tools. Financial assistance, as a typical forest policy tool, is used to make certain activities considered socially desirable (e.g. field afforestation, silvicultural activities, forest road construction) economically attractive also for private forest owners. At the first stage, numerical simulation models may be used to compare economic outcomes of standard chains of stand management with and without assistance. More sophisticated analysis could involve optimization for searching for the best chains of stand management regimes from a large set of alternatives. Through sensitivity analysis of an optimization models, it is possible to find out threshold levels of assistance needed to make certain activities economically attractive under various ecological and economic conditions. Let's consider three examples where numerical models can be used to study efficiency of public support.

Field afforestation

Field afforestation is considered socially desirable activity and is thus supported in many European countries. Shift from agriculture to forestry tends to mitigate oversupply of agricultural production and increase production of timber and environmental services. Economic analysis of field afforestation would involve calculating the value of land initially under cultivation with various alternative uses. Computations should include also any land conversion costs (Salo and Tahvonen 2004). Public intervention is needed if the value of afforested land is lower than the value of land under agriculture or other competing use.

Numerical analysis of field afforestation is a challenging task because much uncertainty is involved in the early development of afforested stands. Young stand are much more vulnerable to disturbances and natural hazards than older stands with higher tree crown cover. One promising way to solve this problem is to connect field inventory and monitoring information to numerical analysis. Using stands that have reached the established phase as initial states gives much more reliable predictions of growth and yield over the whole rotation than using a young seedling stand.

Analysis of single stand/field or fixed economic parameters is not enough to make general conclusions about economic desirability of various land uses. It is reasonable to extend the sensitivity analysis to various soil types, promising timber species and economic conditions to attain better understanding. For example, differences in taxation of various land uses needs to be taken carefully into account. Field afforestation has been investigated with numerical methods e.g. by Niskanen (1999) and Pahkasalo (2004).

Silvicultural activities

Silvicultural activities are investments made especially in young stands to increase the quantity or quality of timber stock to be harvested later. Despite their positive effects on harvesting revenues, silvicultural activities may not turn economically attractive for forest owners due to long time period before the benefits of investment can be realized. Due to market imperfections or other possible reasons, society is supporting silvicultural activities in many countries.

Value of forested stand can be maximized with and without any activity w_u, $u=1,...,k$ (modify equation [1] or [3] to suit to the initial state). Any investment that increases the present value of forested land is attractive to a rational forest owner without any public support. In this case, it is the task of forest extension organizations to inform forest owners on benefits of the activity. In case the maximized value of forest land with exogenously given silvicultural activity w_u is lower than maximized land value without it, the difference between these values reflects the minimum level of assistance needed to make activity attractive for the private forest owner.

Many silvicultural activities aim at increasing the quality of timber stock. Therefore, the models applied in analyzing economics of silvicultural activities should be detailed enough to be able to describe the internal structure of trees and consequently, the quality attributes such as branchiness, in detail. However, explicit inclusion of the quality effects in stand growth models remains still a great challenge for growth and yield research.

Forest road construction

Construction of forest roads is supported in many countries as they bring new areas into production of timber, recreation and other active forest uses. Road construction project typically considers a large number of forest owners, who seldom are benefiting from the new forest road equally. Forest road construction increases the stumpage prices of timber through reduced harvesting cost. Also, the costs of silvicultural activities as well as administrative costs are likely to decrease due to better accessibility of forest stands. Participation in the project becomes economically attractive for individual forest owner if the net present value of his or her forest property is increased, i.e. the positive effect of road construction on logging costs, and consequently on stumpage prices and net present value of forestland outweigh the investment cost. This requires extending the computation for all stands affected by the project. Private profitability of field afforestation has been investigated in Finland by Saarinen et al. (2002).

Some caveats

Assumptions concerning both biological process of timber production as well as economic parameters of an optimization model must be taken carefully into account when interpreting

the numerical results. Growth predictions given by the stand growth models represent average levels estimated from a number of similar stands. However, there may be considerable variation in true growth due to site-specific factors such as soil properties, microclimate or susceptibility to natural hazards that are not explicitly included in the growth model. Therefore the true yields and present values of land may turn out to be either smaller or higher than the predicted ones.

Another problem connected to application of growth models in optimization is that optimal solutions do not always fall within standard stand management. Empirically validated stand growth models give reliable predictions of growth and yield, but only when they are applied to silvicultural conditions that fall within the range of conditions for which the models are built and estimated. Optimal solutions that are based on unrealistic growth predictions leads to overestimated present value of land. Ideally, the growth predictions behind the optimal solutions can be verified against independently collected field measurement data. Unfortunately, such data is rarely readily available.

One possible approach to tackle the problem is to limit optimization to reliable range of application. Growth and yield researchers may also pay attention to formulate the growth models carefully also outside the most reliable range of application by excluding clearly unrealistic predictions. One promising approach is to apply process-based growth models that explicitly include the causal relationships driving growth processes of trees and forest stand (see e.g. Mäkelä 2002).

Any numerical analysis should be done on the best information available. In absence of more sophisticated predictions, the long-run average levels of roundwood prices, harvesting and stand management cost and market rates of interest serve as justified parameter values to be used in computations. Economic parameters tend to fluctuate in the short run, but when smoothed over decades the demand for standard timber products such as lumber and pulp has remained rather stable. However, we cannot postulate from the past development that roundwood prices, for example, should remain at the present levels also in the future. Therefore sensitivity analysis with respect to different price paths or by making roundwood prices stochastic (see e.g. Insley 2002) may be in order.

References

Brazee, R.J. and Bulte, E. 2000. Optimal harvesting and thinning with stochastic prices. Forest Science 46: 23–31.

Cao, T., Hyytiäinen, K., Tahvonen, O. and Valsta, L. 2004. Effects of initial states on optimal thinning and rotation of Norway spruce stands. Submitted manuscript.

Davis, L.S., Johnson, K.N., Bettinger, P.S., and Howard, T.E. 2001. Forest management: to sustain ecological, economic, and social values. McGraw-Hill, 4th ed., New York. 804 p.

Eriksson, L.O. 1994. Two methods for solving stand management problems based on a single tree model. Forest Science 40: 732–758.

Getz, W.M. and Haight, R.G. 1989. Population harvesting: demographic models of fish, forest and animal resources. Princeton University Press, N. J. 391 p.

Gong, P. 1998. Determining the optimal planting density and land expectation value – a numerical evaluation of decision model. Forest Science 44: 356–364.

Haight, R.G., Brodie, J.D., and Dahms, W.G. 1985. A dynamic programming algorithm for optimization of lodgepole pine management. Forest Science 31: 321–330.

Haight, R.G. 1987. Evaluating the efficiency of even-aged and uneven-aged stand management. Forest Science 33: 116–134.

Haight, R.G. and Monserud, R.A. 1990. Optimizing any-aged management of mixed-species stands: II. Effects of decision criteria. Forest Science 36: 125–144.

Hartman, R. 1976. The harvesting decision when a standing forest has value. Economic Inquiry 14: 52–58.

Hyytiäinen, K. 2003. Integrating economics and ecology in stand-level timber production. Finnish Forest Research Institute Research Papers 908 (Doctoral dissertation).

Hyytiäinen, K. and Tahvonen, O. 2002. Economics of forest thinnings and rotation periods for Finnish conifer cultures. Scandinavian Journal of Forest Research 17: 274–288.
Hyytiäinen, K., Hari, P., Kokkila, T., Mäkelä, A., Tahvonen, O., and Taipale, J. 2004. Connecting a process-based forest growth model to stand-level economic optimization. Canadian Journal of Forest Research 34: 2060–2073.
Insley, M. 2002. A real options approach to the valuation of a forestry investment. Journal of Environmental Economics and Management 44: 471–492.
Mäkelä, A. 2002. Derivation of stem taper from the pipe theory in a carbon balance framework. Tree Physiology 22: 891–905.
Niskanen, A. 1999. The financial and economic profitability of field afforestation in Finland. Silva Fennica 33: 145–157.
Pahkasalo, T., Leppänen, J., and Hyytiäinen, K. 2005. Private and social land values of afforested and cultivated fields in Finland (in this same publication).
Pukkala, T., and Miina, J. 1998. Tree-selection algorithms for optimizing thinning using a distance-dependent growth model. Canadian Journal of Forest Research 28: 693–702.
Riitters, K.H., Brodie, J.D., and Hann, D.W. 1982a. Dynamic programming for optimization of timber production and grazing in ponderosa pine. Forest Science 28: 517–526.
Roise, J.P. 1986. An approach for optimizing residual diameter class distribution when thinning even-aged stands. Forest Science 32: 871–881.
Saarinen, V.-M., Aarnio, J., Uotila E., and Viitala, E.-J. 2002. Metsätiehankkeen yksityistaloudellinen kannattavuus kestävän metsätalouden rahoitustuella. Metsätieteen aikakauskirja 4/2002: 593-604. (In Finnish).
Salo, S. and Tahvonen, O. 2004. Renewable resources with endogenous age classes and allocation of land. American Journal of Agricultural Economics 86: 513–530.
Solberg, B. and Haight, R.G. 1991. Analysis of optimal economic management regimes for Picea abies stands using a stage-structured optimal-control model. Scandinavian Journal of Forest Research 6: 559–572.
Thorsen, B.J. and Helles, F. 1998. Optimal stand management with endogenous risk of sudden destruction. Forest Ecology and Management 108: 287–299.
Valsta, L. 1992. An optimization model for Norway spruce management based on individual-tree growth models. Acta Forestalia Fennica 232.
Valsta, L. 1993. Stand management optimization based on growth simulators. Finnish Forest Research Institute, Research Papers 453 (Doctoral dissertation).
Vuokila, Y. and Väliaho, H. 1980. Growth and yield models for conifer cultures in Finland. Communicationes Institutie Forestalis Fenniae 99(2). (In Finnish with English summary).
Wikström, P. 2001. Effect of decision variable definition and data aggregation on a search process applied to a single-tree simulator. Canadian Journal of Forest Research 31: 1057–1066.
Yoshimoto, A., Haight, R.G., and Brodie, J.D. 1990. A comparison of the pattern search algorithm and the modified PATH algorithm for optimizing an individual tree model. Forest Science 36: 394–412.

Further Research Needs: Challenges for Policy Analysis

Ilpo Tikkanen
European Forest Institute

Contents:

- **Emerging policy issues vs. needs arising from science community**
- **EFFE-proposals for further research**
- **Towards comprehensive policy analyses**
- **Expanding across the policy sectors, and policy layers**

Heikki Pajuoja, Ludek Sisak and Krzysztof Kaczmarek (eds.)
Evaluating Forestry Incentive and Assistance Programmes in Europe – Challenges to Improve Policy Effectiveness
EFI Proceedings No. 54, 2005

Emerging policy issues vs. needs arising from science community

Official group statement by Scientific Community (EFI, IIASA, IPGRI, IUFRO and UNU) at Vienna MCPFE Summit in 2003:

> *"In Vienna Declaration, the Signatory States and EC commit themselves to take forest-related decisions based on science, and to take measures that strengthen existing interdisciplinary research. This statement provides a good basis to design mechanisms to better integrate scientific research into MCPFE-process."*

How well available forest research at large, and policy research especially contributes to MCPFE commitments?

Review and Analysis of Policy Relevant Research related to the MCPFE-process (EFI/Laura Bouriaud)

Some preliminary results:

- **2/3 out of research issues identified in Lisbon and Vienna documents require socio-economic and policy science approaches**

- **However, around 1/10 of human resources in person years are allocated into socio-economic and policy research!**

EFFE-project proposals for further research needs

Research Topics

- **Efficiency and equity (CBA, EDCBA)**
- **Effectiveness**
- **Implementation analysis**
- **Financial policy instruments**
- **Data availability / quality**

Efficiency and equity (CBA and EDCBA)

Theoretical and empirical challenges:

- general problem: determining expected effects as benefit variables => identifying policy goals
- special challenges: valuation of recreation, biodiversity, soil protection, water management; non-wood products and services
- analysing equity and efficiency together in evaluating social projects => developing decomposable indicators of social desirability / sustainability for policy makers
- identification of administrative or transaction costs

Effectiveness

Theoretical and empirical challenges:

- General and basic challenge: specifying causal policy models including policy variables and non-controlled explanatory variables: impacts of policies and other factors =>
- Employing behavioural sciences in order to estimate behavioural responses of / impacts on target groups (e.g. forest owners) of implemented policy interventions
- Identifying / quantifying policy / programme objectives => e.g. developing criteria and indicators especially for measuring environmental and social effects
- Comprehensive policy analysis of certain type of forestry activities, e.g. biodiversity protection, protective functions of forests, stand improvement etc.
- Policy analysis, including evaluation of effectiveness, of social sustainability related to forests

Implementation analysis

- Make better use of rational choice theory in agency situations with asymmetric information

- Data at the forest holding level and local level (cross section and time series) to analyse supporting and impeding factors of implementation success

- Institutions as policy tools (e.g., the role of associations) and good governance at large (law enforcement, capacity building, etc.)

Policy instruments

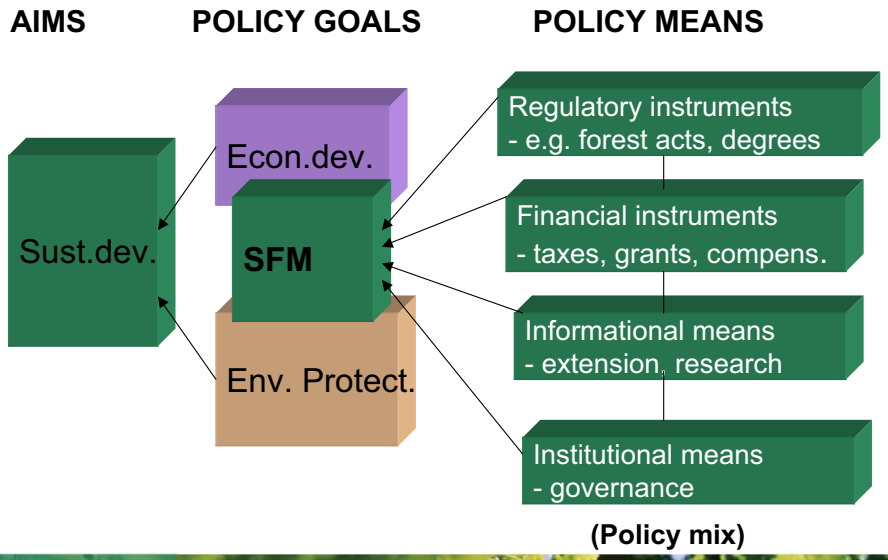
- Determining appropriate type of funding for different target groups (e.g., *compensation payments* for farm-forestry versus *investment credits* for profit-oriented forest owners)
- Different specific funding systems for different areas within one country?
- How could an appropriate compensation-system look like? (compensation payments for forest owners providing non-timber goods and services and/or public goods?)
- Private property restitution and the design of forestry incentive / compensation schemes in countries in transition

Data availability / quality

- Scarce and imperfect monitoring information (e.g., detailed information concerning species planted, improvement operations etc. almost non-existent or inaccessible)
- Lack of consistency between national figures and the data collected directly from regional authorities
- Absence of common data-collection and data processing methods between countries and regions

Assessment and international comparisons of government assistance programmes in forestry require comprehensive and comparable information system for Europe

Towards comprehensive policy analyses



Expanding across policy sectors and policy levels

- Analysis of the cross-sectoral policy impacts on SFM (economic, social & environmental aspects)

- Analysis of two-way impacts and linkages of multi-level governance of forests

Economic, Environmental and Social Impacts of Forestry Assistance and Incentive Programmes (Empirical Findings)

Government Investment Cost-Sharing for Non-Industrial Private Forestry in Finland 1963–2000: An Econometric Analysis

M. Linden[1] and J. Leppänen[2]

[1]Department of Business and Economics, University of Joensuu, Finland
[2]Finnish Forest Research Institute, Helsinki and
Faculty of Forestry, University of Joensuu
Finland

Abstract

The economic effects of government investment cost-sharing for non-industrial private forestry were analysed with econometric methods for Finnish data in years 1963–2000. The cost-sharing effects on private timber supply and private forest investments were focused in details. The econometric models were derived from different theoretical economic optimisation models. Two data sets were used. Finnish regional panel data in years 1983 to 2000, and aggregate data in years 1963 to 2000. Different model alternatives, estimation results and model tests resulted in robust cost-sharing effects. Negative cost sharing effects on private timber supply were not found. Government cost sharing (grants and favourable loans) has positive private investment effects. The public versus private investment fund substitution hypothesis was mainly rejected. Investments supported by public funding behave in a strongly complementary fashion to each other. In general results indicate that positive forest investment and timber supply effects of public cost-sharing programmes are dominant among private forest owners in Finland in years 1963–2000.

Keywords: grants, loans, private forestry investments, timber supply, econometrics.

1. Introduction

Non-industrial private forest (NIPF) management practices such as timber harvesting and forest investments (e.g. reforestation and timber stand improvements) are important for nation's forest resources. Managerial effort and material inputs in silvicultural activities are

Heikki Pajuoja, Ludek Sisak and Krzysztof Kaczmarek (eds.)
Evaluating Forestry Incentive and Assistance Programmes in Europe – Challenges to Improve Policy Effectiveness
EFI Proceedings No. 54, 2005

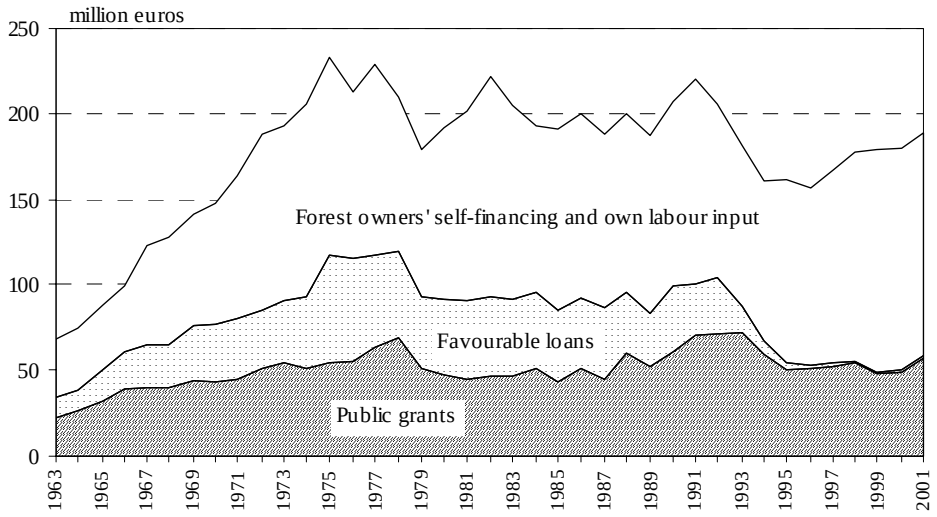


Figure 1. Public cost-sharing and private financing for silvicultural and forest improvement investments 1963–2001, million euros in 2001 prices (cost-of-living index). (Finnish Statistical Yearbook of Forestry 2002).

targeted to increase the productivity of timber production. In the long term, continuous and sustainable national level of timber supply and forest investments are not necessarily provided by NIPF without government assistance.

The private incentive for forest investments may be low for many reasons. The relative low return of forest capital makes alternative investment projects more attractive than wood production. Imperfect capital markets constrain the funding to investments. Self financing reduce consumption possibilities and the long maturity of forest investments and risks involved therein are difficult to reduce. Typically, the social or the government discount rate is lower than the private rate. This is also valid for the forest wealth.

Due to the divergence between forest management practices that maximise private and social welfare, state agencies are frequently involved in financing and otherwise encouraging investments in forestry. These cost-sharing programmes generally fall into categories of direct tax incentives, input financial aid (grants and favourable loans) and non-financial aid (training, technical assistance). The effect of each of these programmes is to reduce the cost of forest management. However, efficient public policy instruments depend on the accurate characterisation of the factors influencing landowners' forest management decisions. An important question is the extent to which cost sharing programmes are leading to new investments as opposed to replacing private investments (Beach et al. 2004).

In Finland, the framework of public intervention in NIPF was created during the 20th century, initially with legislation, and since 1928 with extension and funding for selected forestry activities. A major change in forestry policy took place during the 1960s with increased public involvement in forest management and financing. This was carried out via several large-scale forestry programmes and additional budget expenditures (Figure 1).

The aim was to increase the long-term cutting potential of the forests (see also Figure 2). In the 1950s cuttings were exceeding annual growth and the sustainable cutting budget was of increasing concern to public decision makers.

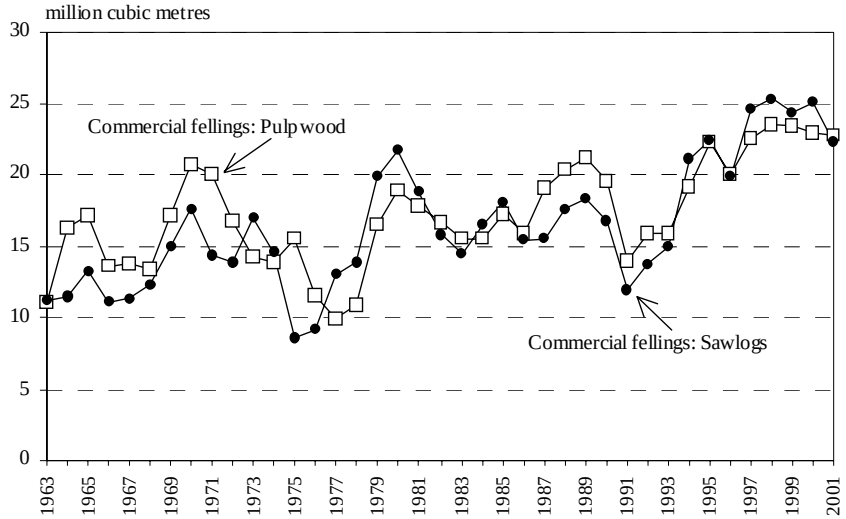


Figure 2. Commercial fellings from NIPF 1963–2001 by sawlogs and pulpwood, million cubic metres (over bark). (Forest Statistics Information Service of the Finnish Forest Research Institute).

In practice, forestry intensification was achieved by increasing the share of clear cuttings in final fellings. This led to an expansion of artificial regeneration and consequent need for tending seedling and young stands. In addition, many peatlands were drained, fertilisation was increased and a dense network of forest roads was built. All these measures were made feasible by directions and substantial financial assistance from government. It was not until the l990s that the policy aiming at intensive forestry was called into question in Finland. During the l990s, changes in environmental and social values began to affect many forestry routines. Figure 1 shows that public grants and loans and NIPF financing of investments increased both during years 1963–1978 close to 120 million euros. During the period from 1980 to 1993 they remained at this level but since 1994 the public financial share has decreased. This is much due to the remarkably decreased share of repayable but favourable loans as financial instrument, which since the decrease in commercial market interest rates have been substituted mainly by forest owners' financing. Connecting these findings to commercial timber supply reveals that increased fellings started in years 1977 and 1992 (Figure 2). However these possible long run harvesting effects of forest investments are not analysed in this context.

Since there have been very few *ex post* evaluations of the costs and benefits of the public sector aid and investments in Finland among NIPF, within the project Evaluating Financing of Forestry in Europe (EFFE) the focus was partly targeted to econometric analysis of cost-sharing effects on NIPF harvesting and forest investments. By econometric analysis we mean empirical analysis based on the estimated statistical models derived from the principles of economic theory. In Chapter 2 we give a short sum-up of different model alternatives employed in this context (see Linden and Leppänen 2003a, 2003b and 2004, and the references therein). Chapter 3 presents the data sets employed. Chapter 4 describes the main results obtained and discusses their merits. Chapter 5 concludes the paper.

2. Models

In the following, we give a short review of different economic model alternatives and corresponding econometric models that were estimated with different data sets by the authors.

Model A (Linden and Leppänen 2003a): Harvesting and Investment Effects

The forest owner is a utility maximiser choosing an optimal mix of consumption C and investment I in his utility function $U(C,I)$

$$U(C,I) \geq 0 \quad \text{where } C,I \geq 0, \text{ and } U_C > 0, U_{CC} < 0, \\ U_I < 0,\ U_{II} \leq 0, \text{ and } U_{CI} < 0. \qquad (1)$$

The assumption of disutility effects of investment stems from the fact that forest management is effort demanding and most of the forest investment goods are not consumable although some of them can have positive utility effects (e.g. forest roads). Note that the disutility assumption is quite important for the results derived below.

The forest owner's budget constraint is

$$W = pH + \frac{p^e}{1+r} G^{+1}(I, G-H) - p_c C - c_I (1-s) I \geq 0, \qquad (2)$$

where
p = given market price of timber minus unit harvesting costs at current period
p^e = given expected market price of timber for period t+1
r = given interest rate used for discounting next period forest stock
G^{+1} = next period forest capital stock (m^3)
G = given current stock
p_c = given unit price of consumption goods
c_I = given unit price of investments goods
s = given share rate of government assistance (0<s<1)
H = current cuttings (H≤G)

The optimal amounts of consumption, investment and harvesting are derived from following constrained maximisation problem

$$\underset{\{C,I,H\}}{MAX}\ L(C,I,H,\lambda) = U + \lambda W. \qquad (3)$$

Theoretical implications of optimisation results were derived with comparative statistics (see Linden and Leppänen 2003a). Following gives the sum-up

	Δs	Δp	Δp^e	Δr	Δc_I	
ΔH	+ (0)	−	+	−	− (0)	(4)
ΔI	+ (0)	+ (0)	+ (0)	− (0)	− (0)	

The results in parenthesis are obtained, when it is assumed that harvesting effects on the forest stock are linear, i.e. $G^{+1}_{HH} = 0$, or the cross derivate effect of harvest and investment on forest stock is zero, i.e. $G^{+1}_{IH} = 0$.

Assume that we can approximate the true optimal reaction equations from the optimisation results with linear econometric models. As our theoretical model is based on the fact that the forest owner optimises with respect to the level of his/her forest investments and harvesting

(timber supply) simultaneously, we add to the models endogenous variables H and I in equations for I and H. Separate harvesting equations were estimated for sawlogs and pulpwood.

$$\ln H_i = \alpha_{1i} + \underset{(?)}{D1} + \underset{(?)}{D2} + \underset{(?)}{D3} + \underset{(?)}{D4}$$

$$+ \underset{\leq 0}{\beta_{1i}} \ln P_i + \underset{>0}{\beta_{2i}} \ln P_i^e + \underset{<0}{\beta_{3i}} rr + \underset{\geq 0}{\beta_{4i}} \ln s_p + \underset{\leq 0}{\beta_{5i}} \ln c_I \qquad \text{(A1)}$$

$$+ \underset{(>0)}{\beta_{6i}} \ln I_g + \varepsilon_{1i}, \quad i = 1, 2,$$

$$\ln I_g = \alpha_3 + \underset{(?)}{D1} + \underset{(?)}{D2} + \underset{(?)}{D3} + \underset{(?)}{D4}$$

$$+ \underset{\geq 0}{c_1} \ln P_1 + \underset{\geq 0}{c_2} \ln P_1^e + \underset{\geq 0}{c_3} \ln P_2 + \underset{\geq 0}{c_4} \ln P_2^e \qquad \text{(A2)}$$

$$+ \underset{\leq 0}{c_5} rr + \underset{\geq 0}{c_6} \ln s_p + \underset{\leq 0}{c_7} \ln c_I + \underset{(>0)}{c_8} \ln H_1 + \underset{(>0)}{c_9} \ln H_2 + \varepsilon_3,$$

where

H_i = timber supply (contracted amount of fellings in m^3 between the wood sellers and buyers); H_1 = sawlog supply, H_2 = pulpwood supply.
I_g = geometric mean of investment outputs measured in kilometres and hectares
s_p = unit price of government grants and loans to private forest investment
c_I = unit costs of private forest investments
P_i = observed market price; P_1 = sawlog price, P_2 = pulpwood price
P_i^e = expected market price for next period derived from forecasts of distributed lag model of observed prices: P^e_1 = sawlog price, P^e_2 = pulpwood price.
rr = real market interest rate for private loans
D1 = dummy variable for collective timber price agreements in period 1979–1990
D2 = dummy for year 1992 adjustment period for change in forest income taxation
D3 = dummy starting in year 1993 for alternative forest income taxation system
D4 = regional percentages of alternative forest tax formulas adopted since 1993
ε = normally distributed error term of model

The signs without brackets below the parameter follow explicitly from first order conditions of optimisation results (see Eq. 4). The equality signs mark the variable effects under the assumptions that the stock effects of harvesting are non-linear and investments and fellings affect forest stock independently. We assume also that endogenous variables are positively related to each other, i.e. increased felling lead to increasing investments. Different dummy variables (D1–D4) capture the institutional changes in wood markets during the analysed period.

Model B (Linden and Leppänen 2003b): Investment Shares Substitution

This model analyses the effects of public cost-sharing on private forest investment with a simple cost-sharing optimisation model. Assume that representative NIPF owner faces a

following maximisation problem. He has to choose the level of private funding *R* to provide desired level of investment capital *I* at given price level *q*. Assume that capital is the only input in his concave forest output function ($f_I > 0, f_{II} < 0$). He is also allowed for public financial aid up till fraction $\bar{\alpha}$ of *R*. The maximisation problem is following

$$\max_{R,\alpha} f(I) - C(R)$$

$$\text{subject to} \quad qI = (1+\alpha)R \quad \text{and} \quad \alpha \le \bar{\alpha} < 1. \tag{5}$$

C(*R*) is a convex cost function of private investment funds ($C_R > 0, C_{RR} > 0$). The Lagrangian of the problem is

$$\underset{\{R,a\}}{MAX}\ L(R,\alpha,\lambda) = f([(1+\alpha)R]/q) - C(R) - \lambda[\alpha - \bar{\alpha}]. \tag{6}$$

It is easy to show that rising the share rate $\bar{\alpha}$ means less private funding, if the marginal output gains from forest investments are high (see Linden and Leppänen 2003b). Thus in general case the substitution between private investments and public financial aid ($dR/d\bar{\alpha} < 0$) occurs. However, the non-substitution case occurs when marginal output gains from forest investments are small ($f_{II} \approx 0$) or when they are constant ($f_{II} = 0$). Holding $\bar{\alpha}$ instead of *q* fixed gives the own price effect of investments. The sign of dR/dq is non-determined when $f_{II} < 0$, but negative own price elasticity is found ($dR/dq < 0$), when marginal output of investments is constant or small. Note also that $dq/d\alpha < 0$ when $f_{II} \cong 0$.

The econometrics based on the economic theory model employed the translog cost-share system model for private investment costs (*P*), sum of public grants and loans to private forest investments (*A*), and collective investment cost (*C*), which consists of common investments by many individual forest owners who share common forest roads and ditches. Investments in these receive public funding in order to alleviate the investment incentive problem involved therein. The total cost is obtained by $TC = P + A + C$ and cost shares are $s_p = P/TC$, $s_A = A/TC$ and $s_C = C/TC$.

Corresponding investment unit costs p_P, p_A, and p_C were derived next. Including possibility of scale economics in investments, investment volumes *I* were added in the share equations s_P and s_A and in translog total cost equation.

B)

$$s_P = \beta_{P0} + \delta_{PP}\ln(p_P/p_C) + \delta_{PA}\ln(p_A/p_C) + \varphi_{PI}\ln(p_P I/p_C) + \varepsilon_1$$

$$s_A = \beta_{A0} + \delta_{PA}\ln(p_P/p_C) + \delta_{AA}\ln(p_A/p_C) + \varphi_{AI}\ln(p_A I/p_C) + \varepsilon_2$$

$$\begin{aligned}\ln(C/p_C) = {} & c_0 + \beta_{P0}\ln(p_P/p_C) + \beta_{A0}\ln(p_A/p_C) + \beta_I\ln(I) \\ & + 0.5\delta_{PP}(\ln(p_P/p_C))^2 + \delta_{PA}\ln(p_P/p_C)\ln(p_A/p_C) + 0.5\delta_{AA}(\ln(p_A/p_C))^2 \\ & + \varphi_{PI}\ln(p_P I/p_C) + \varphi_{AI}\ln(p_A I/p_C) + 0.5\varphi_I(\ln I)^2 + \varepsilon_3\end{aligned}$$

The implied elasticities of substitution ($\theta_{ij} > 0$) and own price elasticities ($s_i\theta_{ii} < 0$) are easily computed once the parameters of the model have been estimated

$$\theta_{ij} = \frac{\delta_{ij} + s_i s_j}{s_i s_j} \quad \text{and} \quad \theta_{ii} = \frac{\delta_{ii} + s_i(s_i - 1)}{s_i^2} \qquad (7)$$

Thus, the translog system approach gives the possibility to analyse the substitution and scale effects in different forest investments categories.

Model C (Linden and Leppänen 2004): Funding Substitution

The model takes a closer look at different forms of public aid to private forest investments. Abstracting from stock growth and other input effects for the sake of simplicity we assume that stock is a concave production function of capital *I* input (investments), i.e.

$$G = f(I), \quad \text{with } f_I > 0 \text{ and } f_{II} < 0. \qquad (8)$$

The price of investment goods *q* is given to the forest owner. The financing of investment in forest capital is undertaken with private funds *R* and government assistance programme that has two parts: a lump sum transfer *B* and fixed share rate rule αR where $0 < \alpha < 1$. The private funding is provided by the loan markets with interest rate *r*. The cost sharing rule entails still that forest owner can choose an optimal mix of *B* and *R* in order to maximise the net gain of his investment project subject to cost sharing rules, i.e.

$$\max_{B,R} f(I) - C(R,B)$$

$$s.t. \quad qI = B + (1+\alpha)R, \qquad (9)$$

$$0 \le B + \alpha R \le \bar{W} \quad \text{and} \quad R > \bar{W}.$$

C(*B*, *R*) is a convex or a linear cost function of provided public and private funds. Naturally, $C_B = s \ge 0$, $C_R = r > 0$ with $r - s > 0$ and $C_{RR} = r_R \ge 0$. The marginal private cost of public funds is close to zero for the private investor, but the marginal cost of private funds is positive. The analysis is conducted using the assumption $C_{BR} = 0$.

The Lagrange of the problem is

$$\underset{\{B,R\}}{MAX}\ L(B,R,\lambda) = f([B + (1+\alpha)R]/q) - C(B,R) + \lambda[W - B - \alpha R] \qquad (10)$$

The solution of maximisation problem support economic implications that rising the share rate α means less private investment, if $C_B = s$ is close to zero and if the level of private funding *R* is high. However, if investment effects on forest stock are linear ($f_{II} = 0$) and $s \ge 0$, then $dR/d\alpha > 0$ and funding substitution will not take place. Similar results are valid for lump sum aid *B*.

The econometric analyses were conducted with a following two equation system for supply of private funds (*R*) and demand for public funds (*B*).

$$R = a + \underset{(?)}{D1} + \underset{(?)}{D3} + \underset{(?)}{D4} + \underset{\leq 0}{a_1} B + \underset{(>0)}{a_2}\ INCOME + \underset{(<0)}{a_3}\ rr + \underset{(>0)}{a_4}\ HECT + \underset{(>0)}{a_5}\ Pe + \varepsilon_1$$

C)

$$B = b + \underset{(?)}{D1} + \underset{(?)}{D3} + \underset{(?)}{D4} + \underset{\geq 0}{b_1} R + \underset{(<0)}{b_2}\ INCOME + \underset{(>0)}{b_3}\ rr + \underset{(>0)}{b_4}\ HECT + \underset{(<0)}{b_5}\ Pe + \varepsilon_2$$

The model treats both the private and the public funding of forest investments as endogenous variable. The level of supply of private funds *R* is partly determined by the public funding *B* since this is the target of public cost sharing programmes. However, the theory predictions derived above indicate that fund substitution is the most expected alternative, i.e. increase of public funding decreases supply of private funds. The private demand for public funds is also endogenous since the level of public funds distributed by the state is conditioned by the increased level of private investment. In this case we cannot assume that public funds are substituted for private funds. Note that this result does not either contradict our theory implications.

Some exogenous variables were added to the empirical model. Incomes obtained by the forest owners in form of wood selling have a positive effect on the supply of private funding of investments. However, the income effect on public funding is assumed to be negative. High forest incomes reduce the need for public investment support. The total forest area affected by forest investments is the scale variable in the system. Large investment areas imply increasing investment funds. However, the financing of investment with bank loans has a negative effect on investment, i.e. high loan interest rates decrease the supply of private investment funds. The commercial interest rate effects on public funding are positive indicating the effects of increased costs of private funds. The price expectations of stumpage market prices increase the private investment funds since next period's incomes are expected to be higher than in current period. Increasing expected incomes allow for larger investments and less public support.

3. Data sets

In models A) and C) we employed cross section time series data (panel data). The data consists of yearly observations from the period 1983–2000 in nineteen regional Forestry Board Districts in Finland. All the observations are from Finnish Statistical Yearbooks of Forestry published by the Finnish Forest Research Institute (METLA) and Statistical Yearbooks of Finland published by Statistics Finland. Some transformations for regional consistency in time have been made. List of variables is found in Chapter 2 above.

In model B) data consisted of yearly observations of six NIPF investment outputs (or area proxies for them) in years 1963–2000. Different NIPF forest investments were aggregated (for details, see Linden and Leppänen 2003b). Data for corresponding NIPF costs and spent public financial support for these six investment activities were also available (Finnish Statistical Yearbook of Forestry, different years). All monetary variables were adjusted for inflation by dividing them with consumer price index (base year 1990).

4. Results

In the following, we do not give a detailed description of econometric results obtained for previous models. Instead, we follow the strategy suggested by Beach et al. (2004) in their

Table 1. Model A: NIPF harvesting and investment volume effects in Finland. Panel data for 19 regions and 18 years (1983–2000). Fixed and random effects estimation (LSDV and GMM).

	Harvesting Effects[1]	Investment Effects
Collective Agreements	0	0
Taxes	+	+
Prices	(+)	(+)
Price Expectations	(+)	0
RealInterest Rates	0	0
Investment Costs	+	–
Investments	+	n.i.
Harvesting[1]	n.i.	+

1) model included separate variables for sawlog and pulpwood

+/– = significant in all estimations at 5% level
(+)/(–) = not significant in some estimation at 5% level
0 = not significant in any estimations at 5% level
n.i. = not included in estimated equation

review article on econometric studies of NIPF management. Thus, we give sum-up tables of results with reference to their statistical and economic significance.

In the Table 1 we report the results from Model A, excluding the investment cost-share effects that are presented in Table 3. In Table 1, collective price agreements did not enter in estimation with significant coefficients. However, the change of forest income tax system starting from year 1993 had a positive effect on NIPF fellings and investments. The Finnish tax system for NIPF owners changed in 1993. The forest owners were forced to choose, for the transitional period of 1993–2005, between 1) continuing with the old system based on the owned forest area and value of growth (site-productivity tax) and 2) adopting the new system based on the income from wood selling (wood sales profit tax). After 2005, all forest owners will be in the new wood sales profit taxation.

The wood market prices give a non-negative, albeit not strong, effect on harvesting and investment. Beach et al. (2004) report similar results in their review of almost 30 different studies. Real interest rate was not found to have effect on investments and harvesting. The parameter for investment costs was negative in equation for investments, but a positive relation – a case against theory implications – was found in harvesting equation. Beach et al. (2004) report ambiguous results in this context. Note that a positive relation between investment costs and harvesting is expected, if the financing of investment is from NIPF's incomes. The cross effects between harvesting and investments were found to be positive.

Table 2 gives the investment cost funding results from Model C. In this case collective price agreements have positive private investment effects. Tax system effects are also positive. Increase of NIPF's forest incomes have a positive effect on supply of private investment funding, but it decreases the demand for public funding. The results given by Beach et al. (2004) support only indirectly these outcomes, because the novelty of employed approach. Real interest rate and price expectation effects are non-positive with low statistical significance. However, investment scale effects or plot size effects are significant and positive.

Table 3 gives the cost-sharing effects from all three model estimations. Model A analysed the harvesting effects. They were found to be non-negative with some statistical significance. However, NIPF investments are boosted with public cost-sharing. The results from Model B based on translog system ML-estimation with cost shares and prices contradict these findings. There exists some substitution between private and public investments. Public cost-sharing is not in all cases incentive supporting. However, the substitution effect between private

Table 2. Model C: NIPF investment funding effects in Finland. Panel data for 19 regions and 18 years (1983–2000). Fixed and random effects estimation (LSDV and 2SLS-LSDV).

	Private FundsSupply	Public Funds Demand
Collective Agreements	+	n.i.
Taxes	+	n.i.
Income	+	–
Real Interest Rates	(–)	(–)
Hectares	+	+
Price Expectations	(–)	(–)

+/– = significant in all estimations at 5% level
(+)/(–) = not significant in some estimations at 5% level
0 = not significant in any estimations at 5% level
n.i. = not included in final estimations

Table 3. Models A-C: Effects of public cost-sharing on NIPF harvesting and investment effects in Finland.

	Model A[1]	Model B[2]	Model C[3]
Harvesting	(+)	n.i.	n.i.
Private Investments	+	–	+
Collective Investments	n.i.	+	n.i.

1) Years 1983–2000 and 19 regions based on investment and harvest volumes.
Cost-sharing measured with unit cost
2) Years 1963–2000 and 2 regions based on investment cost shares and prices.
Cost-sharing measured with cost-shares and unit cost.
3) Years 1983–2000 and 19 regions based on investment funds (costs)
Cost-sharing measured with total public funding.

+/– = significant in all estimations at 5% level
(+)/(–) = not significant in some estimations at 5% level
0 = not significant in any estimations
n.i. = not included in final estimations

financing and repayable favourable loans should be investigated in more details. Note that for collective investments (i.e. investments in forest roads and ditches shared by many NIPF owners) are strongly incentive supporting by public aid (for more details, see Linden and Leppänen 2003b). Model C repeats the result of Model A: Public cost-sharing has in general positive NIPF investment effects. The results reviewed by Beach et al. (2004) give a similar picture. Outcomes in Table 3 indicate that the level of aggregation, estimated models, and how cost-sharing is measured affect the results to some extent.

5. Conclusions

A sum-up of three separate econometric analyses on the public financial assistance for NIPF investments in Finland during period 1963/1983–2000 was given. The analyses were based on different theoretical models. The common feature in all models was the case, where the NIPF owner optimises his/her forest investments under the public cost-share programme.

Theoretical results implied that government investment cost sharing can have positive private investment effects. This result was not rejected in an econometric analysis of the Finnish regional panel data from Forestry Board Districts in years 1983 to 2000. Cost-sharing also increases wood supply.

Aggregate data from Finland in years 1963–2000 was used in analysing substitution between private and public funded investments. The substitution elasticities of purely private, supported individual and supported collective investments were derived from ML estimates of translog system model for cost shares and prices. Supported investments behave in a strongly complementary fashion to each other. Some substitution of supported private funding for non-supported private funding was found, but the substitution between private financing and repayable favourable loans especially during 1990s should be investigated in more details.

Simultaneous econometric model for private and public funding with forest incomes, forest income taxes, interest rates, investment scale, and market wood price expectations as exogenous variables was also estimated. The model estimation with Finnish regional data in period 1983–2000 rejects the substitution alternative.

Generally the results correct the scant view given by Beach et al. (2004) that targeted government aid programs are increasing the amount of NIPF forest investments. A positive forest investment and timber supply effects of public cost-sharing are dominant among NIPF owners in Finland in years 1963–2000.

References

Beach, R.H., Pattanayak, S.K., Yang, J.-C., Murray, B.C. and Abt, R.C. 2004. Econometric Studies of Non-Industrial Private Forest Management: A Review and Synthesis. Forest Policy and Economics, article in press.

Linden, M. and Leppänen, J. 2003a. The Impact of Government Investment Assistance on Forest Investment and Timber Supply. In: Helles, F., Strange, N. and Wichmann, L. 2003. Recent Accomplishments in Applied Forest Economics Research. Forestry Sciences 74:167–180.

Linden, M. and Leppänen, J. 2003b. Effects of Public Financed Aid on Private Forest Investments: Some Evidence from Finland, 1963–2000. Scandinavian Journal of Forest Research 18:560–567.

Linden, M. and Leppänen, J. 2004. Public Cost Sharing of Private Forest Investments in Finland 1983–2000. Submitted manuscript.

Private and Social Land Values of Afforested and Cultivated Fields in Finland

Tapani Pahkasalo, Jussi Leppänen and Kari Hyytiäinen

Finnish Forest Research Institute
Helsinki, Finland

Abstract

Private and social land values of field afforestation are compared within different assistance policies in Finland. Cultivation of oat and reed canary grass were considered alternative land uses. During the years 1995–1999, under the EC Reg. 2080/92, field afforestation target was initially 88,000 hectares, and the aim was principally to reduce agricultural production. However, the programme failed as only some 28,000 hectares were afforested.

With marginal hectare assumption of an active farm, the private land value is lowest in field afforestation, even with the highest financial support of 1995 for afforestation. Reed canary grass production is the most profitable alternative, if distance of biomass demanding energy industry is no more than 60 kilometres from the field.

Field afforestation gives the highest social land value, when carbon sequestration and bioenergy production are social benefits considered. Reed canary grass has adequate social land value especially on peatlands, whereas oat production provides clearly negative outcome when financial assistance and taxes are excluded. In calculations benefits and costs from e.g. labour effects, amenities, biodiversity and carbon flux effects of soils are ignored.

Results may explain why interest in field afforestation has been low and why the EU-funded afforestation programme did not succeed. Field afforestation is not an effective tool in reducing agricultural production, whereas field energy production may provide more attractive opportunities in the future.

Keywords: field afforestation, climate policy, common agricultural policy, field energy, cost-benefit analysis.

Heikki Pajuoja, Ludek Sisak and Krzysztof Kaczmarek (eds.)
Evaluating Forestry Incentive and Assistance Programmes in Europe – Challenges to Improve Policy Effectiveness
EFI Proceedings No. 54, 2005

1. Introduction

The Common Agricultural Policy (CAP) in the European Union (EU) has been aiming at increasing productivity, stabilizing producer prices and securing supply and low consumer prices. The major objectives have evolved in time. One of the main objectives after agricultural reform in 1992 has been to reduce agricultural production and oversupply. Agenda 2000 further emphasized not only reducing the agricultural production but also guaranteeing certain level of income of farmers. Also environmental aspects have become more important with every reform. The coming agricultural reform of 2006 will continue the development of combating the oversupply issue. Increasing attention will be paid on distributive issues and environmental aspects.

Field afforestation has been carried out in Finland since 1969 with the primary objective to reduce agricultural production. Several programmes have taken place with altering success (Figure 1). After the first significant programmes, farmers' interest in field afforestation was very low during the 1980s. The last significant national field afforestation programme was in the early 1990s, when more than 10,000 hectares were afforested annually as Finland was rationalizing the agricultural production. The programme included grants and substantial income-loss compensations. Finland has been a member of the EU since 1995, and the Finnish agriculture part of the Common Agricultural Policy.

In Finland, the field afforestation programme EEC 2080/92 had an objective of withdrawing agricultural land from permanent production and reinforcing forestry as an alternative production line of farms (Programme for... 1995). Afforestation target for years 1995–1999 was set to 88,000 hectares. The programme included afforestation grants, maintenance premium in 2nd and 4th year after afforestation, and 10-year period of agricultural income-loss compensations. In 1997, afforestation target was cut to half (44,000 ha) and also income loss compensations were reconsidered at somewhat lower levels: It was probable that high income loss compensations hindered structural development on farm level because afforesting was more attractive than renting the land for other farmers who intended to expand production. Implementation of the field afforestation programme is therefore a good example of two colliding policies. Total afforested area was less than 28,000 hectares.

According to the implementation audit by the Finnish State Audit Office, the programme 2080/92 was a misjudgement and targets were not carefully set (Paajanen 1999). No reduction in agricultural production was achieved, while the programme acted as a money transfer to already retiring farmers. Financial assistance was misallocated and therefore the programme had no possibility to be successful. Already abandoned fields were afforested while elsewhere forest was exploited for new fields.

Traditionally, field afforestation has been seen as a tool for implementing agricultural policy. Targets and objectives have been set from the agricultural standpoint to serve purposes of the agricultural policy. Field afforestation has seldom been, but should be analyzed also from the forestry point of view (see Niskanen 1999).

In Finnish conditions, field afforestation has had only minor national level significance in wood production and it has provided ambiguous non-market benefits. The timber supply effect is marginal, because since 1969 the afforested areas constitute less than 2% of privately owned forests. Recreational values are usually not connected to afforestation sites, but traditional landscape views have been damaged with field afforestation activities.

Environmental policy has also changed substantially since the 1960s, when the first field afforestation activities began. Environmental values have been recognised, surveyed and the environmental concerns have also changed. Rural biotopes related to traditional agricultural practises belong today to the most threatened habitats in Finland. To conclude, field afforestation programmes of marginal agricultural lands and cultivated fields are considered to have more negative than positive external effects.

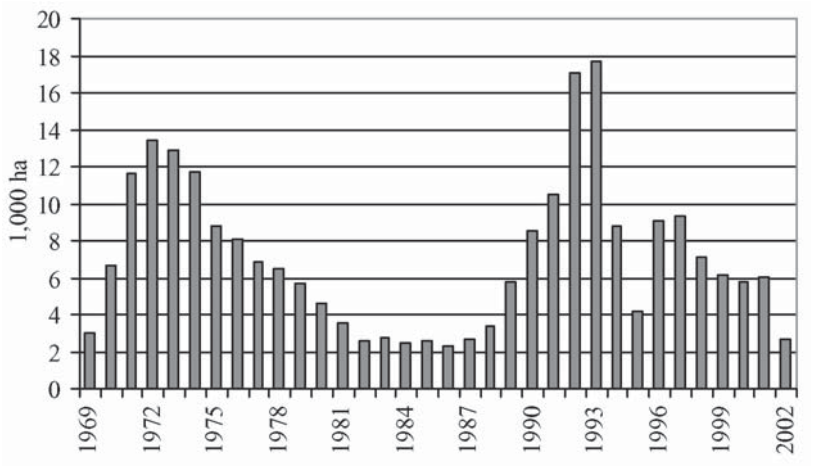


Figure 1. Field afforestation in Finland including cultivated and abandoned fields, 1969–2002. (Source: Finnish Statistical Yearbook of Forestry, 2003.)

However, also climatic change and carbon sequestration have become key issues on political agendas. Bioenergy production is promoted throughout the Europe and new bioenergy demanding industry grows rapidly. Harvest residues from forests are among the most important biofuels in Finland. It is projected that field energy production will grow significantly in the coming years.

The purpose of the study is to examine the economic outcomes of different land management options under different assistance policies from private and social perspective. Land management options considered are field afforestation, oat production as line of traditional agriculture and production of reed canary grass for energy purposes.

2. Methods and data

2.1 Study methods

The employed analysis method is net present value calculation (NPV). In private land value analysis costs and revenues are related to representative farmer and marginal hectare in cultivation. Social land value analysis is similar to cost-benefit analysis (CBA) with the difference that all public costs and benefits cannot be accounted. In addition, the analysis is subject to 'small-project assumption' i.e. possible market effects are ignored (Johansson 1993).

Net present values were calculated for selected land management options under all assistance policies. Market values adjusted for inflation and long term average prices were employed. Agricultural support was assumed to continue on the current level. Production technology and policy restrictions were taken into account. Land value (LV) (1) is thus calculated in following way:

$$LV = \frac{\sum_{t=0}^{s}\left(R_t - \sum_{k=1}^{m} c_{t,k}\right)(1+i)^{-t}}{1-(1+i)^{-s}}$$

where **LV** is land value, **s** is rotation period of the plant, **t** is stand/crop age running over the rotation period, **i** is market real interest rate, **R** is revenues (or social benefits) at time t, **k** is the type of cost (in total m types of costs), **c** is the costs (or social costs) of k at time t. There are infinite number of rotations, as the discount factor $1-(1+i)^{-s}$ states. Taxes and financial assistance are considered as transfer payments and therefore excluded from the social analysis.

Discount rates employed in calculations were 3 and 5%. In addition, average annual net incomes for the first rotation are presented (loosely, forest or agricultural 'rent'). Calculation was carried for all predictable private values (transaction costs between owner generations were excluded) and for chosen social benefits and costs. Social analysis was carried out taking into account benefits from products, carbon sequestration and substitution benefit from bioenergy production. Carbon sequestration analysis was carried out assuming 10 euros unit price for carbon dioxide (CO_2) ton under circumstances of carbon emissions trade that should begin in 2005 in the EU.

2.2 Field Afforestation Data

Inventory data

The afforestation investments are subject to high risks especially in their early development, which cannot principally be evaluated by stand development models. Therefore, field inventory data is required for proper field afforestation evaluation.

The Finnish Forest Research Institute has monitored field afforestation experiments established in 1990 on actual private field afforestation sites (Ferm et al. 1993). Majority of the fields had been in agricultural production in the preceding year prior to afforestation. Field experiments have been measured repeatedly and the latest inventory data is collected at the age of 11 years. At that age, the stands have passed the most risky phase of the rotation and can be reliably applied as initial state for predicting the future growth and yield for the remaining part of rotation. In the latest field inventory also the future timber quality was estimated.

Fields planted with either Norway spruce (*Picea abies*) or two birch species were accepted for the sample. Silver birch (*Betula pendula*) has been used on mineral soils and downy birch (*Betula pubescens*) on organic soils (peatlands). Other tree species (mainly Scots pine) were of minor importance in 2080/92 programme and were therefore excluded from the study. Field afforestation with pine is related to poor timber quality and consequent low economic performance (Aarnio and Rantala 1994; Niskanen 1999). In total of 75 plots, distributed evenly over soil types and regions in Finland, were included in the study.

Stand growth model

Simulation was employed to predict the future growth and yield on the field afforestation plots. Inventory data was modified for the MOTTI-simulator to predict the stand development over age, harvested yields and logging costs (for models, see Hynynen et al. 2002). Standard management regime was chosen for the field afforestation plots. Forestry extension organization Tapio's (2001) recommendations for thinning and rotation age were followed.

Data for private land values in afforestation

Costs and revenues are specific for each individual experiment. An example of typical cost-revenue structure is presented in Annex 1. However, there is a lot of variety within the field afforestation data. Costs and net harvest revenues are reported after taxes (29%).

Today, government offers grants (Act on the ... 1996) for field afforestation activities in Finland. Forest owners receive grants for labour costs (20% – 55%) and tending costs (50% – 70%) depending on the geographical region. Material cost grant is 100%, i.e. plants and other material (herbicides etc.) are fully financed from public sources.

During the field afforestation programme EEC 2080/92 agricultural income loss compensations and maintenance premium were paid for landowners. Afforestation costs were paid according to Act on the financing of sustainable forestry (1996) and preceding Forest Improvement Act (1987). Income loss compensations for farmers were between 193 and 236 € per hectare annually for the first ten years, depending on the geographical region. In 1997, the income loss compensations were reduced to annual 151–219 € per hectare.

Data for social land values in afforestation

Carbon dioxide emissions can be considered as a cost and reduction in atmospheric carbon dioxide as a benefit for the society. Forests sequester carbon dioxide from the atmosphere. Social price for carbon dioxide (10 € / ton) is assumed and absorbed carbon in the forest is accounted as a benefit to society. Biomass increment data is derived from the growth simulation and sequestered carbon dioxide is calculated from the increment data.

Harvested timber is further processed into wood-based products and the final harvest residues are used for energy production. Carbon is stored in the product until the wood-based product is either burned or decomposed. Release of CO_2 causes a cost for the society, just as sequestration was accounted as benefit. Wood products carbon model (Karjalainen et al. 1994) was applied with some updated values (Liski et al. 2001). No recycling and landfill storage was accounted for, but the carbon was assumed to be released back into the atmosphere after the first use. Harvest residues from final cut and energy produced in pulping process were assumed to be CO_2 free. Wood-based fuels are carbon neutral according to international agreements and therefore not causing a cost for the society. Similar carbon neutrality was assumed for reed canary grass in energy production described hereafter. Biofuels are assumed to substitute for other (fossil) energy sources. Material substitution effects were not accounted in this study, but they could also be significant (see e.g. Petersen and Solberg 2002, 2003).

In the social land value analysis all amenity and biodiversity values were neglected. Amenity factors are very often site-specific and should be evaluated for every site separately. However, in most cases field afforestation has been opposed due to amenity values. All carbon flux effects of soils were ignored, although it is known that great amounts of carbon can be stored in forest soil. Carbon in the soil can be tenfold to the amount in the wood biomass (Kauppi et al. 1997). Forest soil can be a carbon sink, but it is not known when afforested field turns into a carbon sink instead of being a carbon source. This may take up to 50 years or more (Hytönen 1999; Wall 1998). Also forest soil remains a carbon source for 20 years after the clear cut (Mäkipää et al. 1998). Agricultural land is usually a carbon source (Maljanen 2003), but this depends also on the cultivation technology and plants. To conclude, available forest carbon data and models were not suitable for soil carbon simulation, especially on the organic soils like peatlands.

2.3 Agricultural data

Considering traditional agriculture, oat (*Avena sativa*) production is an important use of fields in Finland and is therefore taken as one of the alternative land management options. Reed canary grass (*Phalaris arundinacea)* production for energy purposes (non-food production) is

taken as another, new production line of agriculture. Demand and financial support for reed canary grass production is increasing and it is predicted to grow rapidly in the coming years.

Data for private land values in agriculture

Based on average figures 1995–2003 and updated to 2004 situation, financial data for oat production are presented in Annex 2. The reed canary grass production technology and level is obtained from Pahkala et al. (2003). Current prices (2003–2004) are employed since no earlier data exist. Harvest levels vary annually due to biological variation. Support levels also vary greatly between the years due to changes in the agricultural support policy. Agricultural support includes CAP, LFA (Least Favourable Area), agri-environmental support and national aid system. Harvest revenues are in connection to agricultural assistance system via unit prices and therefore only data after 1995 were used.

Net present value (i.e. land value) of oat production is calculated by capitalising the annually realised net incomes from average production over an infinite time horizon. Similarly, land value for reed canary grass production is calculated by applying infinite series of 12-year rotation periods, where establishment costs occur only in the first year, harvest revenues 10 times and annual costs 12 times. Maximum transport distance to energy demanding industry is assumed as in present contracts, 60 kilometres. Alike in afforestation analysis, 29% tax rate was applied to both oat and reed canary grass production.

Reed canary grass substitutes for other energy sources when it is burned for energy. CO_2 premium will be paid for reed canary grass producers in case the CO_2 trade begins in 2005 as planned. Premium for the substitution effect is 15 € per dry matter ton, if CO_2 price will be 10 € per ton. The figures are from a Finnish energy producer, substituting reed canary grass for peat (Pohjolan Voiman ... 2004). Higher revenue from reed canary grass production can be seen in Annex 2.

Data for social land values in agriculture

In this study, social carbon-related costs and benefits of agriculture are entirely connected to energy substitution since carbon flux effects of soil are not taken into account. Agricultural soil is often a net source of carbon dioxide (Maljanen 2003) and annual carbon sequestration by growing biomass (food) is assumed to be released instantly to atmosphere.

Social benefit of reed canary grass production is received from the substitution in the source of the energy. It is assumed that the social benefit is included in the CO_2 premium paid for the reed canary grass producer. If the CO_2 ton has a 10 € market value, reed canary grass will have a higher unit value (+15 € / dry matter ton). All taxes and agricultural support are excluded from the social land value calculations.

3. Results

3.1 Private land values

Field afforestation

Field afforestation with spruce was found more profitable compared to birch on both soil types in both regions. In Southern Finland afforestation had higher land values than in Northern

Table 1. Private average annual net incomes and land values for the field afforestation without financial assistance, euro/ha.

	annual net incomes	3%	5%
Mineral soils	153	1,357	- 115
Peatlands	31	- 623	- 849
Spruce	141	1,046	- 269
Birch	44	- 292	- 692
Southern Finland	128	1,080	- 219
Northern Finland	58	- 322	- 748
Weighted average	109	663	-372

Note: Net-incomes and land values after taxes (29%).

Table 2. Private weighted annual net incomes and land values for field afforestation according to different financing options, euro/ha.

	annual net incomes	3%	5%
a) Self-financed	109	663	-372
b) State assisted	123	1,262	238
c) EEC 2080/92 1995	150	2,801	1,633
d) EEC 2080/92 1997	148	2,626	1,472

Note: Net-incomes and land values after taxes (29%).

Finland with both tree species and on both soil types. Field afforestation on mineral soils had higher land values than field afforestation on peatlands. Results are presented in Table 1.

Results for different soil types, regions and tree species vary considerably. In average terms field afforestation has a positive land value, but several plots analyzed in this study have negative land values. Weighted average for field afforestation plots was calculated based on implemented field afforestation: Species compositions and geographical information for EEC 2080/92 and soil type composition for the total afforestation period 1969-2003. Weighted average of field afforestation is employed in this study as field afforestation land value. Note, however, that there is a lot of variation in land values between individual fields.

Different financing options analysed were **a)** self-financed afforestation, **b)** present situation with state assisted afforestation (Act on the ... 1996) and afforestation under EEC 2080/92 programme with income loss compensation and premium on **c)** 1995 and **d)** 1997 levels. Financial assistance and income loss compensation have great significance on field afforestation land values (Table 2). State assisted field afforestation provides almost two-fold land value compared to self-financed option at 3 % discount rate. When income loss compensation under EEC 2080/92 (1995 level) is taken into account, it can be seen that land value is over four-fold compared to the situation where all expenses are paid by the landowner (3% discount rate).

Table 3. Private annual net incomes and land values for oat and reed canary grass production, averages from 1995–2003, euros/ha.

	annual net incomes	3%	5%
Oat	163	5,448	3,269
Reed canary grass	181	6,095	3,684
Reed canary grass with CO_2 premium	240	8,058	4,859

Note: Net-incomes and land values after taxes (29%).

Agricultural land uses

Land values for oat and reed canary grass production are based on average figures and therefore there is no variation in the results. In reality, variation exists due to several reasons, but this is not considered in this context. Reed canary grass production proved to have slightly higher land value than oat production (Table 3). If CO_2 premium will be paid for reed canary grass, the difference in land values is clear.

Comparison of land uses

According to our results, continued agricultural production (oat and reed canary grass production) is clearly more profitable use of land than field afforestation (Figure 2). Field afforestation, even with the highest income loss compensations of 1995, does not reach the same land value as agriculture and is therefore the least profitable use of land. Oat production land value is over four-fold compared to field afforestation with state assistance (when computed at 3% discount rate). If CO_2 premium is paid for reed canary grass, the land value will be over six-fold compared to field afforestation land value with state assistance.

3.2 Social land values

Field afforestation

Social land values of field afforestation are partly following the private land values, since the value of carbon as a public benefit considered in this study is connected to the biomass increment and life-cycles of wood products. If there was a failure or damage in early stage of afforestation and therefore low private land value, this is reflected to social land value as well. Social land value results are rather different for different soil types, tree species and geographical regions (Table 4).

Agricultural land uses

Without agricultural support and taxes, neither oat production nor reed canary grass production have positive land values (Table 5). The CO_2 premium for reed canary grass is included in the calculation, since it is assumed the premium represents benefit for the society.

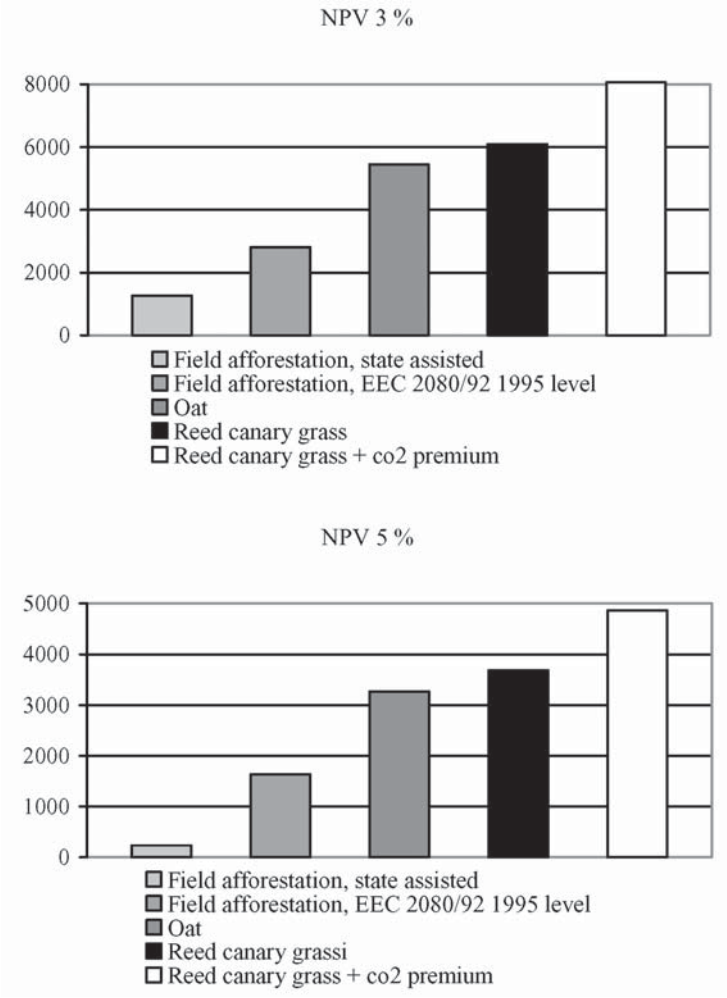


Figure 2. Private land values (NPV) of different land management options, euro/ha.

Low land value especially in oat production is due to high production costs, low producer prices and low harvest levels. In private land value, this is compensated by agricultural support and in case the support is removed the land value is clearly negative.

Comparison of land uses

Field afforestation has clearly higher land values than oat and reed canary grass production, when the public costs and benefits (carbon sequestration, carbon storage of wood products and bioenergy production) are taken into account (Figure 3). In fact, field afforestation is the only land management option that yields positive land value under these assumptions.

Reed canary grass has much higher land value compared to oat production. The land value is rather close to that of field afforestation especially on peatlands. As a land use, reed canary

Table 4. Social annual results and land values for field afforestation, euro/ha.

	annual result	3%	5%
Mineral soils	259	4,141	1,232
Peatlands	54	2	-672
Spruce	226	3,192	735
Birch	90	983	-168
Southern Finland	209	3,410	866
Northern Finland	109	815	-281
Weighted average	185	2,702	571

Table 5. Social annual result and land values for agricultural production, average 1995–2003, euro/ha.

	annual result	3%	5%
Oat	-252	-8,385	-5,031
Reed canary grass	-25	-1,094	-764

grass production has very different characteristics than field afforestation but is more similar to oat production. External effects, like amenity values, can be expected to have comparable magnitude in both forms of agriculture.

An interesting notion is that the social land value of field afforestation has been almost equal to private land value under the income loss compensations and premium of the EEC 2080/92 field afforestation programme in 1995–1999 (Figure 4). Carbon sequestration benefit received by the society was thus paid for the producer of that benefit. In case there was no opportunity cost of the land, future timber sales revenues and the income loss compensations equalled the benefit society received.

The employment effects of different land use categories are very different due to different production periods (Table 6). Traditional agriculture (oat production) is the most labour intensive production line. Reed canary grass requires less effort in production and the employment effects are less than half compared to oat production. Field afforestation is labour demanding during the first years but then the need for labour will nearly disappear for the remaining rotation period. Only highly mechanized thinnings and final cut offer some employment benefits during the production period.

4. Discussion and conclusions

4.1 Field afforestation results compared to earlier studies

For the major parts, our results from the field afforestation private land values are in line with the earlier studies (Aarnio and Rantala 1994; Hynönen 2000; Niskanen 1999). Afforestation

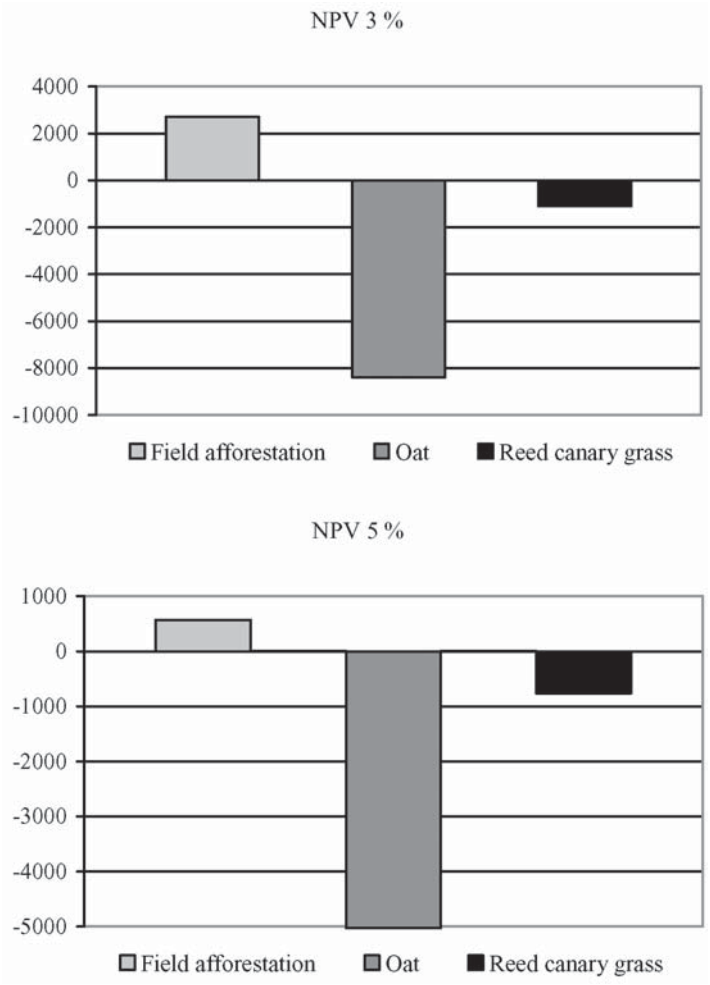


Figure 3. Social land values of land management options, euros/ha.

had highest land value on mineral soils and in Southern Finland as expected. However, Niskanen (1999) suspected that neglecting the timber quality assessment will lead to overestimated timber revenues in field afforestation with birch. According to our results, afforestation with spruce has clearly higher land value compared to birch, although latter can also provide positive private outcome. This finding is significantly different from Aarnio and Rantala (1994) and to some extent different from Niskanen (1999). The difference may be caused by the employed data in general or by the fact that timber quality assessment was included in the data employed in the present study. Fields afforested with birch often provide only pulpwood in harvests. Therefore, it seems to be very important to assess timber quality in field afforestation evaluations.

Differences within the private land values of field afforestation are so great that attention must be paid to implementation. Although the primary objective of field afforestation is the withdrawal of land from agricultural production, it does make difference how the field afforestation is carried out.

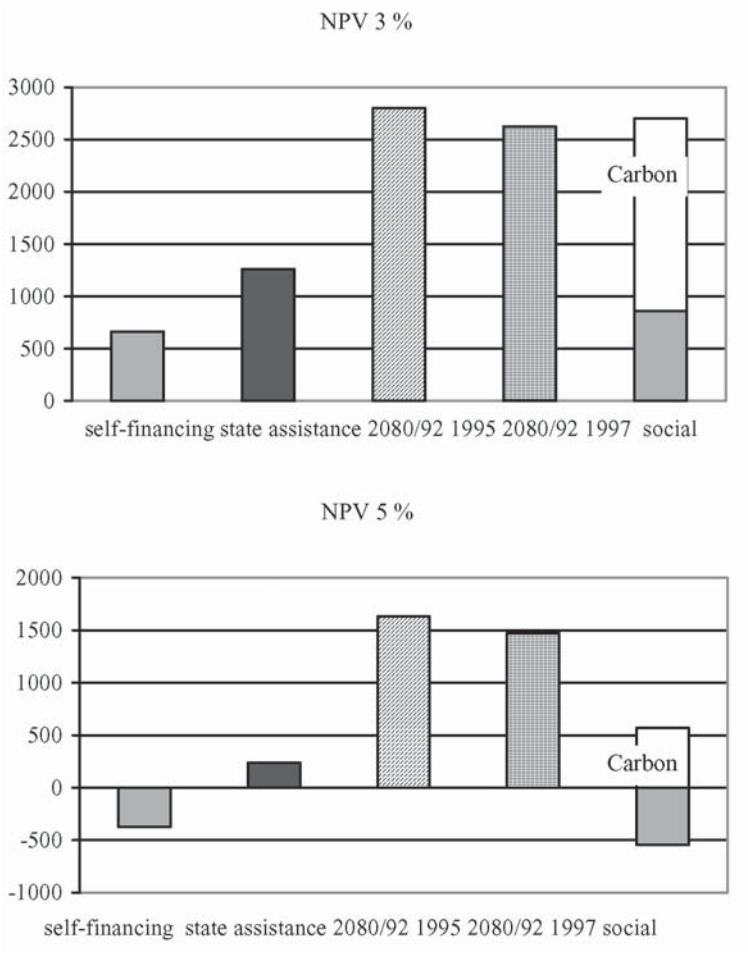


Figure 4. Private and social land values of field afforestation under different financing options, euro/ha.

Field afforestation on peatlands with only spruce in Southern Finland had a positive land value. Rest of the afforestation on peatlands resulted into negative private land values without financial assistance. From forest economics point of view these investments are irrational and may not have been carried out in the best possible way. Aarnio and Rantala (1999) suggested natural reforestation on peatlands as an alternative to planting.

4.2 Reasons for failure of the afforestation programme EEC 2080/92

From private actors' point of view, field afforestation has to have higher land value than continuing agricultural production, selling or renting the land, in order to motivate the agricultural land owners to afforest the fields. Field afforestation programme EEC 2080/92 had little possibilities to success in the reduction of agricultural production since agricultural

Table 6. Employment effects of different land management options.

	amount, hours	rotation, years	amount per year, hours
Field afforestation	40.0	80	2.0
Oat production	11.6	1	11.6
Reed canay grass	9.3	1 / 10 / 12	5.5

Note: Reed canary grass is seeded once, harvested 10 times and administrative tasks occur 12 times in a 12 year production period.

land uses remained more profitable and therefore more attractive production lines. Results indicate that agricultural production has a clearly higher private land value on marginal hectare than field afforestation under state financial assistance, income loss compensations and premium paid under programme EEC 2080/92.

In the realised field afforestation the decision to give up active farming has often been made first before the field afforestation decision (Mustonen 1990; Petäjistö et al. 1993; Petäjistö and Selby 1994). Therefore, retiring farmers have afforested their fields, when they give up production rather than active farmers afforesting agricultural land.

Higher land values of agricultural land uses compared to afforestation were ensured by the Ministry of Agriculture and Forestry when the income loss compensations paid within the programme EEC 2080/92 were lowered (Proposal for a modification ... 1997). According to the Ministry, high income loss compensations could have been a hinder for enlarging the agricultural production units in Finland. Objectives of reducing agricultural production, and at the same time, enlarging remaining production units proved not to be compatible.

4.3 Social land values of land management options

Although the results of our study indicate that field afforestation has the highest social land value and oat production the lowest, it must be noted that other social costs and benefits than carbon sequestration by growing biomass, carbon stored in the wood products and bioenergy production were not taken into account in this study. For instance, employment effects in agriculture are much more significant than in field afforestation. This can be seen crucial for maintaining the vitality and the inhabitants of the countryside, which on the other hand are crucial for maintaining traditional rural biotopes. In addition, landscape and other amenity values can be affected negatively by field afforestation.

One of the key results is, however, that on peatlands the social land value of field afforestation is very close to average social land value of reed canary grass cultivation. Therefore, reed canary grass can be seen as a very competitive alternative for field afforestation.

An interesting observation is that social land value of field afforestation was equal to private land value of field afforestation, under the EEC 2080/92 field afforestation programme's income loss compensations and premium in 1995–1999. Carbon sequestration benefit received by the society was thus paid for the producer of that benefit. From this point of view, the EEC 2080/92 programme proved to be successful. However, referring to the original target of the EEC 2080/92 programme, field afforestation is not a very effective tool in reducing agricultural production in Finland.

References

Aarnio, J. and Rantala, T. 1994. Peltojen metsänistutuksen yksityistaloudellinen kannattavuus. Folia Forestalia – Metsätieteen aikakausikirja 1994(1): 3–17.
Aarnio, J. and Rantala, T. 1999. Peltojen luontaisen metsityksen yksityistaloudellinen kannattavuus. Metsätieteen aikakausikirja 1999(1): 25–37.
Act on the financing of sustainable forestry. 1094/1996.
Ala-Mantila, O. and Riepponen, L. 1998. Maatalouden tuotantokustannukset Suomessa. Maatalouden taloudellinen tutkimuslaitos. Tutkimuksia 222. 120 p.
Finnish Statistical Yearbook of Forestry. Finnish Forest Research Institute. Helsinki. 388 p.
Ferm, A., Hytönen, J., Koski, K., Vihanta, S. and Kohal, O. 1993. Peltojen metsitysmenetelmät. Kenttäkokeiden esittely ja metsitysten kehitys kolmen ensimmäisen vuoden aikana. Metsäntutkimuslaitoksen tiedonantoja 463. 127 p.
Forest Improvement Act. 140/1987.
Hemming, M., Maunu, T., Suokannas, A., Järvenpää, M. and Pehkonen, A. 1996. Agrokuidun tuotanto ja käyttö Suomessa. Tutkimuksen loppuraportti, II osa. Ruokohelven varastointi, korjuu ja mekaaninen esikäsittely sekä tuotantokustannukset ja saatavuus. Maatalouden tutkimuskeskus, 1996. 98 p.
Hynynen, J., Ojansuu, R., Hökkä, H., Siipilehto, J., Salminen, H. and Haapala, P. 2002. Models for predicting stand development in MELA System. Metsäntutkimuslaitoksen tiedonantoja 835. 116 p.
Hynönen, T. 2000. Pellonmetsityksen onnistuminen Itä-Suomessa. Metsäntutkimuslaitoksen tiedonantoja 765. 90 p.
Hytönen, J. 1999. Pellonmetsityksen onnistuminen Keski-Pohjanmaalla. Metsätieteen aikakauskirja 4/1999: 697–710.
Johannson. P.-E. 1993. Cost-Benefit Analysis of Environmental Change. Cambridge University Press. 232 p.
Karjalainen, T., Kellomäki, S. and Pussinen, A. 1994. Role of Wood-Based Products in Absorbing Atmospheric Carbon. Silva Fennica 28(2): 67–80.
Kauppi, P., Posch, M., Hänninen, P., Henttonen, H., Ihalainen, A., Lappalainen, E., Starr, M. and Tamminen, P. 1997. Carbon reservoirs in peatlands and forests in the boreal regions of Finland. Silva Fennica 31: 13–25.
Kemira GrowHow Ltd. 2004. http://www.kemira-growhow.com
Laaksonen, K. 2000. Maatalouskoneiden kustannuslaskenta ja konetöiden hinnoittelu. Työtehoseuran maataloustiedote 4/2000 (520). 8 p.
Laaksonen, K. 2001. Urakointihinnat ja konetyön kustannukset. Työtehoseuran maataloustiedote 6/2001 (535). 8 p.
Liski, J., Pussinen, A., Pingoud, K., Mäkipää, R. and Karjalainen, T. 2001. Which rotation length is favourable to carbon sequestration? Canadian Journal of Forest Research. 31: 2004–2013.
Maljanen, M. 2003. Greenhouse Gas Dynamics of Farmed of Forested Organic Soils in Finland. Kuopio University Publications C. Natural and Environmental Sciences 156. 39 p.
Maunu, T., Järvenpää, M. 1995. Ruokohelven tuotantokustannus ja korjuuvarmuus. Työtehoseuran maataloustiedote 3, 1995 (455). 6 p.
Mellanå Plant Ltd. 2004. Forest plants brochure. Price information.
Mustonen, M. 1990. Pellon metsittämiseen vaikuttavat tekijät. Metsäntutkimuslaitoksen tiedonantoja 365. 70 p.
Mäkipää, R., Karjalainen, T., Pussinen, A. and Kellomäki, S. 1998. Effect of climate change and nitrogen deposition on the carbon sequestration of a forest ecosystem in the boreal zone. Canadian Journal of Forest Research 29: 1490–1501.
Niskanen, A. 1999. The financial and economic profitability of field afforestation in Finland. Silvica Fennica 33(2): 145–157.
Paajanen, V. 1999. EU:n metsätoimenpideohjelman toimeenpano. ETY 2080/92 -asetuksen mukainen pellonmetsitys Suomessa. State Audit Office, Finland. Tarkastuskertomus 15/99. 51 p.
Pahkala, K., Partala, A., Suokangas, A., Klemola, E., Kalliomäki, T., Kirkkari, A-M., Sahramaa, M., Isolahti, M., Lindh, T. and Flyktman, M. 2003. Ruokohelven viljely ja korjuu energian tuotantoa varten. Maa- ja elintarviketalous 1. Kasvintuotanto. 20 p.
Palonen, J. 1997. Ruokohelpeä ja olkea energiantuotantoon. Työtehoseuran maataloustiedote 5, 1997 (483). 8 p.
Petersen, A.K. and Solberg, B. 2002. Greenhouse gas emissions, life-cycle inventory and cost-efficiency of using laminated wood instead of steel construction. Case: beams at Gardermoen airport. Environmental Science and Policy. 5/2002. Pp. 169–182.
Petersen, A.K. and Solberg, B. 2003. Environmental and economic impacts of substitution between wood products and alternative materials: a review of micro-level analyses from Norway and Sweden. Forest Policy and Economics. Article in press.
Petäjistö, L., Mustonen, M. and Selby, J.A. 1993. Metsittääkö vai ei? Metsäntutkimuslaitoksen tiedonantoja 448. 32 p.
Petäjistö, L. and Selby, A.J. 1994. Pellonmetsitysalttiuteen vaikuttavat käyttäytymis- ja arvotekijät. Metsäntutkimuslaitoksen tiedonantoja 487. 50 p.
Pohjolan Voiman tiedote ruokohelven viljelijöille. 2004. 2 p.
Programme for forestry measure in agriculture. 1995. Ministry of Agriculture and Forestry. Department of agricultural policy. 16 p.
Tapio. 2001. Hyvän metsänhoidon suositukset. Julkaisusarja 13/2001. 95 p.
Wall, A. 1998. Peltomaan muutos metsämaaksi – metsitettyjen peltojen maan ominaisuudet, kasvillisuuden kehitys ja lajimäärä. Metsätieteen aikakauskirja 3/1998: 443–450.
Yearbook of Farm Statistics. 2003. Ministry of Agriculture and Forestry. Helsinki. 266 p.

Annex 1. Field afforestation costs and revenues on sample plot Nuijamaa. (Sources: Ferm et al. 1993; Act on ... 1996; Kemira GrowHow Ltd 2004; Laaksonen 2000, 2001; Mellanåplant Ltd 2004.)

	Year	EUR / ha a) self-financed	EUR / ha b) state assisted
Herbicide spraying	1989	- 12	-9
+ herbicide, 5 ltr		- 43	
Ploughing	1989	- 46	-37
Soil preparation and ditching	1989	- 177	-142
Planting	1990	- 324	-259
+ material costs		- 625	
Grass mowing	1990	- 65	-52
Manual spraying	1990	- 50	-40
+ herbicide, 5 ltr		- 43	
Total		- 1,385	- 539
Tending of young stand	1997	- 169	- 85
1st thinning	2009	607	607
2nd thinning	2014	904	904
3rd thinning	2029	2,211	2,211
Final cut	2044	9,094	9,094

Note: Costs and revenues are before taxes. State grant is 20% for labour costs, 50% for tending costs and 100% for material costs.

Annex 2. Costs and revenues for oat and reed canary grass production in Finland, 1995–2003, updated for 2004. (Sources: Ala-Mantila 1998; Hemming et al. 1996; Kemira GrowHow Ltd 2004; Laaksonen 2000, 2001; Yearbook of Farm Statistics 2003; Maunu and Järvenpää 1995; Pahkala et al. 2003; Palonen 1997.)

	Oat	Reed canary grass	
	2004	2004	CO_2 trade
Costs			
Establishment costs		272	272
Annual costs	606	38	38
- harvest		82	82
- fertilizing		75	75
Revenues			
Harvest revenues	354	100*	200*
Annual support	482	363*	363*
Total annual revenues	836	463*	563*

Note: Costs and revenues are before taxes.
* Average values, although annual values employed in calculations.

The Social and Environmental Benefits of Forestry in Great Britain

Pat Snowdon[1] and Ken Willis[2]

[1]Forestry Commission, Edinburgh, UK
[2]University of Newcastle, Newcastle, UK

Abstract

Non-market social and environmental benefits occupy a major role in forest policy in the UK. Since the 1980s, UK forests have been managed increasingly for multi-purpose objectives, a policy which has been underpinned by international agreements on sustainable forestry. Within this context, there is a need to understand public preferences and values for the outputs of forests. Under-valuation of these outputs can impede the efficient allocation of resources required for sustainable forest management. A major study funded by the Forestry Commission estimated marginal and total values for a wide range of social and environmental benefits. The paper discusses the valuation methods that were used, and presents the main results of the study. Finally, the methodological and policy implications of the results UK are discussed.

Keywords: Economic valuation, environmental, non-market, social.

1. Introduction

Forest policy in the UK is based on multiple objectives under which non-market outputs are provided in addition to timber production. Investigation into non-market outputs from forests and woodlands has been a major avenue of economic research in the UK (and elsewhere) in recent years. This paper reports on a study funded by the Forestry Commission in the UK to value a range of non-market social and environmental benefits provided by forests in Great Britain (i.e. England, Scotland and Wales). The paper comprises several parts. First, the policy framework surrounding forestry is reviewed. Second, a brief review is provided of earlier studies to value non-market benefits and the methods used. Third, the methodology and results of this study are presented. Finally, the methodological and policy implications of the study are discussed and conclusions drawn.

Heikki Pajuoja, Ludek Sisak and Krzysztof Kaczmarek (eds.)
Evaluating Forestry Incentive and Assistance Programmes in Europe – Challenges to Improve Policy Effectiveness
EFI Proceedings No. 54, 2005

2. Forest policy in Great Britain

The current institutional framework supporting forestry in Britain dates to the formation of the Forestry Commission (FC) in 1919. Exacerbated by felling to meet wartime needs, forest cover in Great Britain had fallen to around 5% (Forestry Commission 2003). The FC was charged with acquiring, afforesting and managing land and with incentivising (and regulating) the private sector to plant and manage forests. Despite repeated changes in policy and institutional structures, and a succession of government reviews, this dual function of the FC survives essentially intact. The FC remains the principal government department responsible for delivering forestry policy in the UK although this role has become increasingly interdependent with wider government objectives.

In the first half of the 20th century, government intervention in forestry was driven by a need to maintain a strategic supply of timber in case of future military conflicts. The 1950s to 1970s saw a steady recognition of wider forest values – especially wildlife and recreation – as public demand for outdoor recreation increased and as environmental issues became a key public concern. Substantive changes in forest policy and practice followed and, by the early 1990s, a multi-purpose role for forestry was firmly embedded in government policy (FC 1991). Forestry also became part a more cross-sectoral and integrated approach to land-use policy that has developed since the 1980s, as shown in reforms to EU Structural Funds programmes and, to some extent, the Common Agricultural Policy. Over the same period, the multi-functional role of forests was further advocated through a series of international agreements (following the Rio 'Earth' Summit) within the broader context of sustainable development.

Most recently, forest policy in Britain has been devolved to the government administrations in England, Scotland and Wales. Separate forest strategies for England, Scotland and Wales were launched at the end of the 1990s and set out the objectives of forestry in each country. While there are differences in emphasis between the three countries, each strategy is firmly based on a multi-purpose role for forests and woodlands, in which the provision of non-market social and environmental benefits is a central aim.

3. Previous research on non-market benefits of forests and woodlands in Great Britain

The non-market outputs of forests and woodlands are associated with a range of market failures. Market failure is a fundamental premise for government intervention (see Balls et al. 2004) as long as any resulting intervention provides a net gain to society. CJC Consulting (2003) identifies possible market failures in relation to forests and woodlands for recreation, biodiversity conservation, landscape amenity, carbon sequestration, air pollution and water regulation[1]. Since the late 1980s, environmental economists in Great Britain have devoted substantial effort to estimating values for non-market outputs of forests and woodlands. Such work is important to understanding public preferences for the different outputs of woodlands, and to providing evidence to inform the design and implementation of forest policy. Research on non-market outputs of forests has focused on several main areas.

First, the valuation of non-market benefits of forests and woodlands in Britain was kick-started to a large extent through research into recreational values of forests, initially through

1 These outputs exhibit at least two of the main qualities that cause market failure: externalities and public goods.

a series of revealed preference (travel cost) studies (see Willis and Benson 1989; Willis and Garrod 1991; Dobbs 1993). Willis et al. (2000) indicate that research on the valuation of forest recreation made significant advances in resolving methodological issues and in examining values in specific woodland localities but, by the late 1990s, had contributed relatively little to producing reliable estimates of the value of open access non-priced recreational benefits across woodland as a whole in the UK.

Second, woodland landscapes were investigated in a number of studies during the 1990s, using revealed (hedonic pricing) and expressed preference (contingent valuation, choice experiments) methods. ENTEC (1997) valued landscape attributes (species, shape and felling regime) and willingness to pay (WTP) for an 'ideal' forest design but the attributes were generic and lacked sufficient detail to be applied to individual forests. Willis et al. (2000) concluded that different studies had used different landscapes and contexts and that a consensus had not been reached on a monetary estimate for forestry's contribution to landscape.

The third key area of research into non-market forest outputs concerns biodiversity. Biodiversity is a difficult concept to grasp and generating associated public preferences has proven a problematic task. Prior to the mid-1990s, the FC had limited knowledge of public preferences regarding forest biodiversity. This deficit of knowledge was partly addressed by ERM et al. (1996) who used contingent valuation and contingent ranking techniques, applied to a stratified random sample of nearly 1700 households across Great Britain, to investigate public preferences (non-use values) for enhancing biodiversity through improved management of remote coniferous forests. The study showed that substantial non-use values are generated through improved management for biodiversity in commercial forests. However, there remained a lack of knowledge about the biodiversity values associated with other types of woodlands.

The remaining key area of research is the role of trees in abating greenhouse gases. The principal focus here has been on the carbon sink effect of forests and woodlands (see, for example, DETR 2000). The FC and others have carried out work to estimate the physical effects of forests and woodlands on carbon sequestration (Matthews 1993). There is also a substantial body of work on the economic values (social costs) of carbon emissions, although such estimates vary widely (Pearce 2003). The contribution of forests to greenhouse gas abatement has acquired increasing political interest although, by the end of the 1990s, there had not been an overall estimation of the contribution of Britain's forest estate to this end. Further work was also needed on the variations in carbon sequestration associated with different forest management regimes.

Finally, earlier research has shown that forests and woodlands generate other forms of non-market outputs; including effects on water quantity and quality, pollution absorption, human health and the preservation of archaeological artefacts. However, Willis et al. (2000) indicated that existing evidence suggested that such effects were relatively small although it was also clear that further scientific understanding was needed to inform conclusions about the magnitudes of any related economic costs and benefits.

In summary, a substantial but disparate body of research into the non-market outputs of forests and woodlands emerged during the 1990s. Much of this work addressed methodological tasks commensurate with a relatively nascent and challenging area of research. A wide range of increasingly sophisticated estimation techniques had been used in the research. Inconsistencies in methodologies limited the extent to which values from different studies could be compared. Values for some outputs proved sensitive to estimation methods and major tasks remained to overcome data and statistical constraints pertaining to these methods. From a policy perspective, a more comprehensive estimate of the non-market outputs of forests was needed to inform management decisions on the forest estate.

4. Study on the social and environmental benefits of forestry

In the late 1990s, the FC commissioned a major research study to provide a more comprehensive valuation of the non-market outputs of forests and woodlands in Great Britain. The study comprised two phases. Phase 1 reviewed existing research and methodologies and recommended areas for subsequent research. Phase 2 of the study aimed to provide empirical estimates of the:

(i) the total value of the non-market benefits of Britain's public and private forests, disaggregated to country and regional levels; and,
(ii) marginal values of non-market benefits that can be used to inform a selected range of forest management practices.

Based on the review in Phase 1, the study focused on providing values for the recreation, biodiversity, landscape and carbon sequestration. Analysis was also carried out on benefits relating to air pollution absorption, water quantity and quality, and the preservation of archaeological sites, although this tended to be more exploratory in nature. A range of estimation techniques were employed to derive values for the different benefits. Existing data sources and information were used where available and empirical methods were used to generate data for the estimation of recreational, landscape and biodiversity benefits of forests. The methods and main findings are set out below.

Recreation

The recreation component of the study (Scarpa 2003) used data from the EU CAMAR data set (Ni Dhubhain et al. 1994), which sampled 15,000 recreational visits to 42 forests in Scotland and Ireland, and from new surveys of forest visitors at seven English and Welsh forests. Scarpa (2003) aimed to estimate the recreational value of forests in Britain through a benefits transfer function[2] derived from the EU CAMAR data set. The reliability of the benefit transfer function was verified through the new survey in 2002[3]. CV methods were used in the EU CAMAR study and by Scarpa (2003) to estimate the "compensating variation" that visitors would require to forgo recreation in a woodland. An open-ended WTP question in the 2002 survey generated a mean WTP of £1.66 although, if an entry charge were actually levied, 34% of respondents indicated that they would reduce the number of visits they made to forests. In practice, it was not possible to use a benefit transfer function to aggregate values across Great Britain due to insufficient data on forest site attributes for a large number of woodlands in Britain. Therefore, a generic (site-independent) value transfer was used, based on the mean WTP of £0.90 for forest visits within a short distance from home (less than 10 miles) and £1.80 for longer distance visits. On this basis, the aggregated value was estimated to be £393 million per year in Great Britain. Over 90% of this value was attributable to woodland located in England, reflecting the proportion of the British population that lives there.

2 The function was based on the following woodland attributes: forest area, percentage cover of broadleaves and larch, presence of nature reserves [which all had a positive effect on utility] and conifers and congestion (annual visits/car-park capacity) [which had negative effects on utility].
3 Reliability was tested by comparing mean and median estimates, using benefit transfer, of visitors' WTP to gain access to the 7 forests in England and Wales with estimates from the actual survey carried out in 2002.

Landscape

The landscape component of the study, carried out by (Garrod 2003), aimed to investigate public preferences and WTP for forested landscapes, seen either from home or from regular journeys to work. This work adopted a choice experiment (CE) approach and extended the scope of earlier studies (Willis and Garrod 1992; ENTEC 1997) by investigating a wider range of generic forest landscapes. It also attempted to separate WTP for woodland views from that for open access recreation and biodiversity.

A household survey of over 400 residents across England, Scotland and Wales was carried out to estimate the value of woodland views from residential properties and on journeys. Respondents were asked about their preferences for the type of forest that they would like to see in a view. Strong preferences were revealed for plantings that mixed trees and open space and where spacing of trees was random rather than regular. It explored the value of coniferous and broadleaved forests in different landscape contexts (e.g. mountain, hilly/rolling, peri-urban) and in terms of different configurations of forest (e.g. shape, scale, structural variety and species variety). The resulting 33 forest landscape configurations were illustrated in a series of computer-generated images. A further four images showing the landscapes without trees were added in order to allow net values to be calculated. In addition to the images, respondents in the CE were shown text indicating the availability, or otherwise, of recreational access and the size of any difference in household costs between the associated house and the cheapest alternative. Each respondent was given four sets of three alternatives to rank.

Statistically significant values could only be estimated for broadleaved woodland in a peri-urban setting. Based on a most preferred alternative model[4], household WTP for woodland views from home was £269 and for views while travelling WTP was £227. These values excluded recreational values[5] and were adopted in the aggregation procedure. The aggregation used data from the 1991 census to estimate the number of households in mixed urban (a proxy for 'urban fringe') wards and used data from the survey to estimate the proportion of residents and commuters who had woodland views. As a result, the annual value of forest landscapes in peri-urban settings was estimated to be £150 million. This equated to a capitalised value of £7,680 per household which is broadly consistent with the results of earlier hedonic price models that estimated the effects of woodlands on house prices (Anderson and Cordell 1988; Morales 1980).

Biodiversity

The biodiversity aspect of the study was carried out by Hanley et al. (2002) and aimed to estimate non-use values. It employed results from an existing study by Garrod and Willis (1997) that valued biodiversity enhancement in remote commercial Sitka spruce forests, to generate biodiversity values for other types of forest and woodland.

As noted above, biodiversity is a complex issue and may not be suited to valuation using standard questionnaire techniques. The approach adopted, therefore, combined the use of "tokens" and CV with focus groups in order to allow respondents more time to develop an understanding of forest biodiversity before stating their preferences. Eight focus groups were held in England, Scotland, and Wales. Using the CV estimate from the study by Garrod and

4 A range of approaches was used to model the choice experiment data, the main variations being the use of a full set of ranks (full ranks or contingent ranking model) of the use of data on only the most preferred alternative (MPA model).
5 Recreational benefits were in general lower than the comparable landscape benefits, ranging from about £40 to £370 per household per year.

Willis (1997) as an anchor value, the focus groups evaluated the relative importance and value of biodiversity in different types of forest (e.g. upland native broadleaved woodland; lowland conifer forest; lowland ancient semi-natural broadleaved woodland). The "tokens" exercise generated relative preferences for different types of woodland biodiversity and the WTP values generated values for marginal increases in biodiversity associated with different types of woodland.

Garrod and Willis (1997) estimated a WTP per household for improved management for biodiversity for a 1% increase in remote coniferous forest of £0.35. The approach used by Hanley et al. (2002) generated values ranging from £0.33 for a corresponding area of lowland conifer forest to £1.13 for lowland ancient semi-natural broadleaved forest[6] .

Given that the study estimated WTP for marginal increases in biodiversity from restructuring forests, the aggregation procedure had to relate to structural change in forests or protection and regeneration of ancient semi-natural woodland. Aggregate values were estimated by multiplying relevant WTP values by the number of households in each country; this excludes the non-use values that exist in one country for woodlands in another country but the alternative approach of assuming that there is no distance decay for non-use values across Great Britain appeared unrealistic. Data on 'structural change' in forests could only be provided for forests replanted in the last 10 years[7] , for new broadleaved woodland created in the same period and for ancient semi-natural woodland. Therefore, the aggregation procedure only assigned a biodiversity value to approximately 23% of the forest estate. Nevertheless, the annual value amounted to over £380 million.

Carbon sequestration

The work on carbon sequestration was conducted by Brainard et al. (2003) and aimed to produce a value for carbon sequestration across British forests. Valuing carbon sequestration requires estimates to be made for net levels of sequestration under forestry and the value per tonne of carbon sequestered (represented by the damage cost of a tonne of carbon).

Carbon sequestration varies spatially according to forest cover, structure (e.g. broadleaves or conifers), tree growth and soil conditions. The Forestry Commission sub-compartment data base and the National Woodland Inventory were used to map carbon sequestration across woodland in Britain. A model was constructed which applied FC predicted yields to private forests. Sitka spruce, beech and oak were used to represent the general categories of broad-leaved and conifer species. The model took into account carbon changes in soil, the effect of thinning, and energy use to manage the forest. Three different values for the social value of carbon were then used in estimating aggregate values of carbon sequestration, to reflect global uncertainty about the cost of carbon in global warming damage estimates.

The results showed that the annual aggregate value of carbon sequestration by woodland in Great Britain is £93.66 million. Considerable variations were found between different regions, due to different forest levels and types and different soil conditions.

Other benefits

The study of pollution absorption (Powe and Willis 2002, 2004) measured the impact of tree type (broadleaved and conifer) on improved air quality in terms of particulate matter (dust

6 I.e. to protect and regenerate lowland ancient semi-natural broadleaved forest.
7 Restocking plans in this period have been subject to appropriate biodiversity standards.

particles) and sulphur dioxide. It estimated the health impact using epidemiological information on the link between air pollution and deaths and hospital admissions for respiratory diseases adopted by the Department of Health; and matched the distribution of woodland with the distribution of population across Great Britain. Values used by the Department of Health for preventable fatalities and hospital care were then applied to the estimated levels of delayed deaths and hospitable admissions. Net pollution absorption by woodland was found to have reduced the number of deaths brought forward by air pollution by between 59–88 deaths and between 40–62 hospital admissions. The net reduction in costs (or increase in benefits) was estimated to be up to £0.39 million annually. However, this is likely to be a under-estimate because the study only investigated the effects of forests with areas greater than 2 hectares. The air quality benefits of smaller areas of trees in urban areas may be significant. Some simplifying assumptions were also made, perhaps the most notable being that people only benefit from improved air quality when they live in the same 1 kilometre square as the forest or woodland.

The impact of forests and woodland on water supply was assessed from hydrological and ecological models of the effect of woodland on rainfall inception and transpiration rates compared with grassland (Willis 2002). The value of water was estimated in terms of its replacement costs; specifically, the marginal costs faced by different water companies for abstracting potable water supplies. Information from existing literature and discussions with water companies was used to assess the impact of forests on water quality, but this was not quantified. The value of forests' role in flood prevention was also not assessed. Due in part to the need for further scientific understanding of the effects of woodland on water supply, the results were inconclusive.

Archaeological benefits of forests proved difficult to estimate, because of uncertainty about the quantity of archaeological artefacts on forested land, and the public's value of different quantities and types of archaeological artefacts. Based on the results of earlier studies, the value of good forest management in protecting archaeological sites was estimated at up to £247 per hectare, but this is highly dependent on the landscape setting (MacMillan 2002). The earlier studies were based on archaeological sites in 'attractive' landscape settings. However, where settings are more ordinary, or are perceived to be less attractive, the values may be expected to be lower.

The aggregate total annual and capitalised values of the non-market benefits of woodland investigated in this study amount to £1.0 billion and £29.2 billion respectively across Great Britain (see Table 1 below). This total aggregate value of woodland is dominated by recreational and biodiversity values, followed by landscape benefits, with carbon sequestration also contributing significantly to the total social and environmental benefit of forests. The air pollution absorption (health effect) of woodland is relatively small because of the small numbers in close proximity to areas of woodland.

5. Implications

The study by Willis et al. (2003) confirms the importance of non-market benefits: indeed annual non-market benefits of forestry are many times greater than revenue from timber sales. This difference is attributable only in minor part to the decline in timber prices: prices for saw-logs in 2002/03 were 54% of their 1995 value, while standing timber was 27% of its 1995 value (FC 2003). The difference is mainly attributed to the fact that forestry provides enormous non-market benefits through non-priced open access recreation, and 'public good' benefits of landscape, biodiversity, and carbon sequestration.

Table 1. Annual and capitalised social and environmental benefits of forests in GB (£ millions, 2002 prices).

Environmental benefit	Annual value	Capitalised value
Recreation	392.65	11,218
Landscape	150.22	4,292
Biodiversity	386.00	11,029
Carbon sequestration	93.66 *	2,676
Air pollution absorption	0.39 *	11
Total	1,022.92	29,226

* An approximation, since carbon sequestration, and probability of death and illness due to air pollution, varies over time. More carbon is sequestrated in early rotations than in later rotations, resulting in an annuity stream that is inconsistent over multiple rotations. Similarly for air pollution, that results in an individual's life being shortened by a few days or weeks at the end of the individual's life at some point in the future.

In 2002/03, sales of timber generated revenue of c.£70 million for the FC, whilst financial income from recreation amounted to c.£12 million. This financial revenue is dwarfed by the non-market benefits of woodland, which are estimated to amount annually to £1.02 billion. Thus, whilst the total benefits of woodland recreation amounted to £393 million, actual financial revenue from recreation (e.g. charges for forest drives, camping, etc) amounted to only £12 million. The overwhelming proportion of the total recreational benefit arises from the non-priced open access nature of day visits to woodland, for which it is not optimal to charge because of the high transactions costs (manning every entry point to woodland).

Most estimates of non-market forest benefits are based on studies of marginal values derived from the analysis of individual sites, and based upon the *ceteris paribus* assumption. This poses problematic issues in aggregating values based on these estimates across all woodland in Britain. The principal problems concern substitution effects (e.g. between recreation sites within and outside forestry); part-whole bias (i.e. value of the parts exceeding that of the whole when elements are valued individually); the value of intra-marginal benefits (e.g. if total benefits of forestry rather than marginal benefits are required); distance decay effects (typically local non-use values decline with distance); and populations of relevance (e.g. over which to aggregate non-use benefits or estimate recreational benefits where the recreation market is segmented into different groups). There is also the problem of the 'with-without' scenario or counterfactual position to use in the evaluation (e.g. the land use cover that would pertain in the absence of forestry). The 'counterfactual' affects estimates of recreational, landscape, biodiversity, carbon sequestration, and air pollution absorption.

The counterfactual position underlies estimates of the air pollution absorption effect of woodland (the study by Willis et al. (2003) assumed that the alternative vegetation would be grass which absorbs less PM_{10} and other pollutants than trees), biodiversity (the study assumed a counterfactual of no biodiversity in the absence of trees, i.e. that any increase in the number of existing species on agricultural land that might replace forestry would not be a substitute for the loss of wildlife woodland species that would disappear). Similarly, for carbon sequestration, it is necessary to assume a land-use in the absence of forestry, since this affects alternative carbon estimates, principally those of the soil. The alternative land-use that is specified as the counterfactual has an enormous impact on the magnitude of the estimated net benefits attributable to forestry. Thus, for recreation, whether the land was arable with no recreational access, or rough grazing with recreational access, greatly affects estimates of net benefits. It is clearly easier to determine this counterfactual with respect to forestry expansion (e.g. where agricultural land, of a known farming regime and recreational access, is

afforested); than it is to specify the counterfactual for established woodland (i.e. what particular land-use would occur in the absence of forestry).

The fact that studies of non-market benefits of forests (e.g. with respect to biodiversity) typically assess the benefit of a marginal change in forest area or policy, poses difficult conceptual problems in aggregating benefits to obtain a value for the whole estate. Economic theory predicts that intra-marginal benefits will be larger than marginal benefits, so extrapolating marginal values back along the demand curve will seriously under-estimate the value of woodland.

Aggregation of recreation benefits is typically based on benefit transfer. Recreational demand curves are estimated at a number of woodland sites. Consumer surplus for the average trip from this pooled data set is then applied to all visits to all forests in Britain. This assumes that the distribution of forest types, recreational facilities, and distance visitors travel to forests is proportional to the forest sites sampled. A more accurate aggregation would be to apply the estimated demand curve for each study site to all forests that this study site represents, and then aggregate across forest types. Such a benefit function transfer (BFT) approach is regarded as more likely to provide a more accurate estimate of the value of recreation than multiplying a mean WTP value by the number of visits (Loomis 1992).

Calculating aggregate benefits across different spatial areas based upon a study that has estimated non-use benefits at one location can give rise to part-whole bias. For example, archaeological material that has not been excavated is present in some forests. A study that estimated the non-use and option value benefits of preserving archaeological remains in one forest will usually do so under the assumption of *ceteris paribus*: identifying the value of archaeology holding all other attributes (archaeological preservation in other forests and/or other forest attributes) constant. Where archaeological preservation in other forests, or other forest attributes, are substitutes for archaeological preservation in study forest, then using the study forest to estimate the archaeological benefits for all the other forests and aggregating these values will grossly over-estimate the aggregate value of archaeological preservation function of forests, because of substitution effects. This is the classic problem of too may proposals passing the cost-benefit test (Hoehn and Randall 1989).

Some non-use (i.e. existence and bequest) values essentially concern local public goods: the value for these goods declines with distance from them. Distance decay functions are often applied to derive an aggregate value for these. It has been argued that a distance decay approach will eliminate part-whole bias in aggregating non-use values across different schemes. However, a number of studies have shown this not to be the case, and that aggregates based on a distance decay function can still grossly over-estimate aggregate WTP. Thus, even applying distance decay effects can still result in a substantial part-whole bias; which led Hanley et al. (2002) to suggest that a 'top-down' approach, to non-use value estimation for individual environmental assets within some more inclusive class, should be preferred to a 'bottom-up' approach.

One of the major issues in assessing the public's value of forestry is to determine 'populations of relevance'. For non-use goods this involves identifying the proportion of the population who have a positive WTP as distinct from those with a zero WTP. The population of relevance for use values requires identifying and accurately enumerating those who visit forest sites for recreation and other purposes. To provide accurate estimates of recreational value it is necessary to segment the market, since different categories of users have different use values: local residents who use peri-urban woodland for dog-walking and other casual users are known to have lower values per trip than day visitors to rural forests who spend a considerable period of time or undertake purposeful activities (e.g. mountain biking) in these forests.

It is clear that many economic activities in rural areas generate negative environmental externalities (e.g. quarrying and agriculture). Forestry generates enormous positive

externalities where appropriate landscape and environmental guidelines are met. The intensification of agriculture over the last half of the 20th century has led to an enormous reduction in biological diversity and species numbers on agricultural land. Agriculture also has a negative impact on water quality through nitrate, phosphate and pesticide run-off into water courses and aquifers.

Given the positive external benefits generated by forestry, and the negative external benefits generated by agriculture, there are strong grounds for arguing that forestry expansion would produce considerable net environmental benefits. Optimality requires maximising combined private (farming or forestry) and social (environmental) benefits. The current system of property rights means that farmers have to be compensated for production losses to achieve this combined private and social benefit optimising position. In 2004, farmers in England will receive approximately £83 million in Countryside Stewardship payments (e.g. allowing public recreational access to paths on some farmland); and £48.2 million in ESA payments (for an agricultural regime which does not harm the environment in specified areas). By comparison, forestry subsidies to generate environmental gains, over and above the current position, are much smaller: with £11.0 million in payments in 2004 under the Farm Woodland Premium Scheme, and £12.0 million under the Woodland Grant Scheme.

Clearly, public intervention is justified to ensure that both market and non-market (environmental) benefits are optimised, through the use of either regulatory (command and control) or economic instruments (e.g. taxes on inputs that damage the environment, and subsidies on environmentally beneficial outputs).

6. Conclusions

The study by Willis et al. (2003) provides powerful evidence of the high levels of non-market benefits procured by forests and woodlands in Great Britain. 80% of these benefits are accounted for by recreation and biodiversity values, and are most apparent in more densely populated regions. The results of the study underpin the central role of non-market outputs in UK forest policy.

There have been considerable methodological advances in the past decade or so in the valuation of non-market goods and services. However, major challenges remain to establish data sources and analytical methods that account for the spatial variability of marginal values and that permit aggregation procedures that are fully compatible with micro-economic theory. Estimating net values through the incorporation of counter-factual positions is also an essential stage in generating rigorous values of the non-market outputs of forests and woodlands. The valuation of these non-market outputs is an important step in encouraging more socially optimal outcomes that meet the requirements of sustainable forest management.

References

Anderson, L. and Cordell, H.K. 1988. Influence of Trees on residual property values in Athens, Georgia: a survey based on actual sales prices. Landscape and Urban Planning 15: 153–184.

Balls, E, Grice, J. and O'Donnell, G. 2004. Microeconomic Reform in Great Britain – Delivering Opportunities for All, MacMillan: Basingstoke.

Brainard, J., Lovett, A., and Bateman, I. 2003. Carbon Sequestration Benefits of Woodland. Social & Environmental Benefits of Forestry Phase 2, Report to the Forestry Commission, Edinburgh. Centre for Research in Environmental Appraisal and Management, University of Newcastle upon Tyne.

CJC Consulting 2003. Economic Analysis of Forestry Policy in England, report to the Department for Environment, Food and Rural Affairs and HM Treasury, April 2003.
DETR 2000. Climate Change: the UK Draft Programme. Annex G: Carbon Sequestration. DETR: London.
Dobbs, I.M. 1993. Adjusting for Sample Selection Bias in the Individual Travel Cost Method. Journal of Agricultural Economics 44: 335–341.
ENTEC 1997. Valuing Landscape Improvements in British Forests, report to the Forestry Commission, Edinburgh.
ERM and Centre for Research in Environmental Appraisal and Management 1996. Valuing Biodiversity and Biodiversity Management Regimes in British Forests, report to the Forestry Commission, Edinburgh.
Forestry Commission 1991. Statement of Forestry Policy for Great Britain. Forestry Commission: Edinburgh.
Forestry Commission 2003. Forestry Statistics 2003, Edinburgh: Forestry Commission.
Garrod, G. D. 2003. Landscape Values of Forests. Social and Environmental Benefits of Forestry Phase 2, Report to the Forestry Commission, Edinburgh. Centre for Research in Environmental Appraisal and Management, University of Newcastle upon Tyne.
Garrod, G and Willis, K. 1997. The non-use benefits of enhancing forest biodiversity – a contingent ranking study. Ecological Economics 21: 45–61.
Hanley, N., Schläpfer, F. and Spurgeon, J. 2003. Aggregating the benefits of environmental improvements: distance decay functions for use and non-use values. Journal of Environmental Management 68: 297–304.
Hanley, N., Willis, K. Powe, N. and Anderson, M. 2002. Valuing the Benefits of Biodiversity in Forests. Social and Environmental Benefits of Forestry Phase 2, Report to the Forestry Commission, Edinburgh, Centre for Research in Environmental Appraisal & Management, University of Newcastle.
Hoehn, J. P. and Randall, A. 1989. Too many proposals pass the benefit cost test. American Economic Review 79: 544–551.
Loomis, J.B. 1992. The evaluation of a more rigorous approach to benefit transfer: the benefit transfer function. Water Resources Research 28: 701–705.
Macmillan, Douglas C. 2002. The Value of Managing Forests to Protect Archaeology. Social and Environmental Benefits of Forestry Phase 2, Report to the Forestry Commission, Edinburgh. Centre for Research in Environmental Appraisal and Management, University of Newcastle upon Tyne.
Matthews, R.W. 1993. Towards a Methodology for the Evaluation of Carbon Budgets in Forests, Forestry Commission: Farnham
Morales, D. J. 1980. The contribution of trees to residential property value. Journal of Arboriculture 6: 305–308.
Ni Dhubhain, A., Gardiner, J., Davis, J., Hutchinson, G., Chilton, S., Thomson, K., Psaltopoulos, D., and Anderson C. 1994. Final Report EU CAMAR. Contract No 8001-CT90-0008. The Socio-Economic Impact of Afforestation on Rural Development. University College of Dublin, Queen's University of Belfast, and University of Aberdeen.
Pearce, D.W. 2003. The Social Cost of Carbon and its Policy Implications. Oxford Review of Economic Policy 19: 362–384
Powe, N. A. and Willis, K.G. 2002. Mortality and Morbidity Benefits of Air Pollution Absorption by Woodland. Social & Environmental Benefits of Forestry Phase 2, Report to the Forestry Commission, Edinburgh. Centre for Research in Environmental Appraisal and Management, University of Newcastle upon Tyne.
Powe, N.A. and Willis, K.G. 2004. Mortality and morbidity benefits of air pollution (SO_2 and PM_{10}) absorption attributable to woodland in Britain. Journal of Environmental Management 70(2): 119–128.
Scarpa, R. 2003. The Recreation Value of Woodlands, Social and Environmental Benefits of Forestry Phase 2, Report to the Forestry Commission, Edinburgh. University of York.
Willis, K. G. and Benson, J. 1989. Recreational Values of Forests. Forestry 62: 93–110.
Willis, K.G. and Garrod, G. 1991. An individual travel-cost method of evaluating forest recreation. Journal of Agricultural Economics 42: 33–42.
Willis, K. G., Garrod, G., Scarpa, Bateman, I.J., Hanley, N. and Macmillan, D.C. 2000. Non-Market Benefits of Forestry, report to the Forestry Commission, Centre for Research in Environmental Appraisal and Management, University of Newcastle.
Willis, K. G., Garrod, G., Scarpa, R. Powe, N.A., Lovett, A., Bateman, I.J., Hanley, N. and Macmillan, D.C. 2003. The Social and Environmental Benefits of Forests in Great Britain. Report to Forestry Commission, Edinburgh. Centre for Environmental Appraisal and Management, School of Architecture, Planning and Landscape, University of Newcastle upon Tyne.
Willis, K. G. 2002. Benefits and Costs of Forests to Water Supply and Water Quality. Social and Environmental Benefits of Forestry Phase 2, Report to the Forestry Commission, Edinburgh. Centre for Research in Environmental Appraisal and Management, University of Newcastle upon Tyne.

Implementation Analysis of Forest Area Enlargement in Flanders (North Belgium)

Peter Van Gossum

University of Ghent
Belgium

Abstract

There is an urging political and societal demand for forest conservation and afforestation in Flanders (North Belgium). The policy instruments used to achieve this goal are grants, restrictions and informative instruments. In spite of these instruments the forest area has declined with 3,700 ha during the period 1994–2000. The failure of the policy program was investigated with the guidelines of implementation analysis proposed by Mendes (2004).

The following implementation gaps were uncovered:

1. The policy makers did not have perfect information about the relevant characteristics of the agents (target group to carry on the implementation);
2. There was a low knowledge of the agents of the programs;
3. There is a need for a higher involvement of the agents in the policy process;
4. There are inconsistencies with other legislation;
5. The instrument mix needs some improvement; and
6. There is a problem with political support of the program

Based on these implementation gaps we could recommend the following points of interests:

1. It is necessary to gain an idea of the different profiles of your agents.
2. To involve the agents more in the policy process.
3. Inform on a more regular base the different agents on the possibilities of the program.
4. Simplify and avoid contradictory conditions in different laws or decrees.

Keywords: afforestation, policy instruments; policy process, grants, policy analysis.

Heikki Pajuoja, Ludek Sisak and Krzysztof Kaczmarek (eds.)
Evaluating Forestry Incentive and Assistance Programmes in Europe – Challenges to Improve Policy Effectiveness
EFI Proceedings No. 54, 2005

1. Introduction

There is an urgent political and societal demand for forest conservation and afforestation, especially in densely populated and sparsely afforested regions. This is not only the case in Flanders (North Belgium), but also in Randstad (NL), Copenhagen (DK) and Paris (F) such a need exists (Konijnendijk 1999). It is impossible to satisfy this need by using only public land. Since European (Zanatta et al. 2000) as well as North America (Sampson and De Coster 2000) private owners control more than half of the forests as well as most of the agriculture land, the extension of forests depends strong on cooperation of private forest owners and farmers. Thus the agents for realising this forest enlargement target are the Flemish Forest Service, local administrations and private landowners (including farmers). To encourage landowners to adopt the government policy of forest area enlargement, policy makers have used a wide range of regulatory, economic and informational instruments (Vedung 1998). The policy instruments used in Flanders are grants and income compensation as financial instrument and restrictions for deforestation as regulative instrument. In spite of implementation of these instruments the forest area has declined with 3,700 ha during the period 1994–2000. The aim of this study was to investigate the reasons for failure of the forest area enlargement funding programs, using implementation analysis guidelines of Mendes (2004). Mendes (2004) gives a checklist of questions for analysing the program targets (see Chapter 2), the program instruments (Chapter 3) and programmes outcomes (Chapter 4). Answering those questions can highlight some implementation gaps (Chapter 5.1 and 5.2). Other points of interest are the target-instrument controllability (Chapter 5.3), target-instrument matching (Chapter 5.4) and complementarities among policy instruments (Chapter 5.5). In Chapter 5.6 we will analyse also the political support of the program and in Chapter 5.7 we look to other implementation failures. Information sources were legislation, documents, but also questions and surveys send to persons involved in the programme.

2. Program targets

There are three funding programs for forest enlargement in Flanders, one for public owners (‘*forest enlargement*’), one for private owners (*afforestation and reforestation*) and one for both (*afforestation of agricultural land 2080/92*). These programs are discussed together because they have a common target. The quantitative target is realising a forest enlargement of 10,000 ha between 1994 and 2007 (Spatial Structure Plan Flanders, for definition see appendix). However, no quantification was made of the target for each of the three funding programs. The specific targets for *afforestation of agricultural land* are: enlarge the existing forest area, stimulate the enlargement of large forest complexes and support the afforestation with indigenous tree species. The specific targets for *afforestation and reforestation* are: extend the forest area and motivate the owners to implement reforestation, preferably with indigenous tree species. Finally the specific targets for *forest enlargement* are forest enlargement in the urban sphere (social target) and ecological forest enlargement (ecological target).

The main driving forces behind these targets are the increased demands for recreational and ecological services in densely populated Flanders. The current forest structure cannot sustain these demands (Vitse 2004). For example looking at to the forest structure of the urban centres of Flanders and we use the criterion of 1 ha accessible forest/100 inhabitants, we can conclude that 54 cities need more forest, this is 17.5% of the municipalities but also 66% of the cities larger than 30,000 inhabitants and 87% of the cities larger than 40,000 inhabitants. This need for urban forest enlargement accounts for 5,200 ha (Vitse 2004).

The main stakeholder behind the choice of the program targets is the forest sector as a whole. An important remark is that the opinions of the agricultural sector were not taken into account by the establishment of the 2080/92-regulation and by the afforestation regulation. The main agents for implementation are the farmers, other private owners, the Flemish Forest service and the local administrations.

3. Program instruments

The program instruments are grants for *afforestation and reforestation*. The amount varies with the tree species, indigenous tree species being favoured. For *afforestation of agricultural land* the instruments are grants and income compensation for farmers during 5 years. These grants favour also indigenous tree species, a realisation of a shrub layer and well-structured forest edges. The instrument for *forest enlargement* is direct funding.

3.1 Accompanying instruments

Since the mentioned programs only realise a net increase in the forest area when the current forest area is maintained, these economic instruments are supported by a prohibition of deforestation without compensation and a planning support. To overcome administrative obstacles informative instruments as the programs private forest official, educative forest centre and forest groups were supported. The private forest official is the main contact of the private forest owner with the Forest service. The private forest official has mainly an examining task, but is also the right person for advice concerning regulative and financial aspects. The Groenendaal educative forest centre (EBG) is the main contact point for education, directly or indirectly in co-operation with forest groups. One of tasks of the EBG is to translate research results to useful education package for forest owners, but also for employees of the forest service. The forest group is the main actor for management advice and support and also a forum for consultations between private forest owners and the government.

4. Program output

In the period 1991–2000 the total area of afforestation by private and other public owners amount to 1,125.51 ha (Program *afforestation of agricultural land* and *afforestation and reforestation*). The policy target is to realise between 1994 and 2007 a forest area enlargement of 10,000 ha. Recently allocated the Flemish government 48.9% of this aim to local administrations and private owners. Thus the program effectiveness is 38.7% (946 ha afforested between 1994–2000 /2,445 ha as target between 1994–2000). Between 1994–2002 the Forest service purchased 1,391 ha land: 209 ha remained non-forest for nature conservation, 732 ha has already been afforested and 450 ha will be afforested after the current agricultural lease has expired or the involved farmers discontinue their activities. The program effectiveness is 41% (1,182 ha afforested between 1994–2002 /2,874 ha as target between 1994–2002). In the period 1991–1999 private forest owners reforested also 2,840 ha.

In spite of this limited forest enlargement was the net increase of the forest area during the period 1994–2000 negative, a decrease of 3,700 ha. This means that also the accompanied

regulative instruments for forest conservation don't give the desired result. We investigate this in more detail under Chapter 5.4.

Besides a low program effectiveness the program use by agents was also low. The financial incentive for *afforestation and reafforestation* was directed to private forest owners in Flanders. The exact amount of private forest owners in Flanders is unknown, but it is suggested to be around 80,000 (source: Bos en Groen). Over the total period 1991–1999, about 2,100 owners used this regulation. This means that less than 3% of the total private forest owner population did apply for financial support. A remark should be made here on the proportion of ownership categories in Flanders. Around 80% of them own a very small (< 2ha) forest parcel, resulting in 15% of the total forest area.

5. Implementation gaps

In this chapter we try to find possible reasons for the low implementation. For this analysis we used the guidelines of Mendes (2004) and checked the following aspects:

- involvement of the agents in the policy process (Chapter 5.1)
- awareness of the agents in the program (Chapter 5.2)
- knowledge of relevant characteristics of the agents (Chapter 5.3)
- instrument mix (Chapter 5.4)
- inconsistency with other legislation (Chapter 5.5)
- political support of the program (Chapter 5.6)
- other failures (Chapter 5.7)

5.1 Involvement of he agents in the policy process

Farmers, one of the agents, were not involved in the policy process of the program *afforestation of agriculture land*. According to Mendes (2004) this can cause an implementation failure, since the acceptance of the program by non-participants in the policy process can be low (FAO/ECE/ILO 2000). By giving people a chance to take part and influence the decision-making and handling forest-related issues, public participation aims at enhancing the acceptance of forest policies, plans and operations (FAO/ECE/ILO 2000).

5.2 Awareness of the agents in the program

A Flemish study on the attitude of private forest owners (Serbruyns et al. 2001) revealed that only 40.3% of the small forest owners (< 5ha) had knowledge of the existence of grants for afforestation and only 42.5% of them were unaware of subsidies for reforestation.

The result for the larger owners (> 5 ha) was somewhat better with 63.4% of the owners knowing about the existence of the afforestation subsidy and 68.0% for the reforestation subsidy.

Vanhuyse et al. (2001) confirm the difference in knowledge between small and large owners. The information distribution of grant schemes to private forest owners is more difficult for the small than for the large owners. The latest have better information networks. Examples of information sources of large owners are the Forest service, forest groups, other private forest owners and owner associations (KBBM).

Mendes (2004) confirms this information inequity between small and large owners. Furthermore, Mendes (2004) finds that financial incentives can be best combined with extension services capable of assisting those who have more barriers in that access (small

forest owners, owners living in more remote regions, etc.). Otherwise this may lead to inequities (the incentives go mostly to the forest owners with easier access to the public agencies) and implementation gaps (many forest owners who need technical assistance may not participate in the program). Therefore, we can conclude that there is a need for a better information distribution to private forest owners, especially for the small.

5.3 Knowledge of relevant characteristics of the agents

When the afforestation and reforestation programs were introduced, policy makers did not gather relevant information over the main agents (private forest owners, farmers and owners of non-forest land that are not farmers). According to Mendes (2004), this can cause implementation failures because of information imperfections. For example the funding program may induce behavior by the agents, which is not compatible with the targets set by the policy makers.

Serbruyns and Luyssaert (subm.) and Meiresonne (2001) give a typology of respectively the private forest owner and the farmers. No information is available with respect to the owners of non-forest lands not being farmers and about their motivation and attitude not to join an afforestation program.

Private forest owner

Serbruyns and Luyssaert (subm.) made an empirical owner typology based on motivation and attitudes. They distinguished four well-defined owner groups: materialistic, satisfied recreational, dissatisfied recreational and profit-seeking owners. A typical *materialistic* owner was older than 56 year, spent none to very little time in his/her forest and owned either a coniferous or deciduous forest. *Materialistic* owners were unlikely to own mixed forests. And these owners had no nature or recreation motivation. The typical *profit-seeking* owners received less than 12 years of education, do not sell wood from their forests and are ground speculators. The typical *satisfied recreational* owners was younger than 56 year and was well informed about general forest and forestry issues. Typical *dissatisfied recreational owners* owned a property of more than 15 ha, spent a lot of time in the forest and sold wood during the past 10 years. The difference between the two last categories is their satisfaction of the current forest policy. Despite the use of the Forest service of financial, regulative and informational instruments for changing the management of privately owned forests; none of the owner groups was committed to change their management practices. Policy instruments were accepted as far as they did not involve a change in the owner's current management practices. Owners did apply for those subsidies supporting management practices they were going to do anyway i.e. reforestation. Policy makers should ask themselves if it was really the incentive that persuaded owners to reforest or, would most of the owners who applied for subsidies have reforested anyway (Kluender et al. 1999)? Possible underlying reasons for the selective use of subsidies were reported to be disregard or growing mistrust for financial incentives (Sample 1994), privacy protection (Rickenbach et al. 1998; Wicker et al. 2002) and the sum of the incentive (Kline et al. 2000). Mean incentive payments necessary to induce owners to forego new management practices such as close-to-nature forest management were reported to depend on the owner type (Kline et al. 2000).

The highest acceptance of policy instruments was found for the best informed and highest educated owners i.e. the satisfied and dissatisfied recreational owners. The lowest acceptance was found for the mal informed and lowest educated owners i.e. the profit-seeking owners. Therefore, Serbruyns and Luyssaert (subm.) expect that practice-based education, which

include economic as well as ecological and recreational aspects of forest management, can be a prerequisite for a successful use of financial, regulative and informational instruments.

It can be conclude that the public policy makers did not have perfect information about the relevant characteristics of the agents (private forest owners) when they introduced the grant scheme and therefore behaviour of the agents could not be predicted. The study of Serbruyns et al. (2001) and Serbruyns and Luyssaert (subm.) is a step in the good direction, but more research is needed in this field.

Farmers

Meiresonne (2001) has probed the views of farmers on afforestation of agricultural land with poplars by a postal survey and focus groups. Farmers are rather opposed to classic poplar cultivation because of the legal insecurity concerning the 'land designation' and also because of, from the viewpoint of the farmer, the 'long' rotation time (15 to 20 years). On the other hand they seem really interested in short rotation forestry for energy purposes.

The survey of Meiresonne (2001) revealed that there are almost no possibilities to stimulate the farmers in Flanders to afforestation. They have only a moderate interest in an income support longer than 5 years. Poplar breeding, higher wood prices and a higher profitability is a better motivation. Decreasing price levels for agricultural products have no influence. The main reasons for this general dissatisfaction of Flemish farmers are that forestry does not fit in the current management, fear for a decreasing value of this land, strong believe that with time a reconversion to agricultural land will be legally impossible and fear of game damage to their agricultural crops.

In the Dutch provinces 'Groningen' and 'Drenthe' the afforestation of agricultural land by farmers is more successful. What are the reasons of this success? Wiersum (1996) gives two main reasons for farmers to afforest their land. The first is the bad economic prospects of agriculture. This aspect has its importance in the 'Veenkoloniën', which has the lowest farm profitability of the Netherlands. Besides this 'push' effect form agriculture there is also a 'pull' effect from agriculture policy. There are diverse positive incentives making it interesting for farmers to afforest their land. Examples of positive incentives are compensation for ground value diminution, income compensation for 15 or 20 years dependent on the choice for temporary or permanent forest, carbon benefits and other financial instruments. But both effects separately are for the majority of the farmers not enough. Konijnendijk and van Laar (1996) point out that an early adopter is needed for convincing the other farmers. These early adopters reduce the distrust by others because they can see what the advantages and possible problems of this 'new' system are. Based on these findings, some recommendations can be made for the Flemish programs:

- more financial instruments: especially income compensation of at least 20 years and compensation for ground value diminution. In the new grant scheme for afforestation of agricultural land in Flanders, under the rural development program of the EU, the income compensation is 20 years. But as expected this improvement alone is not good enough for convincing farmers to afforest.
- early adopters.

5.4 Instrument mix

Informative instruments best accompany financial instruments, as already stated in Chapter 5.2. But also regulative instruments have their role. Net forest area enlargement is only

possible when there is forest conservation of the existing forests. In Chapter 4 we have pointed out the negative afforestation deforestation balance, which makes it more difficult to reach the targets of the forest area enlargement policy. In the next paragraphs we will discuss the functioning of the two regulative instruments for forest conservation: ban on deforestation and planning support.

The ban on deforestation is not absolute. Exceptions are (1) an urban planning permission for deforestation, (2) an exemption of the ban on deforestation and (3) a deforestation for nature development and management.

The *urban planning permission* for deforestation can be requested for the following situations: designation (for definition see appendix) of the parcel as 'urban', 'industrial' or 'public concern' on the Flemish master plans, not-expired permitted allocation and exemption of the ban of deforestation (see below). Compensation of the deforestation is imperative. Usually this compensation is a forest conservation payment, not a real afforestation. For the other master plan destinations deforestation is only possible with an *exemption of the ban on deforestation*. The Minister of forestry must allow the request for exemption. A special case is *nature development and management*. In two cases deforestation is allowed anyway: for small open spaces in forest and in recognized nature areas with an accepted nature management plan. The manager must make an evaluation of the change in nature value, a conversion of forest to non-forest nature type is only allowed when this nature value increased.

The enforcement is undermined though discrepancies between the categories wherefore an illegal deforestation is sanctioned (Dumortier et al. 2003). Private landowners are systematically sanctioned, nature conservation NGOs are not, which rise to incomprehension by the general public and by the members of the administration.

The planning support consists of the designation of 10,000 ha forest area and forest enlargement area by means of spatial executive plans (see appendix). By this the forests receive a higher protection. This is connected with the problem of the so-called "zonevreemde" (see appendix) forests: forests that are situated on locations destined for other purposes on the Flemish master plan (see appendix) (Leyman and Vandekerkhove 2003). With its high population, Flanders has always known a high land use pressure. In the sixties, one started to make up a kind of "Master Plan" defining the future destination of all land in Flanders within a legal framework. All land has been "coloured" (see appendix), resulting in among others green, industrial, agricultural and residential areas. As a result 46,000 ha of forests, i.e. 30% of the current forest area, is situated within areas that are not "green areas" (Figure 1.) (Leyman and Vandekerkhove 2003). The consequence is that these forests are not sufficiently protected, although a lot of these forests are very valuable. Around 6,000 ha of these forests are situated within the special protection zones of the European Directives (SPB's). Although these guidelines demand to maintain and restore the species and habitats within these areas, this is not at all guaranteed, as they are not legally protected. Another problem associated with possible changes in plan designation of the master plan is land speculation, whereby the owner hopes that the Master plan designation will change from forest to housing or industry: (ground prices increase a fifty- to hundredfold!)

5.5 Inconsistency with other legislation

There is an inconsistency with the legislation concerning authorization and recommendations of afforestation by other departments of the Flemish administration (Field code (see appendix) and Forest decree). Before the owner (private, other public and also the Forest service) can afforest a non-forest land, he must ask afforestation permission by the municipality. An illustrative example of this inconsistency is the refusal by two municipalities

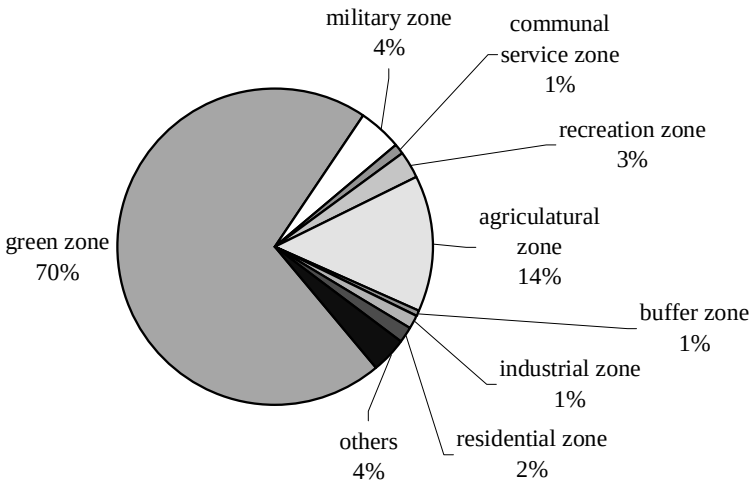


Figure 1. Overview of the location of forests in Flanders, referring to the "Master plan" ('Gewestplan') (source: Leyman and Vandekerkhove 2003).

of an afforestation authorization by using the Field code. The reason was that the delineation of the agricultural planning area was not finished. But there is not only a land struggle between the forestry and agricultural sector, each sector (also nature, housing, industry) wants to expand in densely populated Flanders.

There is also an inconsistency with the legislation on tenure. An owner of an agriculture land cannot afforest his land, without the permission of the leaseholder. Another drawback is that the legislation on tenure is very complex; this is a frequently heard argument among owners to give up the idea of afforestation.

5.6 Political support of the program

The political parties were interviewed by the Flemish Forest Organisation (VBV 2004), before the European and Flemish election, on their political support to change the inconsistencies of the forest area enlargement program with the legislation concerning authorization of and recommendation concerning afforestation (Field code) and the tenure law.

The first question was: "The forest service must ask permission to afforest from the municipalities. Often this permission is refused. Thus the forest enlargement will accelerate when we abolish this rule." The Christian Democrat party (CD & V) disagrees with this proposal and find also that there is no need for more forest in Flanders. The Liberal party (VLD) disagrees because they find this local autonomy too important to drop. The Socialist party (SP.A) agrees with this proposal. And also the Green party (Groen!) agrees with a revision of this legislation so that it will be possible to balance afforestation with the conservation of open space for agricultural, landscape or nature conservation purpose.

Another obstacle is the legislation on tenure. Moderating this law will stimulate forest enlargement. CD&V disagrees, they would only accept it outside the agricultural planning zone. This means only where farmers work on land in green planning zones. VLD favours a moderating of the tenure law only for agricultural land with a forest designation on the Spatial

Structure Plan Flanders (recent planning document). SP.A and Groen! agree with this proposal and propose to include afforestation of agricultural land as an additional cancellation clause in the tenure law.

The different political parties do not value the need for afforestation to the same extent. Afforestation is a long-term project, while political legislature change mostly in the short-term (5 years). If is therefore difficult to reach the targets set by another political party.

5.7 Other failures

These implementation gaps alone do not explain the total picture of forest enlargement problems. Dumortier et al. (2003) give as additional reasons for this tardiness:

- the time-consuming and inflexible purchasing procedure (dependent on price estimates and bureaucracy
- the high sale prices of agricultural land
- the recurring local resistance of the agricultural sector (NIMBY-effect, 'not in my backyard'), which (still) exerts a strong influence on the local political decision-making in Flanders
- the lack of official support by other administrations
- the time-consuming character of an academic preparation and final realisation of urban forests

And a final implementation failure is that, especially the farmers feel that there is an imbalance between right and duties.

6. Conclusions

Based on these implementation gaps we could recommend the following points of interest.

1. It is necessary to gain insight in the profiles of your agents.
2. There is a need for a better public participation of the agents in the policy process, this can enhance the acceptance of the targets and instruments.
3. Inform on a more regular base the different agents on the possibilities of the program according to their information needs.
4. Give also special attention to farmers, try to solve the discrepancy between the nature and agriculture sector.
5. Give an adequate grant so that the efforts of the landowners to serve the general concern are compensated.
6. Simplify and avoid contradictory conditions in different laws or decrees.

However, this will solve only a part of the problem because forest area enlargement will be also highly dependent of the political composition of the local and Flemish administrations.

Acknowledgements

We thank Brenda Bussche and Cyreen Knockaert of the Forest service to answer the difficult questions and Inge Serbruyns and An De Schrijver for their useful remarks.

References

Dumortier, M., De Bruyn, L., Peymen, J., Schneiders, A., Van Daele, T., Weyembergh, G., van Straaten, D. and Kuijken, E. 2003. Natuurrapport (NARA) 2003. Toestand van de natuur in Vlaanderen: cijfers voor het beleid. Mededeling van Instituut voor Natuurbehoud nr 21, Brussel.(in Dutch).

FAO/ECE/ILO committee on forest technology, management and training. 2000. Public participation in forestry in Europe and North America. Sectoral Activities Department, International Labour office, Geneva, Switzerland. 130 p.

Kline, J.D., Alig, R.J. and Johnson, R.L. 2000. Forest owner incentives to protect riparian habitat. Ecological Economics 33: 29–43.

Kluender, R.A., Walkingsticks, T.L. and Pickett, J.C. 1999. The use of forestry incentives by nonindustrial forest landowner groups: is it time for a reassessment of where we spend our tax dollars? Natural Resources 39: 799–818.

Konijnendijk, C.C., 1999. Urban forestry: comparative analysis of policies and concepts in Europe – Contemporary urban forest policy-making in selected cities and countries of Europe. EFI Working Paper 20. European Forest Institute. 266 p.

Konijnendijk, C.C. and van Laar, J.N. 1996 Boerenbosbouw is zo gek nog niet. Noordelijke agrariërs stappen over op bosbouw. Nederlands Bosbouwtijdschrift 68: 7–11. (in Dutch)

Leyman, A. and Vandekerkhove, K. 2003. Beleidsondersteunend onderzoek rond 'zonevreemde' bossen, bosuitbreiding & A-locaties. Deelrapport luik 1: Opstellen van een rangorde voor gewestplanwijzigingen van 'zonevreemde' bossen. Rapport IBW Bb R 2003.007. (in Dutch)

Meiresonne L. 2001. Bebossing van landbouwgronden met populier. Wat denken de Vlaamse boeren daarover? Hebben zij een zelfde mening als andere Europese boeren? (Resultaten van een enquête). Silva Belgica 5: 18–22. (in Dutch)

Mendes, Américo M. S. Carvalho. 2004. Implementation analysis of National Forest Programmes. In: Glück, P. (ed.). Making NFPs work: Procedural Aspects and Supporting Factors. Publication Series of the Institute of Forest Sector Policy and Economics, University of Natural Resources and Applied Sciences, Vol. 48, Vienna (forthcoming).

Rickenbach, M.G., Kittredge, D.B., Dennis, D. and Stevens, T. 1998. Ecosystem Management: capturing the concept for woodland owners. Journal of Forestry 26: 18–24.

Sample, V.A. 1994. Building partnerships for ecosystem management on forest and range lands in mixed ownership. National Workshop Synthesis, New Haven, Connecticut, October 22–24, Forest Policy Center. 17 p.

Sampson, N. and De Coster, L. 2000. Forest fragmentation: Implications for sustainable private forests. Journal of Forestry 98(3): 4–8.

Serbruyns, I., Mertens, F., Lust, N. and Mortier, F. 2001. De perceptie van de ecologische functie van bossen: attitudes van privéboseigenaars in Vlaanderen. Rapport Vlina 98/04. Universiteit Gent in opdracht van de Vlaamse gemeenschap in het kader van het Vlaams Impulsprogramma voor Natuurontwikkeling. (in Dutch)

Serbruyns, I. and Luyssaert, S. (submitted) Acceptance of sticks, carrots and sermons as policy instruments to direct private forest management. Forest Policy and Economics.

Vanhuyse, E.; Denutte, T., Van Geluwe, J., Steenhout, K., Mortier, F., Lust, N. and Hens, L. 2001. Natuureducatie bij privé-boseigenaars in Vlaanderen. Rapport Vlina 00/18. Universiteit Gent en Vlaamse Universiteit Brussel in opdracht van de Vlaamse gemeenschap in het kader van het Vlaams Impulsprogramma voor Natuurontwikkeling. (in Dutch)

VBV 2004. Politieke rondvraag: liggen onze beleidsmensen wakker van bossen. Vereniging voor Bos in Vlaanderen, Gontrode. 17 p.

Vedung, E. 1998. Policy Instruments: typologies and theories. In: Bemelmand-Videc, M. L., Rist, M.L. R. C. and Vedung, E. (eds.), Carrots, sticks, and sermons: policy instruments and their evaluation. Transaction Publisher, New Brunswick, N.J.& London, UK. Pp. 21–58.

Vitse 2004. Aankoopbeleid en bosuitbreiding. Internet site Forest service. http://www.mina.vlaanderen.be/wiedoetwat/aminal/taken/bosengroen/frmsetbos.htm (in Dutch)

Wicker, G. 2002. Motivation for private forest landowners. In: Wear, D.N. and Greis, J.G., (eds.). Southern forest resource assessment. General Technical Report SRS-53. US Department of Agriculture, Forest Service, Southern Research Station, Asheville, NC. 635 p.

Wiersum, K.F. 1996. Partikuliere bosbouw in Nederland: Een nieuwe toekomst?

Zanatta, Y., Mikkola, E. and Engels, M. 2000. Statistics in focus. Forest and Environment. Eurostat, Luxemburg. 7 p.

Appendix. Definitions of the used terminology.

Terminology	Definition
Spatial structure plan Flanders	A structure plan is an policy document that specify the framework of the desired spatial structure. It gives the longterm vision of the spatial development of the area in question. It aim is to give the whole structure planning process (preparation, assessment, implementation) coherence.
Spatial executive plan	This plan implement the structure plan. It reflects the real and legal situation of the different areas (designation).
Master plan	This plan is a planning document that define the future designation of all land in Flanders within a legal document before the system of structure planning
Land designation/ coloured	This give land a specific use and a value. The designation were coloured on the planning document: e.g. yellow means ‘agriculture’.
Zonevreemd’	A current use with not correspond with their original designation e.g. forest in an area with a designation ‘agriculture’ do not have the same protection as forest in a green planning area.
Land speculation	The system whereby the owner hopes that his current low economic value designation will change to a higher one (e.g. green zone to residential zone). In the earlier phase of the master plans happen this often. Certainly when you had good connections with the mayor. This is still a touchy subject.
Field code	These legislation was introduced in 1886, but his rules and prescriptions are still actual.

Empirically Based Policy Implications and Recommendations

Attitudes towards Forestry and Information Needs among Estonian Private Forest Owners – Implications for Policy Decision Making

Ritva Toivonen and Erno Järvinen

Pellervo Economic Research Institute PTT
Helsinki, Finland

Abstact

The new EU-member countries are undergoing a significant change in their forestry; about half of the forest area is being privatised, and millions of private forest holdings are created. At the same time, forest industry is re-structured and grows significantly. This is a major challenge for forest policy. This study describes the forestry-related attitudes and information needs of Estonian private forest owners, and draws conclusions how economically and ecologically sustainable forest management could be supported in private forestry through improved training and information availability. The data was collected by a mail survey in the autumn of 2001. The data consists the responses of 584 forest owners. The primary objective of Estonian private forest owners for forest ownership is to obtain household timber, but other economic aspects are also emphasised. Environmental matters are of average interest to forest owners. Most serious lack of information regards legal and economic matters related to forestry, but also forest diseases and pest control. Even though there are clear information and training needs, most forest owners are reluctant to pay for advisory information. Forest owners are not well-organised either. Both there facts imply that organising information and training for forest owners is an important but also challenging task to forest policy. The most serious problem in private forestry is perceived to be illegal logging. Even though the case study was carried out in Estonia, it can be assumed that the results may be generalised at least to some degree to other new EU-countries.

Keywords: Estonia, private forestry, information needs, forest ownership, forest policy.

Heikki Pajuoja, Ludek Sisak and Krzysztof Kaczmarek (eds.)
Evaluating Forestry Incentive and Assistance Programmes in Europe – Challenges to Improve Policy Effectiveness
EFI Proceedings No. 54, 2005

1. Background

The forest area in Estonia is about 2.3 million ha, which is about 52% of the land area. The growing stock volume is 411 million m^3, and the increment is 11.6 million m^3 per year (Statistics Estonia 2002). Thus, Estonia is one of the most forested countries in Europe.

The forest area increased considerably during the 1950s to 1980s. During the 1990s, a major structural change started in the forest sector, along with the overall political and economic restructuring in the country after the collapse of the USSR. Possibly the most significant change in the forest sector was the start of the restitution process, i.e. the re-privatisation of forest land.

At the same time, Estonian forest industry started to grow fast, which resulted in increasing demand and trade of wood and growing production of sawn wood and further processed wood products. The importance of the forest sector on Estonian economy has also increased (Kaimre 2001; Institute of Forest Industry 2000). By 2004, industrial capacity has grown to an extent where it is facing the problem of procuring suitable raw materials from the domestic market. This has resulted in very intensive exploitation of domestic wood resources, and Estonia turning from net sawlog exporter to net importer. Also wood prices have continuously been increasing in Estonia due to high demand for roundwood. Estonian forest sector is described in more detail in Järvinen et al. (2003), where also the data collection and results presented in this paper are explained in more detail. Current situation in Estonian wood markets is presented, for example, in Tilli and Skutin (2004), and in Toppinen et al. (2004).

The number of privately owned forest holdings was about 52 000 in 2001, which covered totally 543 000 ha (Centre of Forest Protection and Silviculture, 2001b). The average size of a private forest estate was about 10 ha, and over 30% were less than 5 hectares. The ownership structure is however still in change due to the land reform process. In the land reform, the forest estates that belonged to private persons before the expropriation in 1940 will be returned from the state to the previous owners or their descendants. In the restitution process, the forest estates are returned free of charge to the previous owners. In privatisation, forest estates are sold by auction from the state to the private persons. If the previous owners cannot be found and hence the forest estates cannot be returned, they are finally sold by auction.

Due to the change in forest ownership structure in Estonia, a large share of forest owners have very little or no knowledge of forestry related issues. The purpose of the study was to analyse the attitudes towards forestry and the information needs among Estonian forest owners. The theme has been studied earlier e.g., by Karppinen (1996), and parallel with this study, also another study focusing all Estonian forest owners was conducted (Centre for forest protection and Silviculture…2001a).

2. Data and methods

The study was carried out as a survey. The population of the study consists of all Estonian forest owners (51 777 on 1 January 2001, source Centre of Forest Protection and Silviculture 2001b). The sample of the study comprised the forest owners included in the address registers of Erametsakeskus (Centre of Private Forestry) and Eesti Erametsaliit (Estonian Private Forest Union)[1] . The sample was accepted to represent forest owners who are interested about

1 The sample of this study does not accurately represent the population of Estonian private forest owners. This might bias the results.

forestry at least to some degree, and thus familiar with forestry related terminology which would improve the quality and reliability of the data, and improve the response activity. The disadvantage was that the data may not be perfectly generalisable to the group of owners of very small holdings.

The research questions were formulated as a structured questionnaire following the indications and results of earlier forest owner studies in Estonia and Finland (e.g. Karppinen 1996; Karppinen et al. 2002), and expert interviews. The questionnaire was translated in Estonian language, and tested through a telephone survey (17 interviews) during September 2001. After the test survey, a few questions were reformulated. The data was then collected as a mail survey during November 2002. Those persons who did not return the questionnaire by the first deadline received a reminder with a fresh questionnaire and return envelope. The questionnaire and related letters are in Järvinen et al. (2003).

In total 584 forest owners returned their questionnaires by the final deadline. Thus, the response rate was 69%. Out of the 260 forest owners that did not return the completed questionnaire, 28 informed us that they could not participate in the survey. The most frequent reason was that the forest had been sold. Seven persons were not reached.

The data was analysed based on direct distributions, mean values, and testing differences between respondent groups (differences having a risk under 5% of rejecting the null hypothesis when true were considered as significant). The differences between respondent groups were studied using cross-tabulation and statistically significant differences measured using the χ^2-test. In addition, Maximum-Likelyhood factor analysis with Varimax-rotation was applied in studying the dimensions of information needs.

3. Results

The respondent forest owners represented fairly well all Estonian forest owners regarding the majority of background factors. The average length of forest ownership in this study (approximately 4 years) is very similar to that of Estonian forest owners as a whole. In addition, the respondents of this study had mainly acquired their forest holdings through returning, which is the most common method among all Estonian forest owners. The respondents' distance between their place of residence and their forest estate is also very similar to that of Estonian private forest owners as a whole. Most of the forest owners live closer than 5 km from their forest estates[2].

However, the mean size of the forest estate in this study is significantly larger than on average in Estonia (Table 1; 35 ha in this study versus 10.5 ha). The proportion of female respondents was also smaller than their actual proportion (24% in this study versus 39%). The larger forest estate size was probably due to the fact that the address registers only included those forest owners who have voluntarily given their contact information to the Centre of Private Forestry and the Estonian Private Forest Union, reflecting over average interest towards forestry issues, which again can be assumed to reflect larger forest estate size. Fairly few, i.e. 12% of the respondents were members in some forest owner organisation. Among all Estonian forest owners, the membership rate is still clearly lower than this.

Objectives for forest ownership can be expected to be important in explaining forestry-related behaviour. The ownership objectives of the forest owners were identified by asking

2 See Centre for Forest Protection…20012. The data of this study was collected using the systematic sampling procedure and thus more accurately represents the whole population of Estonian private forest owners.

Table 1. Distribution of forest estates by size classes.

Forest area of the estate (ha)	Respondents in this study		All Estonian forest owners*	
	%	N	%	n
Under 1	2.1	12	9.9	5126
1–4.9	15.2	89	30.7	15896
5–9.9	16.6	97	23	11909
10–19.9	23.8	139	21.5	11132
20–49.9	32.0	187	12.8	6627
>50	10.3	60	2.1	1087
TOTAL	100	584	100	51777
Mean size of forest area (ha)	35.4		10.5	

* Centre of Forest Protection and Silviculture, 2001a
- Most of the respondents had received their estates through the return of land, both in this study and in the study of the Ministry of the Environment.
- Most of the respondents in this study lived very close to their forest estate. The average and median distance to the forest estate were 26.9 km and 3.5 km, respectively.
- Over a half of the respondents had been a forest owner for less than five years in 2001.

Table 2. Objectives for forest ownership in Estonia.

	Very Important				Not at all Important		
	1	2	3	4	5	Mean	
Objective	% of respondents						n
Forest provides household timber (firewood and construction timber)	39.7	39.5	14.2	4.2	2.4	**1.9**	577
Obtaining economic security	32.7	36.9	23.7	4.9	1.8	**2.1**	569
Conservation of forest nature and landscape	22.4	40.9	27.1	6.3	3.3	**2.3**	558
Emotional and traditional values of forest ownership	18.5	34.6	28.1	10.5	8.3	**2.6**	563
Offers job opportunities	15.0	29.2	34.9	15.4	5.5	**2.7**	559
Recreational use	11.0	29.1	36.0	16.1	7.8	**2.8**	564
Acquisition of income by selling timber	11.5	26.6	36.3	16.1	9.4	**2.9**	564
Investment opportunity	9.3	32.3	30.1	17.7	10.6	**2.9**	548
Secondary forest products (berries, mushrooms, game)	9.0	24.9	36.1	20.1	9.9	**3.0**	567
Pasturage	2.9	6.5	9.6	25.6	55.4	**4.2**	552

1= very important, 2= important, 3= moderately important, 4= not very important, 5= not at all important

the owners to rate the importance of ten given alternatives, which represented various forest ownership objectives revealed in previous studies. The questions covered economic, ecological and social objectives.

Economic objectives (forest provides household timber and obtaining economic security) were perceived to be the more important objectives for forest ownership. Interestingly, conservation of forest nature and landscape was also considered one of the most important objectives for forest ownership. Moreover, economic security provided by forest ownership was emphasised more than the acquisition of income from selling timber. However, it should be noted that all other objectives except pasturage are generally considered to be of quite high importance in forest ownership. Already in the mid-1990s, Karppinen (1996) observed as

Table 3. Problems related to Estonian forestry: perceptions of Estonian private forest owners.

	Very Problematic				Not at all Problematic		
	1	2	3	4	5	Mean	
Forest-related issue:	% of respondents						n
Illegal logging	59.3	24.5	8.5	5.0	2.7	**1.7**	563
Forest owners have insufficient investment capital	49.0	30.2	13.9	4.9	2.0	**1.8**	547
Taxation (e.g. sales at delivered price vs. standing stumpage sale, taxation of enterprises vs. private persons)	39.6	34.5	17.0	6.3	2.6	**2.0**	540
Lack of tradition in private forest ownership	28.1	39.9	21.2	6.6	4.2	**2.2**	548
Forest owners live apart from their forests	30.3	31.2	20.6	10.0	7.9	**2.3**	558
Lack of forestry-related knowledge (e.g. silviculture, forest management, wood trade)	21.0	33.9	29.5	9.2	6.4	**2.5**	552
Implementation of forest legislation in Estonia (e.g. poor control of Forestry Act)	18.7	31.6	35.2	10.2	4.3	**2.5**	529
The thinning of young forests is unprofitable	22.7	33.8	24.0	11.4	8.1	**2.5**	542
Land reform is still in progress	28.0	25.6	23.3	13.2	9.9	**2.5**	546
Lack of forest insurance	19.3	32.3	30.7	12.5	5.2	**2.5**	535
Forestry and agriculture are managed by different ministries	19.0	19.9	31.5	17.7	11.9	**2.8**	537
Lack of a timber measurement system	15.9	23.6	32.7	16.5	11.3	**2.8**	533
Weak domestic wood processing industry	18.6	22.9	28.9	19.4	10.2	**2.8**	537
Lack of information and training	10.6	23.6	40.6	17.8	7.4	**2.9**	539
Lack of forest infrastructure (roads, ditches)	15.4	22.2	29.6	20.3	12.5	**2.9**	537
Lack of tradition in roundwood trade	8.3	29.8	36.1	14.8	11.0	**2.9**	527
Undeveloped standards in roundwood trade	8.7	25.9	36.3	18.8	10.3	**3.0**	532
Lack of machine or work force	15.1	15.3	28.5	22.1	19.0	**3.1**	543
Lack of saplings and plants	11.1	20.5	32.4	23.5	12.5	**3.1**	550
Lack of demonstration areas	4.4	13.4	40.8	28.2	13.2	**3.3**	522
Lack of information about roundwood markets	8.7	16.8	28.4	25.1	21.0	**3.3**	542

(1= very problematic, 2= problematic, 3= moderately problematic, 4= not very problematic, 5= not at all problematic)

well that the new Estonian forest owners emphasised the importance of household timber and the landscape values.

Approximately half of the respondents had sold roundwood at least once, with a mean sales volume of around 75 m^3. The proportion of respondents selling roundwood has increased every year. By November 2001, 15% of the forest owners had sold timber during that year. As logical, the forest owners with a greater forest area (>20 ha) sold roundwood more often than the owners of small forest estates.

The respondents were asked to evaluate how problematic they consider different forest-related issues (variables measured using a five-class Likert scale). The forest owners considered illegal logging, the insufficient investment capital of forest owners, taxation, a

Table 4. Need for information about forestry issues, as ranked by Estonian forest owners.

Forest related issue	Very Much 1	2	3	4	Not At all 5	Mean	n
	% of respondents						
Legal matters (e.g. in procuring logging permission)	48.2	32.7	13.0	4.6	1.5	**1.8**	545
Forest diseases and pest control	49.5	30.9	13.9	4.1	1.6	**1.8**	560
Economic matters, investment options, taxation etc.	45.1	32.2	16.4	4.3	2.0	**1.9**	543
Guiding the quality requirements of timber	35.5	34.6	19.4	7.1	3.4	**2.1**	552
Forest management	35.8	28.7	19.9	8.7	6.9	**2.2**	553
Co-operation between forest owners	29.5	35.0	26.2	6.8	2.5	**2.2**	546
Regeneration (tree specie selection, soil cultivation)	29.6	34.7	21.4	7.1	7.2	**2.3**	551
Environmental issues (incl. certification)	26.2	34.2	28.0	7.9	3.7	**2.3**	535
Roundwood markets: prices and timber buyers	32.7	24.0	24.7	12.4	6.2	**2.4**	547
Measurement of timber	21.0	28.5	26.8	15.5	8.2	**2.6**	548
Planning the site (e.g. forwarding roads, ditching)	21.4	23.2	29.5	14.7	11.2	**2.7**	543
Methods and standards in wood trade	18.8	26.9	29.4	17.0	7.9	**2.7**	531
Efficient working methods	14.5	25.5	34.2	16.9	8.9	**2.8**	538
Use of safety equipment	18.2	18.2	37.0	18.9	7.7	**2.8**	548
Planning the cutting and thinning (e.g. tree selection)	21.7	22.3	20.4	18.8	16.8	**2.9**	554
Forest industry markets	13.0	22.6	35.6	19.5	9.3	**2.9**	539
Service of working equipment	11.5	23.1	32.6	20.0	12.8	**3.0**	540
Safe working practices	10.6	17.4	37.3	23.5	11.2	**3.1**	536

(1= very much, 2= much, 3= moderately, 4= not very much, 5= not at all)

lack of tradition in private forest ownership, and the fact that forest owners live apart from their forest estates as the main problems in private forestry in general.

The forest owners' information and training needs were asked using a list of potential areas for information needs, which were to be ranked according to importance using five-scale Likert-type scale (very important – not important at all). The results show that the three most important areas are (see Table 4 for details):

Forestry related information is needed most severely about the following issues:

1. Legal matters,
2. Forest diseases and pest control and
3. Economic matters

The information needs of the respondents were further analysed by producing a five-factor solution from the original 18 variables. The solution of five factors explains 53% of the total variance in the original variable set.

Factor I has the highest loadings on the safe working practices, efficient working methods, use of safety equipment and servicing of working equipment. All these characteristics are related to working in the forests. Thus, Factor I can be named the working practices-factor.

Table 5. Dimensions of forestry related information and training needs; factor analysis. (Maximum likelihood solution with Varimax rotation)

	Factor I "Working practices"	Factor II "Quality of timber"	Factor III "Forest management and forest diseases"	Factor IV "Legal and economic matters"	Factor V "Markets and co-operation between forest owners"	Communality
Planning the site (e.g. forwarding roads, ditching)	0.2079	0.1293	**0.5643**	0.0775	0.1376	0.3775
Planning the cuttings and thinning (e.g. tree selection)	0.1010	0.1380	**0.6767**	0.0536	-0.0952	0.4102
Forest management	0.1572	0.1365	**0.6715**	0.1102	0.0132	0.4173
Regeneration (tree specie selection, soil cultivation)	0.1638	0.0405	**0.5924**	0.0293	0.1553	0.3398
Forest diseases and pest control	0.1635	0.0968	**0.4767**	0.1511	0.2302	0.3537
Safe working practices	**0.7452**	0.0651	0.2867	0.0995	0.1446	0.5921
Efficient working methods	**0.4934**	0.1078	0.1837	0.1305	0.3315	0.3918
Use of safety equipment	**0.8500**	0.1378	0.2356	0.1132	0.0888	0.6297
Service of working equipment	**0.5225**	0.2113	0.1581	0.0583	0.2296	0.3789
Measurement of timber	0.2120	**0.6966**	0.3415	0.1097	0.0901	0.5059
Guiding the quality requirements of timber	0.2156	**0.6355**	0.2788	0.2473	0.1632	0.5430
Legal matters (e.g. in procuring logging permission)	0.1466	0.2096	0.1614	**0.6049**	0.2058	0.4371
Economic matters, investment options, taxation etc.	0.1197	0.1482	0.1287	**0.8189**	0.2669	0.4812
Roundwood markets: prices and timber buyers	0.0468	0.4470	0.0571	0.2817	**0.4558**	0.4725
Forest industry markets	0.1651	0.1877	0.0141	0.0998	**0.7456**	0.5158
Methods and standards in wood trade	0.1512	0.4164	-0.0622	0.1447	**0.6567**	0.5379
Co-operation between forest owners	0.1304	-0.0449	0.1486	0.1407	**0.5921**	0.3344
Environmental issues (incl. certification)	0.2181	0.0160	0.2272	0.1945	**0.4932**	0.3713
Eigenvalue	2.170	1.511	2.320	1.366	2.234	9.600
Total variance	12.1%	8.4%	12.9%	7.6%	12.4%	53.4%

Factor II includes measurement of timber and guiding the quality requirements of timber. Both these variables can be considered as representing the quality of timber; thus Factor II can be named the quality of timber-factor. Factor III has the highest loadings on planning the site and the cuttings and thinning, forest management, regeneration and forest diseases. Factor III can be interpreted as describing, and was therefore labelled the forest management and forest diseases-factor.

Factor IV comprises legal and economic matters that were, according to mean values, among the most important areas for receiving more information and training. This dimension is labelled the legal and economic matters-factor. Factor V has the highest loadings on the roundwood and forest industry markets, methods and standards in the wood trade, co-operation between forest owners and environmental issues. All other aspects except co-operation between forest owners in

Table 6. Statistically significant divergences in information and training needs between different forest owner groups (for detailed results, see Järvinen et al. 2003).

<table>
<tr><th></th><th colspan="2">Factor I
“Working practices”</th><th colspan="2">Factor II
“Quality of timber”</th><th colspan="2">Factor III
“Forest management and forest diseases”</th><th colspan="2">Factor IV
“Legal and economic matters”</th><th colspan="2">Factor V
“Markets and co-operation between forest owners”</th></tr>
<tr><td></td><td>-</td><td>+</td><td>-</td><td>+</td><td>-</td><td>+</td><td>-</td><td>+</td><td>-</td><td>+</td></tr>
<tr><td>Professional education</td><td>Academic education</td><td>Compre-hensive school education</td><td rowspan="5">No differences were detected</td><td></td><td colspan="2">No differences were detected</td><td rowspan="5">No differences were detected</td><td></td><td>Academic education</td><td></td></tr>
<tr><td>Forestry-related education</td><td colspan="2" rowspan="4">No differences were detected</td><td>Academic forestry education</td><td>No forestry related education</td><td colspan="2" rowspan="4">No differences were detected</td></tr>
<tr><td>Length of forest ownership</td><td></td><td>After the year 1996</td></tr>
<tr><td>Forest area of estate</td><td><20ha</td><td>>20ha</td></tr>
<tr><td>Distance to the forest estate</td><td><5km</td><td>>5km</td></tr>
<tr><td colspan="11">p-value < 0.05</td></tr>
</table>

this dimension represent market aspects of the forests; Factor V can therefore be named as the markets and co-operation between forest owners-factor.

The divergences in the forest owners' information and training needs, which are illustrated in Table 6, were studied by calculating mean factor scores and then by comparing these mean values using t-test. The background characteristics where statistically significant differences were detected regarding information need dimensions, are also shown in the Table. Each dimension of information and training needs is divided into columns marked with “-” or “+”. Those forest owner groups emphasising an information and training need dimension significantly more than other forest owners (other classes of the respective background variables) are included in the column marked with “+”. Similarly, those groups emphasising an information and training need dimension significantly less are included in the dimensions' “-” column.

It should be noted that the forest owners classified by certain background variable in the “+” columns emphasise the given information dimension more than those indicated in the “-” column, and the difference is statistically significant. However, this does not indicate that the owner groups included in the “+” column would consider the given information and training dimension as the most important one. Thus, it is to be kept in mind that the indicated differences between forest owners with different background characteristics are only relative – not absolute.

Forest owners were also asked about their willingness to pay for forestry-related information and training (yes/no/cannot answer). One third (33%) were willing to pay for forestry-related information and training. Over a half (54%) could not state their opinion on this issue.

Table 7. Preferred information channels; perception of Estonian forest owners.

	Information channel				
	Courses organised for forest owners	Printed and AV information	Personal guidance		
Forestry related issue	% of respondents			In Total (%)	n
Forest diseases and pest control	**44.3**	32.5	23.2	100	535
Forest management	**41.6**	30.4	28.0	100	529
Regeneration (tree specie selection, soil cultivation)	**39.1**	37.4	23.5	100	532
Economic matters, investment options, taxation etc.	**36.9**	31.7	31.4	100	537
Use of safety equipment	30.7	**64.9**	4.4	100	522
Safe working practices	30.3	**64.3**	5.4	100	521
Timber markets and trade	27.5	**60.2**	12.3	100	527
Efficient working methods	33.5	**59.7**	6.8	100	519
Environmental issues (incl. certification)	35.4	**56.0**	8.6	100	520
Servicing of working equipment	32.5	**51.9**	15.6	100	520
Quality requirements of timber	36.8	**51.7**	11.5	100	530
Measurement of timber	36.1	**46.2**	17.7	100	526
Planning the site (e.g. forwarding roads, ditching)	28.1	**36.9**	35.0	100	526
Planning the cutting and thinning (e.g. tree selection)	23.8	26.1	**50.1**	100	529
Legal matters (e.g. in procuring logging permission)	31.7	31.7	**36.6**	100	530

So far, forest owners have most often used journals and periodicals in searching for information about forestry-related issues. In addition, forest owners have relied quite often on literature. Environmental organisations, co-operatives of forest owners and associations of forest owners, by contrast, have been by far the most rarely used information sources. Forest owners were also asked which information channel they would prefer about various forestry-related issues in the future. They were asked to select the best of the given three alternatives: courses organised for forest owners, printed and AV information, and personal guidance. In general, Estonian private forest owners seem to prefer printed and audiovisual information (Table 7). However, it should be noted that regarding issues that the Estonian forest owners most strongly need information and training (legal and economic matters, forest diseases and pest control), courses and personal guidance are clearly the most preferred channels.

5. Discussion

The structure of forest ownership in Estonia is changing due to the land reform process. The share of privately-owned forest is expected to increase to about 60%. The number of

privately-owned forest holdings may approach 100 000, and thus the number of individual persons owning forest may grow even larger than this. Most of the new private forest owners have little or no experience in forestry. Therefore, from forest policy decision making perspective, there is a clear need to know the forest owners' forestry related objectives and information needs as the basis for developing forestry-related information services.

The primary data were collected through a mail survey in October 2001. A five-page questionnaire was sent to 844 private forest owners. In total, 69% (584) responded. In the analysis of the primary data, means, distributions, factor analysis, factor score coefficients and cross-tabulation were used. A detailed description of the study is in Järvinen et al. (2003).

The respondents of this study represent the population of Estonian forest owners in several respects. However, the respondents of this study also differed from the total population of Estonian private forest owners in certain aspects. Most importantly, *the average size of the respondents' forest estates was three times as large as that of all Estonian forest owners*. The proportion of female respondents was also smaller than their actual proportion. These facts need to be considered when interpreting the results. However, the results of this study were anyhow fairly well in line with the somewhat parallel study with a larger data in those cases were the research questions and results were comparable, and thus the results should be fairly well applicable to the Estonian private forestry in general. However, potential reliability and validity risks related to any survey study naturally apply also on this study, even though efforts were made to increase the reliability and validity of the data by careful construction and testing of the questionnaire.

*The procurement of household timber (both firewood and construction timber) and economic security were the most important forest ownership objectives. This was somewhat surprising, when the strong growth in wood supply from private forests to commercial markets is considered. Anyhow, a*pproximately half of the respondents had sold timber on commercial markets at least once during their forest ownership period. The average quantity sold at a time was 75 m^3. On the other hand, the objective of holding forests to support economic security was not surprising in comparison to the situation in Finland, where private forest owners also emphasise economic security as a fairly strong objective forest ownership.

It should be noted that besides economic objectives, also nature conservation was ranked important, as well as emotional values related to forest ownership. These are clearly more important than perceiving forests as an investment, or a source for timber incomes. Thus, forest ownership in Estonia is based on a bunch of several objectives, which needs to be considered in forest management and in planning of the forestry related information services and training.

Overall, forest owners need much or fairly much information in most of the suggested themes related to forestry or wood markets. The strongest information needs regard legal and economic matters related to forestry, and forest diseases and pest problems. The forest owners also found personal contacts and the possibility to communicate interactively very important about these issues, even though generally information about forestry related issues was preferred to be available through printed or audiovisual channels.

Illegal logging was considered the most severe problem in Estonian private forestry, which may also partly explain why forest owners need so much information and training about legal matters. The information and training needs concerning forest diseases and pest control may reflect the forest damage caused by a storm in Estonia in the autumn of 2001, i.e. quite recently before the survey was conducted. The forest owners also think that they would need quite extensive information and training on environmental issues.

The results provided indications that at least some of the forest owners would also consider paying for information and training. Thus, at least some information and training services

could be probably organised at a slight cost. However, it was not analysed how much and for what kind of information the forest owners would be willing to pay.

Since the Estonian forest ownership is still changing, and the forest owner structure is also changing as well as the experiences of forest owners, a new study is probably needed about the issue within about each five-to-ten-year period. A system of conducting the surveys based on a panel-type of data could be considered. This would provide a good basis for follow-up of the development of private forestry in Estonia, and probably would also serve forest policy decision making better than individual cross-sectional studies. The results of this study may reflect the forest ownership objectives and forest owners' perceptions also in a few other new EU-member country, even though all these countries have their own characteristics also in private forestry.

References

Centre of Forest Protection and Silviculture. 2001a. Estonian Forestry Development Programme. Draft 2.3. www.metsad.ee (In Estonian).

Centre of Forest Protection and Silviculture and Ministry of the Environment of Estonia.2001b. The need for advising and the strategy for extension services in forestry. Metsandusliku nõuande vajaduse analüüs ja metsandusliku nõuande strateegia väljätöötamine. 87 p. (http://www.metsad.ee/aruanded/PR_mon.pdf.) (In Estonian).

FAO. 2002. UNECE / FAO FORESTRY database, 2002. http://apps.fao.org/page/collections?subset=forestry

Institute of Forest Industry. 2000. Use of production resources by Estonian forest industries. Estonian Agricultural Univeristy, Tartu. 73 p.

Järvinen, E., Toivonen, R. and Kaimre, P. 2003. The Information and training needs of private forest owners in Estonia. PTT Working Papers N:o 61 (January 2003). 61 p. ISBN 952-5299-63-5.

Karppinen, H., Hänninen, H. and Ripatti, P. 2002. Suomalainen metsänomistaja 2000 (Finnish forest owner 2000). Finnish Forest Research Institute. Research Papers 852. ISBN 951-40-1832-X. ISSN 0358-4283. 83 p. (In Finnish).

Karppinen, H. 1996. Private forestry in Estonia – results from a survey study conducted together with Indufor Oy. Estonian Forestry Development Program (EFDP). 25 p.

Kaimre, P. 2001. The influence of the forest sector to the Estonian economy in 1994-1999 (in Estonian). Transactions of the Faculty of Forestry, Estonian Agricultural University. 35 p.

Statistics Estonia /Statistical Office of Estonia. 2001. Database of Statistics. www.stat.ee

Tilli, T. and Skutin, S-G. 2004. Roundwood markets in the Baltic Sea Region. Pellervo Economic Research Institute Reports No. 188. 54 p.

Toppinen, A., Viitanen, J. and Toivonen, R. 2004. Roundwood Price Development in Estonia, Finland and Lithuania. 14 p. Manuscript submitted to Baltic Forestry.

The Forest Act. 1998. Riigi Teataja I 1998, 113, 1872. (In Estonian).

Challenges of Forestry Financing in the Czech Republic

Ludek Sisak and Karel Pulkrab

Faculty of Forestry and Environment, Czech University of Agriculture in Prague
Prague, Czech Republic

Abstract

The paper is devoted to the problems of forestry financing in the Czech Republic (CR) in the period of transition to market economy (1991–1999), partially regarding the years 2000–2004. Miscellaneous sets of measures financially promoting forestry were used in these periods. The policy of forestry financing was related in the first stage especially to the restitution and privatisation processes, and to the securing and enhancing of sustainable forestry providing the population with non-market forest goods and services in the second stage. 30 programmes and 46 measures were identified in 1991–1999 in the CR. The level of financial support ranged from 910 mill. CZK (in 1997) to 1501 with the exemption of 2539 mill. CZK in 1991 (all in constant 1999 prices). On average, the support varied about 10% of the GDP created by the forestry sector in the period. Effectiveness of promotion of forestry can be expressed only partially and with great difficulties.

Keywords: financing of forestry, transition to market economy, Czech Republic.

1. Introduction

This paper presents important research results on the analysis of forestry financing in the Czech Republic in the early period of transition to the market economy 1991–1999. The analysis was performed at the Department of Forestry Economics and Management of the Faculty of Forestry and Environment, Czech University of Agriculture Prague. In the period 1990–1999 the Czech Forestry Sector experienced many substantial changes significantly influencing the process of forestry financing:

- Completely new state forest administration was formed.
- Private forestry sector was restored (about 150 thousand private forest owners).

Heikki Pajuoja, Ludek Sisak and Krzysztof Kaczmarek (eds.)
Evaluating Forestry Incentive and Assistance Programmes in Europe – Challenges to Improve Policy Effectiveness
EFI Proceedings No. 54, 2005

- New categories of forest owners came into being.
- New structure of state forest establishments administering state forest lands was created.
- A quite new system of forestry financing was gradually formed.

The State is interested in the permanent and balanced use of this renewable resource and the utilisation of its benefits for the public interest (Ministry of Agriculture 1994). Bases for the forest policy were updated in 1999 (Conception of the forest policy for the period before accession of the Czech Republic to the European Union 1999).

Long-term principles of the Czech forestry policy have been:

- Restoration and preservation of stable forest ecosystems;
- Increase of diversity of the forest tree species to become closer to natural composition;
- Significant decrease of air-pollution load on forest stands;
- Safeguarding and revitalising forest stands in regions damaged by air-pollution;
- Maintaining and developing of the gene pool of forest tree species.

Short-term principles of the Czech forestry policy included:

- Complete restoration of property rights to forests, including the settlement of indemnities;
- Stabilisation of organisational structure of the State forests;
- Preservation of a high level of forest management planning;
- Significant reduction of damage caused by hoofed game;
- Assistance in the improvement of forest management (especially for small owners, through establishing and supporting groups/associations of owners) by increasing the professional level of the staff, consultations, and public awareness.

Legislative tools are applied to all forest owners, without exception, to regulate their activities in favour of public interest. These regulations are applied under the Forest Act (No. 289/1995), Nature Conservation Act (No. 114/1992), and the Water Act (1996). The Forest Act constitutes fundamental part of new legislation related to forestry, creating a legislative framework for the fulfilment of the major international commitments, such as respecting the principles of environmentally friendly forest management, sustainability and biodiversity protection. The Forest Act defined new basis for financial support to forestry in the CR. Accordingly, financial support system was completely changed in 1996.

At the end of the analysed period, the forestry policy principles were adjusted by "Conception of the forest policy for the period before accession of the Czech Republic to the European Union", issued by the Ministry of Agriculture in 1999. Also, the National Forest Programme was started with a view to elaborate a system of implementing projects of state forest policy. Apart from completion of the restitution processes, improvement of the condition of forest ecosystems, conservation and enhancement of biodiversity in forests, development of non-market forest goods and services, the support for extending timber utilisation and for forestry institutions is mentioned in the National Forest Programme.

2. Materials and methods

This paper was elaborated in the frame of the research project "Evaluating Financing of Forestry in Europe" carried out with the financial support from the Commission of the European Communities (DG Research – Quality of Life and Management of Living Resources Programme under contract number QLK5-CT-2000-01228). The article reviews the most important information presented in the research report by Sisak et al (2002), and in

the paper by Sisak and Chytry (2004). The data was partially taken from Reports on the state of forests and forestry in the Czech Republic by the Ministry of Agriculture of the Czech Republic (1994–2001), partially it was gathered at the respective Ministries.

The policy in forestry financing is related above all to the securing and enhancement of the sustainable provision of non-market goods and services. It also supports competitiveness of timber production and employment. This is because timber is considered very important, environmentally friendly renewable raw material in contrast to other non-renewable and environmentally unfavourable materials. The economic instruments are distinguished according to their functions:

a) Subsidies (grants – motivating);
b) Compensations;
c) Taxes (fiscal).

2.1 Subsidies and compensations

The problem is that subsidies (grants) and compensations in the CR are treated as one group of financial support; they are not differentiated into two groups of financial instruments that are of quite different essence. Grants financially support some activities and have motivating impact while compensations represent reimbursement of costs or income loss caused by providing the public with non-market forest services. To a certain extent, compensations represent purchase of non-market services by public institutions. If these two financial instruments (grants and compensations) are not treated separately in the administrative records, it may confuse the evidence on the actual amounts and objectives of forestry funding.

Information on respective subsidies and compensation programmes in 1991–1999 was gathered from different sources. Data on programmes implemented by the Ministry of Agriculture, the most important programmes for forest owners and managers, was collected in close collaboration with the experts of the Ministry of Agriculture, Forestry Branch. There have been surveyed archives and statistics of the Ministry and of the state forest administration of lower levels (regional departments of the Ministry). In particular, data on programmes financed by the Ministry was collected from summaries of contracts granting subsidies. Financial support provided in the frame of these programmes constitutes the most important source of assistance to forest owners and managers in the Czech Republic.

Data on Programme ‘Investments support by the Supporting Guaranteeing Farmer’s and Forestry Fund’ (1996–1999) was collected from the Fund (a limited company with 100% shares owned by the state). Data on financial support in military forests was collected from the respective authorities and from the statistical surveys at the Ministry of Agriculture.

Below we describe the main problems and shortcomings related to gathering and analysing data on direct and indirect financial instruments in forestry in the CR. Analysis of the financing of forestry in the CR in the period 1991–1999 revealed that in the course of the so-called “transition to market economy” changes in administrative record keeping procedures have greatly influenced possibilities for consistent data analysis.

Up to 1991, almost all forests were in the state possession or were managed as a state ownership (directly connected with the state budget), and there existed quite a different system of financial support. Basically, financial losses (predicted) were covered from the state budget, profits were returned to the state budget.

In the period 1992–1995, the gradually created new system of the financing of forestry was heavily influenced and distorted by restitution processes. The system was also different in respective years. In 1995, new Forest Act came into existence changing principally the system

of forestry financing. Apart from this, the system of state forest administration was substantially rebuilt. As for the period 1991–1995, the processes mentioned above resulted in:

- Great lack of statistical data on forestry financing;
- Considerable unreliability of some of the data;
- Incompatibility of the data.

In 1992, after the restitution process had begun, the first forestry subsidies were offered to all forest owners. The instructions for their granting gradually developed in accordance with the needs of the society undergoing important changes. The sets of instructions were annually issued by the Ministry of Agriculture in co-operation with the Ministry of Finance.

The Forest Act, issued in the autumn of 1995, was a decisive turning point. This act for the first time defined forestry support as an instrument of the forest policy. Since 1996, a relatively modern system of forestry financing has been sufficiently stabilised. The proper and stable financing programmes started mostly in 1996. It means that available and reliable data on forestry financing could have been collected systematically only since 1996 (including that year).

2.2 Tax concessions

After 1990, all revenue statutes were amended to allow enterprising. Since 1993, the new tax system, corresponding with the tax system in the EU, has been in force in the CR. The most prevalent is the income tax. The law divides this tax into two sub-categories: natural person income tax, and legal entity income tax. The tax base represents the sum of which the yearly revenues of the tax-payer exceed the provable expenses needed to achieve, secure, and maintain the revenues.

As for the natural person income tax, forestry revenues attained by timber harvest can be divided into ten proportional shares. Relevant expenses claimed in the preceding tax periods are not taken into account. One proportional share is included in the tax base of the relevant tax period, and the percentage of the tax base is calculated. Using this figure, the tax is calculated from the remaining part, or parts, of the revenue obtained in more tax periods. If the percentage is less than 15, the tax rate used for calculation of the tax from the remaining parts is 15%.

Legal entities can create from their incomes so called “reserve fund for silvicultural operations” (future costs). In this case, financial means are taxed in respective years of their employment for the silvicultural operations.

The real estate tax is divided into the land tax and the real estate tax. Subject to the land tax are all lands in the territory of the CR recorded in the land register. Forestland is taxed only in case there are commercial forests on it. Land on which there are protection forests and forests of special purposes is not subject to the land tax. The following kinds of land are also exempt from the tax:

- specially protected areas by regulations of nature and landscape protection (except national parks and protected landscape areas – forests of special purpose),
- holding covers, groves and wind breaks on the fields, meadows and pastures,
- protection zones of water resources of 1st degree,
- agricultural land for 5 years and forest land for 25 years, starting one year after the year when they were returned to agricultural or forest production after technical or biological land restoration ,
- forestland set off for electricity and fuel gas distribution.

Vehicles, such as tractors and their trailers in forestry and agriculture use are not subject to the road tax.

The most frequent rates of value added tax in forestry in 1990–2003 were:

a) 22% on goods (e.g. purchase and sale of wood except fuelwood),
b) 5% on services and works in forests (e.g. felling, skidding, silvicultural operations, etc.) and purchase and sale of plants and seedlings of forest trees species, and fuelwood.

3. Results and discussion

3.1 Programmes and measures

Regarding the number of forestry assistance and incentives schemes there were identified 30 programmes (see the Tables 1 and 2) and 46 measures (programmes and sub-programmes) in 1991–1999 in the CR. Programmes execution was unstable in the period studied. Their implementation occurred in different years with a different level of finance. Sets of programmes implemented in 1991, 1992–1996 and 1996–1999 are quite different. Intended outputs were not statistically observed on the national level up to 1996 despite the fact that the support was granted for approved projects with physical outputs specified in individual cases. Physical outputs on the state level started to be statistically surveyed in 1996 but in some programmes only in 1999.

Considering the financial support including tax concessions of the whole set of programmes by individual years, the highest support of 2540 mill. CZK occurred in 1991. But 2/3 of the support came from the former financing of air-polluted areas. The other support measures reached only a little more than 800 mill. CZK. On average, the financial support was at the level of 10% of the GDP created by the forestry sector. The majority of programmes and measures were implemented using direct economic instruments.

Administrative procedures are more problematic for small-scale forest owners than for the larger ones. Financial support is performed prevailingly in connection with securing and enhancing quality of non-market public forest services and sustainable forest management. Market relations are not affected.

Efficiency of the majority of the programmes could be calculated only as a relationship between private value of physical outputs and the value of financial and administrative inputs. No external values (outputs) could be identified and used. Using external values, the efficiency of the majority of programmes would be higher. The problems mentioned above should be dealt with in the future studies.

The tax system is rather complex in the CR. Tax concessions in forestry can be related to land tax, road tax (forest tractors are exempt from road tax), to a certain extent to income tax and to value added tax (lower taxation of fuel wood). Reliable data was collected for the most important ‘land tax’ concession. Land tax is not paid on forests categorised as protective forests (3.6% of total forest land in the CR) and forests of special purposes (18.7% of total forestland). Land tax is substantially reduced or abolished in forests affected by emissions. Data on other tax concessions in the forestry sector was not available. Forestland tax concessions can be roughly estimated at about 100 mill. CZK in current prices annually in the period of 1991–1999. However, no official statistics on the value of tax concessions exists. The number of beneficiaries can be estimated at tens of thousands. No exact quantities of programme outputs could be estimated in the present stage. Data on other tax concessions in the forestry sector was not available.

As there is no market demand for operations producing or improving supply of non-market forestry services (especially recreational, nature protection including biodiversity, water management, soil-protection) the government or other public institutions must often create demand for such activities. Without subsidies (grants and compensations) the forest owners

Table 1. Financing of forestry in the Czech Republic 1991–1995 in mill. Czech Crowns (CZK); constant prices of a base year 1999.

Programmes	Years				
	1991	1992	1993	1994	1995
Support of air-polluted areas	1719				
Subsidies – calamity funds	331				
Other subsidies	2				
Silvicultural operations for non-market services	101				
Intensification of non-market forest services	90				
Other public beneficial activities	90				
Forest reclamation and torrent control	206				
Support of minor forest owners (250 ha)		16	27	130	255
Support of innovation in information systems in forestry		95	18	28	29
Public beneficial activities (for non-market services)		480	658	571	584
Support of forestry in air-polluted areas		480	608	479	294
Land tax concessions			160	146	133
Other support		19	30	3	
Total	2539	1090	1501	1357	1295

and managers (private, municipal and state) would not provide non-market forest services in proper quality and quantity.

The owners of protective forests, forests of special purposes, forests on poor sites and forests damaged by air-pollution usually face lack of sufficient financial resources to manage their forests in a sustainable way and to sustain provision of all forest services. Again, without subsidies forest owners would not secure a proper state of forests and they would not protect them sufficiently against pests. Public goods and services would not have been performed in needed quality and quantity. Subsidies ensure proper forest management, a desirable state of forest stands and forestlands, and adequate supply of public forest services.

The subsidies are based on quality of the forestland (land class) and zoning (categorisation) of forests (based on the dominant function of the forest – protective forests, forests of special purpose). The compensations are based on quantity and quality of the operations in respective projects. The subsidiary system is designed to ensure that every forestland owner can manage his or her forest property in a well-balanced, optimal way. Financial support allows sustainable management of forests, by correcting market failures related to public goods and externalities. Market operation as such is not negatively affected at a measurable level. On the contrary, comparable starting conditions are set for all private and municipal forestland owners.

3.2 Problems and gaps

3.2.1 Problems with different finance sources and sectors promoted

Transparency and compatibility of forestry financing in individual countries (or regions) can be substantially affected by funding programmes in other sectors, e.g. by supporting employment and infrastructure in rural areas, or production of certain timber assortments (energy wood, biofuels).

Table 2. Financing of forestry in the Czech Republic 1996–1999 in mill. Czech Crowns (CZK); constant prices of a base year 1999.

Programmes	Years			
	1996	1997	1998	1999
Support of minor forest owners (up to 250 ha)	183			
Reforestation by soil improving and stand stabilising of tree species	12	11	13	12
Soil reclamation and torrent control	170	228	123	178
Regeneration of forests damaged by air pollution		28	30	34
Reforestation, establishment of stands and their tending		122	179	187
Grouping of the small-size forest owners	1	1	2	3
Environment and nature friendly technologies	2	7	8	17
Support of endangered species of wild animals	15	0	1	3
Afforestation of agricultural lands including their protection	27	17	39	47
Investments support	112	4	51	27
Forest management guidelines (FMG)		26	32	40
Licensed forest professionals (LFP)	74	90	98	99
Providing forest services aimed at forest management		10	8	8
Support of forest running in the military forests	65	51	64	58
Public beneficial activities (for non-market services)	334			
Support of forestry in air-polluted areas	213			
Land tax concessions	122	113	102	100
Non-market forest services	179	82	143	200
Torrent control	23	2	42	45
Other subsidies for forest running	9	8	6	5
Providing forest services – large scale measures	28	110	144	116
Total	1569	910	1085	1179

Financial means for forestry are available from the following five ministries in the CR; however, the Ministry of Agriculture plays the most important role:

- Ministry of Agriculture;
- Ministry of Environment;
- Ministry of Regional Development (ensuring rural development policy);
- Ministry of Industry and Trade;
- Ministry of Defence.

In total , it represents 18 sources (distinguished into 50 titles), out of which the most important are the “Financial Contributions for Forests Management” by the Ministry of Agriculture, the “Nature Environment Management Programme” by the Ministry of Environment, and the “Promoting and Guaranteeing Farmers’ and Forestry Fund” by the Ministry of Agriculture.

Financial means come newly also from EU programmes (mainly: Horizontal Rural Development Plan, Sectoral Operation Programme).

3.2.2 Problems with influence and interference of other instruments

Forestry financing, as an economic instrument, is closely connected with and influenced by other policy instruments promoting forestry services. Therefore, forestry financing should be treated in relation to other sets of policy instruments. In the CR, these instruments include:

- Normative, administrative instruments (acts, regulations: limits, standards, permissions, licences);
- Economic instruments (a large set of financial and other economic measures);
- Informational instruments (education, extension, information campaigns);
- Voluntary approaches (unilateral engagements, obligations, public voluntary systems, negotiated agreements, contracts);
- Management and planning (environmental management systems, determining and zoning of protected areas with important environmental services, landscape use and planning);
- Institutional instruments (establishment of state, regional, district or local institutions engaged in protection and promotion of environmental forest services).

The economic instruments (both positive and negative ones) applied in forestry in the CR comprise:

- Grants
  Payments from public sources ensuring desirable forest management, state of forest stands and forestlands, adequately providing non-market forest services in unproductive forest areas;
- Compensations
  Financial means from public sources covering both the higher costs of operations or the losses of income incurred by forest owners, tenants and administrators, usually as a result of legislative restrictions imposed on forest management in relation to public needs and demands;
- Purchase of forest operations and services
  Public financial means used for purchase of respective operations and non-market forest services in demand and consumption by the public, by the state or regional establishments;
- Tax concessions (direct and indirect taxes)
  Concessions on taxes in forestry reflecting peculiarities of forest management, considering the long production cycles, and the economic restrictions;
- Purchase of forestlands
  Public financial means used for purchase of forests in areas zoned as important for nature and environment – national parks, national natural preserves, specially protected landscape areas;
- Ecolabelling
  Systems of timber or forest management certification – e.g. international systems like "Forest Stewardship Council" (FSC), "Pan-European Forest Certification" (PEFC), the new "Programme for the Endorsement of Forest Certification Schemes", promoting better position of such timber on the market, promoting sustainable and environment friendly forest management;
- Soft loans
  Financial support to entrepreneurs in forestry for capital acquisition, connected with innovations and innovating activities in sectors operating in rural areas, consisting of subsidised interest rates and loan guarantees;
- Fees for deforestation
  Financial means paid by those who cause the change in use of forest land, securing protection of forests in the landscape, expressing the loss of non-market environmental services for public;
- Sanction payments
  Penalties for performing illegal activities in forests, protecting forest sustainability and stability, sustainable providing of forest services;

- Indirect economic instruments
  Services provided by public or semi-public institutions to forest owners and managers for free or at below market-level prices.

3.2.3 Problems of the actual allocation of the financial subsidies

Annually, about ten thousand applicants request for the above-mentioned kinds of subsidies (positive incentives). Between 1997–2000, the applications were processed at local offices of the Ministry of Agriculture situated in 77 district towns. However, since 2001 these offices were moved to 14 regional centres making them far more distant from the applicants. An implication of this change is that also personal contacts between the applicants and the administrative offices have diminished as did the advisory role of the administration.

The personnel of regional centres dealing with the applications are not agricultural nor forest professionals any longer; and they are not familiar with the local conditions. Representatives of key actors incorporated into the study would prefer to return to the previous model of smaller-size counties, where the responsible clerks are familiar with the local conditions, know the forestland owners and entrepreneurs, and at the same time can perform the advisory role.

3.2.4 Problems with administrative procedures

Since 1997, a new system of application procedure has been launched. The set of rules for granting forestry subsidies is provided by the Amendment to the Act on the State Budget. These rules determine precisely under what conditions the subsidies are granted, and include all application forms for the projects. The applications can also be submitted in electronic form, available at every administrative office. The applicants submit their application after they fulfilled all the conditions set by the rules. The application must be checked and signed by a licensed forest professional certifying that the projected (planned) operations were performed in required quality and quantity. The administrative office then carry out spot checks (ca 10% of the subsidised operations) and grant the subsidy on the basis of official decree (single-sided legal act). This administrative measure reduces the administrative procedures by 50%. The applications are processed in due order, usually within 30 days since the submission. There are no substantial problems with the time gap.

3.2.5 Questions related to applicants

Large-scale forest owners are familiar with the rules, their personnel is highly professional, and therefore, their applications are usually correct. However, the smaller the size of forest holdings, the worse the quality of the applications. Administrative procedures with the small-scale forest owners' applications are usually more challenging, and often their applications are turned down because the owners did not meet some of the requirements set by the rules.

The terms were also shaping up for some time. Originally, all applications were presented on one specific date appointed by the Ministry of Agriculture. However, it was very difficult to handle all applications at once. Nowadays, the applicants have to submit their applications within 3 months after the operations in question concluded. This proved more convenient. Applications are dealt with individually and processed in due order.

3.2.6 Physical outputs

Physical outputs were properly planned and checked by individual applications (individual projects) in individual districts. Proper projects for all operations had to be elaborated and approved by respective officers. The results were compared with the financial means granted. But in the CR as a whole, statistical data was elaborated and summarised both in the planning process and in evaluation of results for only some measures in the period of 1996–1999.

3.2.7 Programme efficiency

The programme efficiency could have been assessed only since 1996. Usually, the programmes' achievements equal their initial targets. It means that the programmes' (subprogrammes, measures) outputs equal initial programmes' (subprogrammes, measures) targets in respective years in accordance with the finances planned and spent for the activities. Nevertheless, in many cases neither the intended nor actual outputs were not precisely documented on the national level. The drawback was settled in 1999 and in the following years. Since then all the related data has been statistically observed and available.

Total economic values could not be identified because values of externalities based on consumer surplus approach (use-values, non-use values, option, bequest, existence values) have so far not been commonly measured in the CR.

4. Conclusions

Financing of forestry in the CR was not balanced and stable in the period of 1991–1999. This situation resulted from relatively quick and deep socio-economic changes the Czech society and the economy have been going through in the period studied.

Financial support programmes should be analysed in close connection with other policy instruments influencing forestry, and with other economic instruments. The support programmes should be harmonised regarding different sources and sectors, both national and international.

Tax concessions system should be simplified. Political aims should be expressed more clearly. The intended physical outputs should be identified in a more concrete way in this context.

Grants (motivating financial means), compensations (reimbursing additional costs and income losses) and purchase of forest operations and services (meeting public environmental needs) should be treated and observed separately and not in one group of subsidies, so as to make forestry financing more transparent.

The physical programmes' outputs, especially related to individual measures, should be systematically defined, planned and statistically surveyed in a more concrete and measurable way on the national level.

Private values of the outputs as well as the values of financial inputs consisting of financial support and of administrative costs should be systematically surveyed and analysed on the national level.

External values of programmes' outputs (value to the society) should be investigated and identified in cases where it is possible and useful. These values should be taken into account in efficiency analyses of individual programmes and their measures.

The offices responsible for providing financial support should move from regional centres nearer to the applicants. Responsible clerks should be qualified in forestry and more familiar with the local forestry conditions.

Administrative application procedures should be simplified for small-scale forest operations. Small-scale forest owners should be better informed about financial support programmes, as well as instructed and helped to a greater extent in the administrative procedure of the application.

The results of the EFFE project encourage further research work in this field aimed at enhancement of the comparability of forestry financing systems and their monitoring in the European Union member states.

Acknowledgements

This article was prepared in the frame of the EFFE research project, “Evaluating Financing of Forestry in Europe” carried out with the financial support from the Commission of the European Communities (DG Research – Quality of Life and Management of Living Resources Programme under contract number QLK5-CT-2000-01228). The content of this paper represents the results of the study carried out by the Faculty of Forestry and Environment of the Czech University of Agriculture in Prague.

References

Forest Act No: 289. 1995.

Ministry of Agriculture of the Czech Republic. Basic principles of forestry policy. Prague.1994.

Ministry of Agriculture of the Czech Republic. Conception of the forest policy for the period before accession of the Czech Republic to the European Union. Prague.1999.

Ministry of Agriculture of the Czech Republic. National forest programme. Prague. 2003.

Ministry of Agriculture of the Czech Republic. Reports on the state of forests and forestry in the Czech Republic. Prague. 1994–2001.

Sisak L. et al. 2002. Evaluating Financing of Forestry in Europe – country-level report, Czech Republic. Research project, 5th Framework programme “Evaluating Financing of Forestry in Europe”, No: QLKL5-2000-01228. Faculty of Forestry and Environment, Czech University of Agriculture Prague. 58 p.

Sisak, L. and Chytry, M. 2004. Analysis financing of forestry in the Czech Republic in the period of transition to market economy. Journal of Forest Science 50(2): 78–85.

Hard Lessons from Funding Forestry-Related Activities after Catastrophic Events: The Case of the 1999 Storm in the Vosges, France*

Jean Croisel

The French Institute of Forestry, Agricultural and Environmental Engineering (ENGREF)
France

Abstract

In the aftermath of the storms "Lothar" and "Martin", which caused unprecedented damages to the forests, the French Government set up a major assistance programme to support the sector and encourage foresters to cope with the crisis. Five years later, many stakeholders consider this so-called "Relief Plan for Forests" (RPF) with mixed feelings. In order to learn a lesson from the crisis, a fair assessment of what went "wrong" and what went "right" is now seen necessary. For this purpose, a technical expert review with five acknowledged specialists of the field was carried out in the most severely damaged region of the Vosges. Mainly based on qualitative insights, the strengths and weaknesses of each measure of the RPF have been analysed. In this paper, the case of long-term storage under water spraying is discussed to show that this approach is not sufficient to give clear-cut answers about the validity of public intervention, even if it constitutes a sound basis for further investigation.

Keywords: forest policy, assistance programme, technical expertise, 1999 storms, Vosges.

1. Introduction

On December 26–27, 1999, the two winter storms "Lothar" and "Martin" caused unprecedented damages to the French forests. Approximately 450,000 ha of productive forests were seriously hit (more than 50% of the forest cover destructed) and will have to be regenerated. The latest figures related to the total volume of windfalls indicate that 150 to 170

* Research carried out with financial supports from the Local Government of the Vosges and the Regional Government of Lorraine

Heikki Pajuoja, Ludek Sisak and Krzysztof Kaczmarek (eds.)
Evaluating Forestry Incentive and Assistance Programmes in Europe – Challenges to Improve Policy Effectiveness
EFI Proceedings No. 54, 2005

Table 1. the different sub-programmes and measures of the Relief Plan for Forests (RPF).

Sub-programme	Measures
Wood harvesting (economic goals)	Clearing and improvement of accesses, Financing of harvesting costs, Training of lumberjacks, Machinery purchases
Wood valuation (economic goals)	Long-term storage, Crops' withdrawal, Wood transportation, Wood promotion
Protection and reconstitution (silvicultural goals)	Sanitary protection, Fire prevention, Ownership consolidation, Early silvicultural works, Support to tree nurseries, Silvo-cynegetic equilibrium, Reconstitution
Fiscal measures (social goals)	Land tax, Income and wealth taxes, Value Added Tax, Accelerated amortization of machineries
Other measures (institutional goals)	Assessment of damages, Additional workforce, Creation of a Forest Fund, Specific measures for public forests, Expertise on insurance

million m^3 of wood was thrown on the ground (the importance of dispersed windfalls made it impossible to provide definitive figures). In economic terms, these two storms are equivalent to three annual crops and the financial prejudice they caused can be estimated to 6 billion euros (without taking into account social or environmental losses).

In the aftermath of the crisis, the distress of many stakeholders (especially public and private owners) forced a major reaction from the State in order to encourage them to cope with the crisis. Under strong pressure of time, the French Government unveiled on January 12, 2000 a major assistance programme aimed at supporting the whole sector. Dealing with more than 300 million euro of financial incentives and 1.8 billion of low-interest loans, the so-called "Relief Plan for Forests" (RPF) encompassed nearly all forestry-related activities. Table 1 recapitulates the different sub-programmes implemented and their constituting measures.

First received with a lot of "relief" by all stakeholders, the RPF soon became very controversial, crystallizing all fears and hopes of the sector. Far from solving all the problems, the plan actually generated additional annoyances that have been perceived very negatively by the people. That is why, five years later, some of them eventually consider it with radical feelings. What went "wrong" with the RPF? What went "right"? It is now deemed necessary to provide a fair assessment of these questions in order to draw lessons from the crisis.

In order to identify the strengths and weaknesses of the RPF, it is paramount to consider *inter alia* the following aspects: the psychological effect of a public support on forest stakeholders, the volume of timber that would not have been mobilized and valuated without assistance and the formation of prices in the wood market with or without intervention (Rosenberg and al. 2002). Benchmarking methodologies exist to quantitatively address such "with or without" questions, but in the French context they seem rather difficult to implement (all the regions affected by the storm have benefited from the RPF). As a consequence, it seems that qualitative research designs are required, especially for investigating the coherence of the RPF as a hole and the antagonism or synergism of each measure.

However, the soundness of qualitative insights that can be given on the RPF varies greatly from one person to the other, and it is assumed in this study that the outlook from a small group of selected specialists is the most thorough. Due to their privileged position in the institutional background, experts are also expected to bring information that rarely appears in official publications, such as the political background in which the decisions concerning the means and objectives of the RPF have been made (Rosenberg and al. 2002).

2. The technical expertise

The department of the Vosges, in northeastern France, has been particularly damaged by "Lothar" who destructed 30,000 ha of productive forests and uprooted more than 11,000,000 cubic meters of timber (equalling in approximately eight annual crops). In this region, forestry does play a major role in the economy and the local authorities are conscious that the RPF is a crucial tool for the sector's recovery. This is the reason why the local government of the Vosges entrusted on January 2004 the French Institute of Forestry, Agricultural and Environmental Engineering (Laboratory of Forest Policy) with the task of carrying out a technical expertise of the RPF.

First of all, a careful analysis of the available documentation (ministerial circulars and decrees, official reports, articles in specialised books or journals, minutes of relevant meetings) dealing with the RPF has been made at the laboratory. This enabled (i) the reconstitution of the official discourse related to each measure and, (ii) the identification of several specialists, acknowledged for their scientific or technical skills, who could potentially act as experts in the research.

Secondly, eleven specialists were introduced to the research. Among those willing to participate on a voluntary basis, five people were eventually selected, in order to cover the different fields of knowledge regarding forests: (i) one person from the Regional Direction of Agriculture and Forest, specialist of administrative and juridical matters, (ii) one person from the National Forest Office, specialist of the management of public forests, (iii) one person from the Regional Centre for Private Ownership, specialist of the management of private forests, (iv) one person from the Inter-sectorial Institute for the Promotion of the Wood Economy in Lorraine, specialist of the wood industries and, (iv) one person from the Forest Health Department, specialist of forest ecology and pathology.

In accordance with Buttoud and Yunusova (2003), a rather small group of experts has been constituted, in order to optimize meetings. Once they accepted to provide technical expertise of the RPF, these five specialists nominally became "experts" whose role in the study consists in the provision of a knowledge which: (i) is aimed at being integrated to a political process, and therefore formulated in a comprehensible way for decision-makers ; (ii) does not have the status of scientific knowledge, because scientific proofs are not available for the issues under consideration ; (iii) transgresses the limits of individual competence, since the scope of the raised questions ineluctably encompasses strict professional domains. (Roqueplo 1997)

Next, each expert was formally interviewed, following the rationale presented in Figure 1. For each measure of the RPF, the interviewer first briefly reminded the official discourse related, and asked the interviewee to complete it if necessary. Then, the validity of the choices made (regarding both objectives and means) was questioned. Finally the interviewee was asked whether alternatives would have been possible and/or preferable. During the interviews, the classical guidelines for qualitative investigation were followed (see Patton 1990: 277–359).

Once all experts had been interviewed, the notes taken have been transcribed and sent to them for possible corrections. It was clearly specified that these notes would remain strictly confidential. After that, corrected notes were analysed and re-arranged in a visual and synthetic way, using the MindManager© software.

Finally, a meeting was held at the laboratory with the entire group of experts. The objectives of this meeting were to complete and validate a multi-disciplinary expertise, and to confront opposite arguments (without excluding any). The draft redacted after this meeting then constituted the technical expertise of the RFP in the Vosges. Instead of presenting all results, only one emblematic measure of the RPF is discussed in the next section: the long-term storage of windfalls under water spraying.

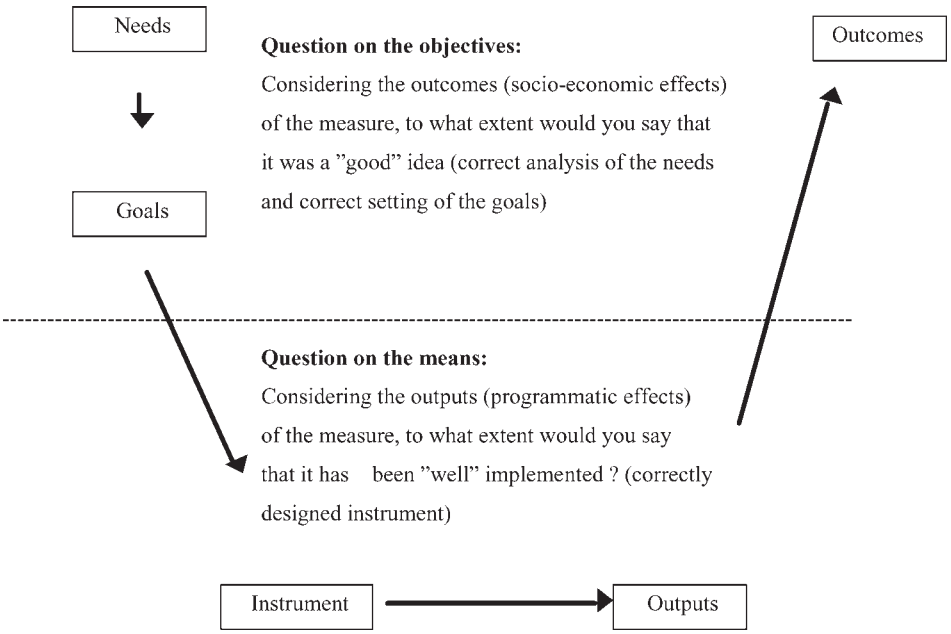


Figure 1. Rationale of the interviews (adapted from Kaczmarek and Ottitsch 2004).

3. The case of long-term storage

Actually, two activities related to long-term storage have been publicly financed: the creation of storage facilities (Circular of February 7, 2000), and the financing of these storage facilities (Circular of February 25, 2000).

3.1 Subsidies for the creation of storage facilities

Objectives

The official discourse: "Considering the past experiences of France (1982) and Germany (1990), the French public authorities – together with the Wood Industrialists Trade Union – advocated an important effort of storage under water spraying, in order to (i) somehow desaturate the market and (ii) partly secure future supplies of industries in very damaged areas" (Barthod and Barrillon 2002). In the Vosges, operational objectives were to store 1.5 million cubic meters of windfalls (on a total of 11 millions).

Regarding the first objective (desaturate the market), all experts agree on the fact that long-term storage gave an outlet to a significant share of windfalls, but it is not sure that the stored quantities (1 million cubic meters) positively impacted on wood prices. On the contrary, it seems that the storage increased the bargaining powers of buyers against sellers. Knowing that they could rely on important stocks (largely exceeding their needs), the industrialists who implemented storage facilities may have been progressively tempted to lower the price of raw materials from forest owners (who needed to sell the fallen timber very quickly). But soon after, knowing that their suppliers have a lot of wood in storage facilities (which needs to be

processed rather quickly too), the buyers of primary or secondary transformed wood obtained drastic reductions in prices from industrialists. As a result, the creation of storage facilities, which was primarily intended to sustain the wood prices during the first years of the crisis, is very likely to have disturbed the market a little bit more.

Regarding the second objective (secure future supply), its interest vanished for three reasons. First, the quality of stored wood varies a lot between different tree species, and between different individuals of a same species (depending on the time they stayed on the ground, from one week to more than a year). For all species (but to a less extant for spruce) the results have been globally disappointing and timbers, when they can be effectively processed, have diminished technological or aesthetical characteristics. Second, the demand for beech (especially from the Extreme East) has collapsed after the storm, because of harmful commercial practices (some containers full of rotten timbers have been sent to China) but above all owing to a turn in fashion accelerated by a massive and paradoxical supply of a "rare" species. Finally, the future supply in coniferous, which was supposed to be achieved thanks to stored timber, has been actually provided by fresh wood that have been prematurely cut after the drought of 2003 or bark beetle outbreaks (since 2001). Because these woods have better properties than the stored ones, they slacken the emptying of storage facilities, and some of them are still in use today. Even more seriously, the remaining woods are suspected to impede the prices to rise again.

Clearly, the situation did not unfold as expected, but in spite of all its side effects, all experts consider that it was necessary to publicly support the storage. However, it was learnt that a crucial issue of storage is de-storage (especially when storage is performed by non industrial entities), and that if it is to be publicly financed again, it is very important to formalize and secure by contracts both storage and de-storage at the very beginning of the crisis.

Means

The official discourse: in the Vosges like in the rest of France, all infrastructures were to create, and the exploration of the possibilities given by canals and existing dams rapidly showed that immersion of windfalls was technically of limited interest. Finally, the solution of water sprinkling imposed itself (Barthod and Barrillon 2002). Consequently, the Ministerial Circular of February 7 2000 made it possible the funding (40 to 60 % of the total cost) of long term storage facilities.

In the Vosges, many industries and communes rallied to this idea of storage, and 43 facilities have been created with the help of the State, amounting to 2.14 million euros (more than ten percent of the national budget for this measure). This success surprised the Forest Administration itself, and can be explained by the simultaneous presence over the territory of a large volume of windfalls (more than 11 millions cubic meters) and industries (more than 1,000 industries of first and second transformation of wood).

Though, both forest administration and beneficiaries encountered many difficulties in finding potential sites for water spraying. Indeed, this measure has been considerably slowed down (and even blocked in some places) by other administrations, notably those in charge of water protection. This weakness of the measure refers to the wider problem of decision-making during emergency crisis. In this case, the Ministry of Agriculture didn't manage to make its point of view understandable to other institutional actors, probably because of insufficient inter-ministerial co-operation or lack of personnel within forest administrations.

With regards to these difficulties, the present abandonment of these facilities is missed by many experts, who consider that at least some of them should be perpetuated in case of a new storm.

3.2 Loans for the financing of storage

Objectives

The official discourse: very soon, while the idea of storage was unanimoulsly accepted, uncertainties related to the extra costs induced by storage and commercial risks emerged, and both buyers and sellers looked forward the State intervention (Barthod and Barrillon 2002).

When this measure has been announced, many actors found it unfair, because it was primarily intended for wood industrialists, who were already thought to be better off by the decrease in raw materials prices. But five years after the event, it is now acknowledged that industrialists have suffered from the storm as well, and that it was important to help them, and especially to assume a part of the costs induced by the storage, which allowed for the valuation of one million cubic meters in the Vosges.

However, it is clear that the commercial and technical risks have been underestimated by the public powers, who really thought (together with the majority of actors) that the operation would be financially profitable. Actually, experts consider that storage is neither gain nor lose for its beneficiaries (it would have been clearly in deficit without public support). It is then possible to think that by publicly supporting the storage, authorities have been misleading for many actors.

Means

The official discourse: on February 25 2000, low interest loans have been put at the disposal of single or joint private forest owners, forest communes, harvesting companies and wood processing industries. The interest rate of the loans amounted to 1.5 % and they ought to be repaid in six years, with a posible delay of three years before to start the refund (Barthod and Barrillon 2002). In the Vosges, 61 loans have been attributed, for approximately 10 million euros.

The problem with this kind of loans (that have been employed for other measures) is that the repayment occurs in a very depressed economic context (especially if the beneficiaries have opted for the delayed payment). Actually, the situation did not unfold as expected, and the wood market hasn't recovered today, while it was initially thought that the storm effect will not last more than two or three years. The situation is particularly critical for those companies that have been too optimistic regarding storage, and which face now great difficulties in order to repay the loans.

In addition, the loans may not be the optimal way to finance the costs of storage, since it turns out that woods have not always been stored properly (already deteriorated timbers have been mixed with healthy ones, propagating pathogens), and that the storage facilities have not been monitored continuously (especially during winter time, when the water spraying has to be stopped but when sudden increases in temperature are possible, facilitating the propagation of pathogens). These two factors also explained why the technical results of storage are so disappointing.

4. General significations and conclusions

At the end of the study, it was decided to classify the different measures and sub-programmes of the Relief Plan for Forests into four different categories: the good ideas well implemented

("big relief"), the good ideas poorly implemented ("small relief"), the bad ideas poorly implemented ("small damage") and bad ideas well implemented ("big damage").

In some cases though, like the case of long-term storage, the status of many measures remains unclear even after the technical expertise. Was the long-term storage a good idea? Considering its many adverse effects on wood prices and its non profitability one may be tempted to answer no. But on the other hand, long-term storage made it possible to valuate (to some extent) one million of cubic meters that wouldn't have been valuated otherwise. As such long-term storage lessened the financial losses of a large number of forest owners. Has it been well implemented? It is clear from the expertise that the financial tools used suffered from many weaknesses, but considering the scarcity of technical insights available at the beginning of the crisis, a great deal of work has been achieved.

Actually, experts are reluctant to give clear-cut answers. They expose the pros and cons of each measure, but they do not to take their opinion for granted. Indeed, there are so many uncertainties – considering for example the ecological impacts of some measures – that experts only gave tentative answers. However, the fact that several experts from different fields participated in the technical expertise facilitated their free expression, because they knew that another expert may complete or correct him later. Surprisingly, shared agreements between experts from fields traditionally seen as conflictive (e.g. ecology vs. timber production) have been more frequent than previously expected. Consequently, the confrontation between experts has been considerably facilitated, since each of them easily recognised the points of view of others.

A technical expertise is not sufficient to provide an evaluation of the Relief Plan for Forests. It is just a sound basis for further investigation, and needs to be combined with the opinions of those who directly experienced it in the field. Besides, from a philosophical and political point of view, it can't be any other way: the role of experts is to inform the public about the positive and negative impacts of our actions (that sometimes cannot be foreseen by the average citizen), but they shouldn't decide for the society (Habermas 1970).

In the evaluation framework proposed (Croisel 2004), the society will be (imperfectly) represented by a large group of actors involved in the Relief Plan for Forests in the Vosges. In the second step of the research, they will react to and balance the technical expertise elaborated earlier, ultimately providing an evaluation that combines technical expertise and public participation.

References

Barthod, C. and Barrillon, A. 2002. Government support for forests – the government relief program (in French). Revue Forestière Française. LIV:41–65.

Buttoud, G. and Yunusova, I. 2003. The mixed model for decision making as a conceptual framework for IMP formulation. In Brun, F. and Buttoud, G. (eds.). The formulation of Integrated Management Plans (IMPs) for mountain forests. Quaderni del dipartimento di economia e ingegneria agraria, forestale e ambientale: Grugliasco, Italy.

Croisel, Jean. 2004. Bridging the gap between managerial and participatory evaluation of forestry programmes at the local level: the case of the relief plan for forests after the 1999 storm in the Vosges, France. In: Buttoud, G., Solberg, B., Tikkanen, I. and Pajari, B. (eds.) The evaluation of Forest Policies and Programmes. EFI Proceedings 52, European Forest Institute. Pp. 189–198.

Habermas, J. 1970. Towards a Rational Society: Student Protest, Science, and Politics. Beacon Press, Boston.

Kaczmarek, K. and Ottitsch, A. 2004. Programme evaluation in public sector management practice. In: Buttoud, G., Solberg, B., Tikkanen, I. and Pajari, B. (eds.) The evaluation of Forest Policies and Programmes. EFI Proceedings 52, European Forest Institute. Pp. 17–28.

Ministry of Agriculture and Fisheries – Circular DERF/SDIB/C2000-3003 of February 7, 2000 relative to the creation of long-term storage facilities.

Ministry of Agriculture and Fisheries – Circular DAF/SDFA/C2000-1504 – DERF/SDF/SDIB/C2000-3006 of February 25, 2000 relative to low-interest loans for financing wood harvesting and storage.

Patton, M. 1990. Qualitative Evaluation and Research Methods (Second Edition). Sage Publications, Newbury Park.
Roqueplo, P. 1997. Between knowledge and decision, the scientific expertise (in French). INRA (French Institute of Agronomic Research), Paris.
Rosenberg, P.E., Barthod, C. and Barrillon, A. 2002. Conclusion of the special issue 'After the storms…' (in French). Revue Forestière Française. LIV :217–223.

Policy Implications and Recommendations for Public Sector Management

Andreas Ottitsch

European Forest Institute

Policy implications and recommendations for public sector management

- **The public administration and financial policy instruments**
- **QCA-approach**
- **Research hypothesis**
- **Results**
- **Discussion**
- **Conclusions - Recommendations**

Heikki Pajuoja, Ludek Sisak and Krzysztof Kaczmarek (eds.)
Evaluating Forestry Incentive and Assistance Programmes in Europe – Challenges to Improve Policy Effectiveness
EFI Proceedings No. 54, 2005

3

The public administration and financial policy instruments

- **Formally:**
  - **Objective implementation of funding program**
    - **effective, efficient, according to politically accorded equity criteria**
  - **Funding to correct ”market failures”**
  - **Funding as incentive to encourage further activities**
- **Informally:**
  - **Funding supports institution’s power (clientela-structures, legitimation of (personnell) resources)**
  - **Implemenation harnessed to institution’s objectives**
  - **”Success” of funding (spent resources) legitimates new programs**

4

Program failures occur because of:

- **Disjunction between costs and revenues**
  - **Criteria for program success…**
- **Institutional rationale**
  - **Maximisation of institutional profits (rationale choice)**
  - **Maximisation of profits for clientele / constituency**
- **Program externalities**
  - **Territorial and sectoral aspects**
- **Distributional inequity related to power-structures**

5

Identification of problems

- **Disjunction between costs and revenues**
  - **Mechanisms for enhancing efficiency (e.g. bids, competitions, decreasing payments)**
- **Institutional rationale**
  - **Link between program implementation and institutions' resources?**
  - **Link between funding distribution and other roles of the institution**
- **Program externalities**
  - **Relation to other sectoral fundings (e.g. agriculture, conservation)**
  - **Regional preferences of programs**
- **Distributional inequity related to power-structures**
  - **Qualification criteria for (direct) beneficiaries (geographic, socio-economic? (e.g. profession, occupation))**

6

Basic description of QCA-approach

- **Example for basic principle of logical minimisation:**
- **There exist three factors A/a, B/b C/c (CAPITAL: factor is present, low cap: factor is absent), which are considered to be relevant for outcome D/d**
- **IF (A and B and C) = D OR ((NOT A) and B and C) = D**
- **THEN the value of A/(NOT A) is "irrelevant", since it does not change the result.**

- **Identification OF and *necessary* and/or *sufficient* conditions**
  - **In the above example, both B and C are *necessary* conditions, since they are required for outcome D, but each of them alone is not *sufficient*, since both their presence is obviously necessary for outcome D.**

7

Alternative use of QCA

- **Descriptive tool to identify co-occurrence of factors**
- **Outcome defined as ”presence” of phenomenon (e.g. funding instrument)**
- **Identification of ”necessary” conditions and/or combinations of conditions → conclusions towards interconnection of factors**
  - **IF (A and B and C) = D OR ((NOT A) and B and C) = D**
  - **THEN the co-occurrence of ”B andC” is a necessary condition for the observed phenomenon**
  - **→ B and C are likely to be linked**

8

Co-occurence of ”institutional factors” in EFFE-cases

- **Which combination(s) of institutional factors can be observed?**

- **Hypothesis**
  - **There exist typical links between factors**
  - **IF not rejected → solutions should focus on these linked factors**

9

QCA-results

Finland
France
Germany
Spain
Poland
Belgium
Slovenia
Czech R.
Estonia

France
Germany
Spain
Poland
Belgium
Slovenia
Netherlands

```
Variable Names by Column
DISJUNC
 INSTRAT
  EXTERN
   INEQU
    PROG
```

	0 Cases		1 Cases		- Cases	
DIEIP	Freq	Pct	Freq	Pct	Freq	Pct
11001	0	0	1	100	0	0
11111	0	0	5	100	0	0
11101	0	0	2	100	0	0
01101	0	0	1	100	0	0
11011	0	0	2	100	0	0

Hypothesis: Typical links exist

- **could not be rejected based on the observed cases**

```
CASEIDS FOR THE TRUTH TABLE

11001 =>        FINLAND     =1
11111 =>        FRANCE      =1  GERMANY     =1  SPAIN       =1
                POLAND      =1
11101 =>        BELGIUM (FL)=1  SLOVENIA    =1
01101 =>        NETHERLANDS =1
11011 =>        CZECH REP   =1  ESTONIA     =1
```

```
MINIMISATION RESULT:
Model: PROG = DISJUNC + INSTRAT + EXTERN + INEQU
Outputs Minimized: 1
Method: Quine-McCluskey (Minimal)

  DISJUNC INSTRAT +
  INSTRAT EXTERN inequ
```

10

Interpretation of result

```
MINIMISATION RESULT:
Model: PROG = DISJUNC + INSTRAT + EXTERN + INEQU
Outputs Minimized: 1
Method: Quine-McCluskey (Minimal)

  DISJUNC INSTRAT +
  INSTRAT EXTERN inequ
```

Two combinations of factors can be observed:

- **DISJUNCTION between costs and revenues and STRONG presence of INSTITUTIONAL rationale**
- **or**
- **STRONG presence of INSTITUTIONAL rationale and EXTERNAL factors (in the absence of inequity problems)**

11

Discussion of result

- In all observed cases the influence of institutional rationale could be observed
  - Link between funding programs and institutions' resources
- This was combined with either
  - No clearly defined criteria for "success" (effectiveness/efficiency/equity) (regardless of whether the program showed inequity problems)
    - or
  - Program externalities (in the absence of inequity problems)

12

Conclusions & recommendations

- Administrative institutions are successful in defending in "institutional rational"
  - Options:
    - "Live with it" → design programs so that IR and objectives are compatible
      - → LINK OF IR-interests TO SUCCESS CRITERIA
      - GLOBAL BUDGETING of institution's resources
  - → Problem of "Lack of SUCCESS-criteria "solved"...?

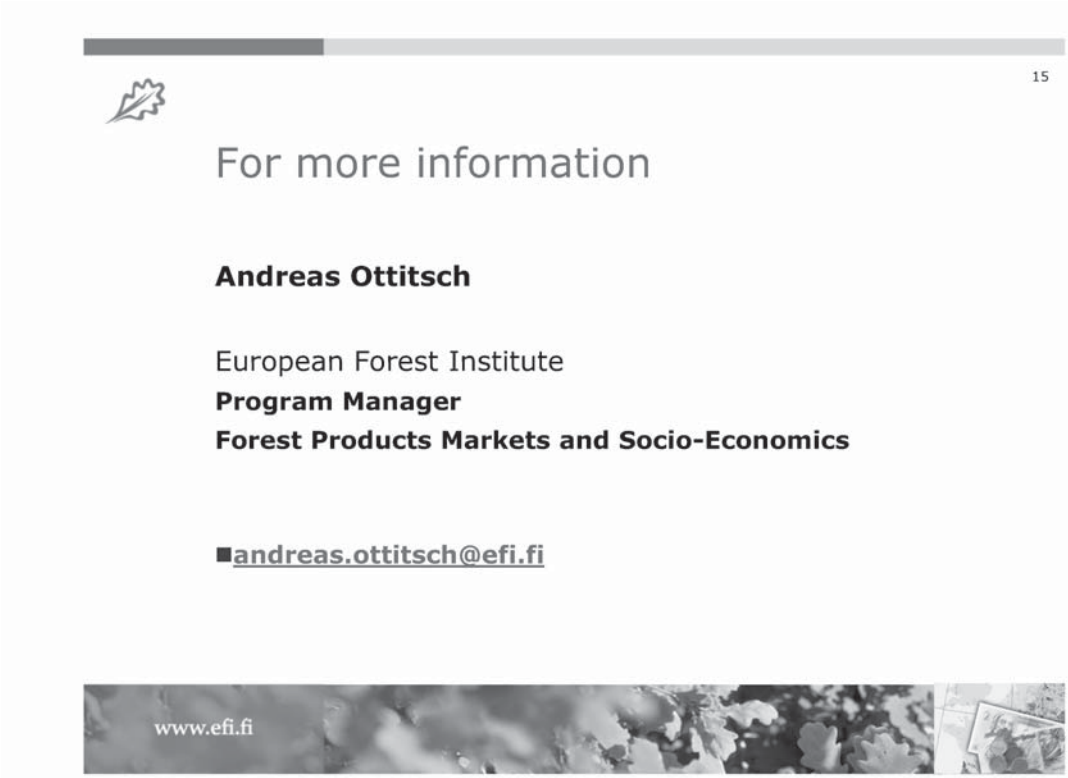
13

Conclusions & recommendations cont.

- **Program externalities**
  - **Intersectoral co-ordination**
    - **Funding programs need to be part of intersectoral programs**
    - **”putting issues in perspective”**
  - **Problem: How to overcome SECTORAL structures (e.g. clientela) in societies?**
  - **Geographical instead of sectoral focus?**
    - **RURAL / URBAN development programs**
    - **Focus on ”location” instead of ”profession”**
  - **Danger: Shift from ”sectoral” to ”inter-local/regional” conflicts...**
  - **....**

14

Institutional ”habitats” more similar than ”ecological” ones...


15
For more information
Andreas Ottitsch
European Forest Institute
Program Manager
Forest Products Markets and Socio-Economics
andreas.ottitsch@efi.fi
www.efi.fi

Implementation Analysis of Public Expenditure Programmes in Forestry – Policy Implications for Private Forestry

Américo M. S. Carvalho Mendes

Faculty of Economics and Management, Portuguese Catholic University
Porto, Portugal

Abstract

In situations where private forestry is salient, forest policy makers face an immense multiple agency problem which gets worse as the degree of collective organisation of private forest owners is weaker. Forest owners are in large numbers, and they differ very much in their resource endowments, opportunity sets and preferences. Forest policy makers often have a poor knowledge about these characteristics and a poor capacity to monitor private forest owners' behaviours.

In these situations, in addition to feasibility constraints (ecological, technical, legal, financial, epistemological, etc.), public policy makers also have to worry about individual rationality and incentive compatibility constraints: to be effective in meeting their targets policies have to make private forest owners better off and have to provide incentives leading them to behave consistently with the policy targets. If any of these three types of constraints is not met, there will be implementation failures. This is the basic idea of implementation analysis framework adopted in the EFFE project.

The purpose of this paper is to present this framework, together with the research findings and policy recommendations drawn from the analysis of the programmes covered by the EFFE project based on that framework.

Keywords: private forestry, forest programmes, implementation analysis.

Heikki Pajuoja, Ludek Sisak and Krzysztof Kaczmarek (eds.)
Evaluating Forestry Incentive and Assistance Programmes in Europe – Challenges to Improve Policy Effectiveness
EFI Proceedings No. 54, 2005

1. Theoretical foundations

The theoretical framework adopted for implementation analysis in the EFFE project represents forest policy as a *multiple agency problem*, with *asymmetric information*, where forest policy makers are viewed as a single principal and the multiple stakeholders are the agents supposed to behave in a rational way.

Given the objectives a forest programme was set out to reach and the instruments made available for that, *implementations failures* are due to the fact that the programme does not meet one or more of the following types of constraints:

a) feasibility constraints;
b) individual rationality constraints;
c) incentive compatibility constraints.

Feasibility constraints include:

a) constraints related to the availability of material and immaterial resources needed to implement the programme:
   - natural resources;
   - budget constraints (public and private);
   - human resources;
   - knowledge resources;
   - institutional capacities;
   - political support;
b) modes of matching between programme targets and instruments:
   - the "Tinbergen rule" in the fixed target case (the number of instruments has to be no less than the number of targets);
   - the mode of adjustment of the economic characteristics of the targets to the economic characteristics of the instruments, as explained in Mendes (2002b);
c) complementarities needed between instruments like the following ones:
   - complementarities between financial incentives and capacity building in forest owners' associations and other providers of information and technical assistance;
   - complementarities between financial incentives and taxation;
   - complementarities between financial incentives and forest research;
   - complementarities between financial incentives for (re)afforestation or improved forest management and measures to reduce the risk of damage to forest resources (e.g. fires);
   - complementarities between forest financial incentives and environmental economic instruments, including market oriented instruments and incentive based voluntary mechanisms enabling forest owners to be paid for the environmental services provided by their forests;
   - complementarities between forest financial incentives and integrated rural development measures combined with appropriate spatial modulation of these measures according to the level of population and development of rural areas;
   - complementarities between financial incentives and improved participatory mechanisms enabling private stakeholders to get involved in policy making and formulation;
   - complementarities between financial incentives and improved intersectoral coordination mechanisms in forest policy formulation and implementation.

The *individual rationality constraints* concern the following condition: rational agents do not participate voluntarily in a programme if this does not make them better off. This means that, for a given stakeholder to participate in a programme, his private benefits from this participation have to be higher than his private opportunity and transaction costs.

The *incentive compatibility constraints* concern the following condition: when monitoring is imperfect, agents who are made better off by participating in a programme may use the programme's instruments for purposes inconsistent with the programme's objectives. So a programme meets the incentive compatibility constraint if this does not happen.

2. Research findings and policy recommendations

2.1 Feasibility constraints

2.1.1 Natural resource constraints

Afforestation and *reforestation* programmes tend to be more frequent and more easily implemented in countries where there is relatively more land unfit for farming and low competition for construction uses. In the other countries, forest *conservation* goals tend to be more frequent in forest programme target setting.

Note that reafforestation usually means repeated afforestation (i.e. when establishment of forest fails and needs to be repeated).

2.1.2 Budget constraints

In countries, such as Portugal and Spain, where private forestry is important and where there was not a long tradition of public policies targeting this kind of stakeholders, accession to the EU structural funds contributed to raise public and private investment in private forestry.

This *triggering effect* of foreign funds did not yet bring about efforts to build up sustainable sources of *national* funds to complement or substitute for those EU contributions.

2.1.3 Human resources and institutional constraints

Concerning human resources and institutional capacities, some examples of impeding factors of a successful implementation of forest programmes for private forestry are the following:

- *centralisation* in the public administration;
- weak public *participatory mechanisms* in policy making and implementation;
- long tradition of Forest Services action focused on the management of *public forests***;**
- insufficient *collective organisation* of private forest owners;
- strong emphasis of *forest education* on silviculture and other technological matters and insufficient training in socio-economics and forest extension.

2.1.4 Knowledge constraints

When research about the technical and economical aspects of the measures supported by a forest programme (e.g. species more appropriate for each site to be afforested, methods for conducting afforestation works, etc.) is insufficient and not well *tested at the local level*, or if this knowledge is available, but not well disseminated among forest owners and forest contractors, this knowledge gap contributes to lowering the survival rates of the (re)afforestation and forest conservation projects.

2.1.5 Political factors

Forest programmes tend to be weak in contents and implementation effectiveness when the degree of diversity, coordination and political strength of public and private stakeholders interested in forest policy is also weak.

2.1.6 Modes of targets – instruments matching

As forest programmes tend to give more room in their targets for the *provision of forest public goods and other positive externalities*, the mix of policy instruments and the institutional capacities to implement them are not yet rich enough to attain many of those targets which does not contribute to implementation success.

A particular problem in this area concerning private forestry is that there is often a tendency for forest polices to rely more on *command and control* instruments to promote those public goods and externalities, than on *economic instruments* adapted to private forestry, including here *market oriented* instruments and *incentive based voluntary mechanisms*. The problem with the command and control approach is that it tends to impose new duties, or to increase existing ones, on private forest owners (that often reduce landowner's income) without providing appropriate compensatory payments, which leads to implementation failures.

2.1.7 Complementarities between instruments

Weak *intersectoral coordination* in forest policies is the most frequent situation in the case studies covered by the EFFE project. This situation is an impeding factor of success in forest programmes' implementation for several reasons:

- it causes situations of *conflicting regulations*;
- intersectoral coordination is crucial for implementation success when forest programmes aim to promote *multiple use* forestry and an increased provision of forest public goods.

Financial instruments alone, without support for technical assistance (through public or associative organizations) to private forest owners may result in implementation failures. One of these failures is an adverse *distributional effect*: forest owners with larger holdings tend to capture relatively more public financial support than forest owners with smaller holdings.

2.2 Individual rationality constraints

2.2.1 Diversity of forest owners' characteristics and motives

Even within a small region, private forest owners are of *different types* and have *different forest holding motives*. In some countries there is research available on these characteristics and motives, but for most of the territory covered by the EFFE project this kind of research is still missing. In the cases where this research is available, it is not always well incorporated in forest policy making and implementation.

Because of this diversity in forest owners' characteristics and motives, *opportunity and transaction costs* for participating in public programmes are also diverse among private forest owners. A weak knowledge about these costs and their variability contributes to implementation failures.

One way to improve knowledge about the relevant characteristics and motives of private forest owners and to incorporate that knowledge in policy making and implementation is through active and qualified *participation* of forest owners' associations in the policy process. When this participation exists individual rationality problems tend to be weaker. The forest owners and their organisations feel more involved in policy making, policies can respond better to their needs and are more easily revised when it is needed.

2.2.2 Private and social profitability

With the exception of plantations based on growing species, and the purchase and conservation of forests for amenity self-consumption by the forest owner, in many parts of Europe it is difficult to raise private investment in forestry, not only for conservation purposes, but also for production purposes, when the support of public financial incentives is not available. This is due to the fact that the private profitability of forestry is often negative. Opportunities for joint production of forest private goods and forest public goods are not enough to generate a positive private profitability. Opportunities to turn non marketed forest outputs into marketable products may exist (e.g. recreation, carbon, etc.), but they are not always at a point where it is feasible for the forest owners to take advantage of them. Therefore what remains is the appeal to public incentives which can be justified on economic grounds since the social profitability of forestry is often positive, and so the aggregate welfare may thus be improved.

There are situations where the negative private profitability of forestry is aggravated by the *high risk of damage* to forest resources (e.g. fires). In these cases financial instruments alone, however generous they may be, are not enough to motivate forest owners without complementary measures to reduce those risks.

2.2.3 Opportunity costs

Participation of private forest owners in forest programmes providing financial incentives involves opportunity costs for them (e.g. costs related to alternative land uses, alternative uses of the forest owners' capital and time, etc.). Even when financial incentives are generous, these opportunity costs may be high enough to motivate forest owners to stay out of the programme.

One situation which contributes to raise those costs is when forest programmes impose new *duties* on private forest owners or increase existing ones, limiting their future options about the use of their forests. This tends to happen when there are *regulatory instruments* attached to financial instruments.

2.2.4 Transaction costs

Often forest programmes for private forestry don't take in due account and don't try to minimize the transaction costs forest owners have to bear when they participate in those programmes. Therefore implementation failures tend to happen when programmes providing financial incentives don't include complementary measures to support *forest owners' associations* or other organizations which can help to lower transaction costs through. These costs refer to activities such as the search for information about financial incentives, the preparation of applications for public funds and the contacts with the public agencies in charge of managing the programmes.

There are cases, like Portugal, where one of the major positive side effects of programmes providing financial incentives to private forest owners' was the emergence and development of forest owners' associations whose main mission initially was to lower transaction costs to landowners.

2.2.5 Financial incentives and fiscal instruments

Depending on how they are designed and combined with financial incentives, fiscal instruments can be either and an *impeding* or a *supporting* factor to raise investment in forestry by forest owners and by other stakeholders.

The possibility of using and shaping these fiscal instruments depends a lot on the capacities of national taxation institutions to effectively implement tax laws and on the national traditions concerning tax compliance behaviours.

2.2.6 Forest financial incentives and integrated rural development

Forest programmes tend to be more easily implemented when the level of development of rural areas is higher.

More developed rural areas also create *more income generating opportunities* for private forest owners, enabling them to rely less on public incentives for improved forest management.

The forest development problems and the appropriate public policies vary a lot from low populated rural areas to highly populated rural areas. So the likelihood of implementation successes increases when there is not only *integration* between forest and rural development policies, but also appropriate *spatial modulation* of these integrated policies.

2.3 Incentive compatibility constraints

2.3.1 Weaknesses in monitoring capacities

Asymmetric information problems (moral hazard, adverse selection) are more severe when forest programmes address a large population of private forest owners who are dispersed and not well known by the public agencies in charge of programme implementation. Therefore when the monitoring capacities of those agencies are weak incentive compatibility problems are bound to happen.

One signal that monitoring capacities are weak in many of the cases studied in the EFFE project is that there are *very insufficient data collection networks* and no good and comprehensive data sets publicly available concerning the actual implementation of forest programmes. Often data is too aggregated, stops at the stage of the amounts of public incentives approved, without information about how much was actually spent, for whom, and for what specific uses.

2.3.2 Policy evaluation and policy research capacities

When monitoring capacities are weak, policy evaluation and policy research capacities are also weak, which does not favour the design of programmes with successful implementation.

2.3.3 Incentives for (re)planting vs. incentives for maintenance

When the financial incentives for (re)afforestation support the costs of planting, but not the costs of maintaining the plantations, at least, during their initial years of life, it often happens that they are not appropriately managed by the forest owners.

2.3.4 Over budgeting in applications for public funding

One example of incentive compatibility problems of an *illegal* nature is when there is over budgeting in the applications for public financing filed by private forest owners in collusion with their forest contractors, in order to increase the amount of public money received. To cope with this problem, programme tend to include regulation which set caps on the amount of unit costs eligible for public funding.

2.3.5 Incentive compatibility problems within the Public Administration

Bureaucratic behaviours impede intersectoral coordination and transparency in public decisions. So, often, there are *redundant costs* in the public management of forest programmes, poor accountability, and high *transaction costs* for private stakeholders. This situation also causes negative *equity effects* (the better informed forest owners tend to get most of the public incentives).

Another example of incentive compatibility problem within the Public Administration (at the central or the local level) arises when public agencies can also be beneficiaries in programmes targeting private forestry, either because they are supposed to take care of infrastructures and other actions complementary of private investment, or because they may even be competing with private forest owners for similar types of support. If they don't have strong forest motives (e.g. they don't own forest land; they don't have strong forest constituencies), public authorities benefiting from these funds use them for purposes which don't have a significant contribution to forest development.

3. Future research needs

Usually implementation analysis tends to be reduced to the role of what we call "feasibility constraints". The framework adopted in the EFFE project added to the role of those constraints, the *individual rationality* and *incentive compatibility constraints*, which are very relevant in the case of programmes targeting private forestry. This is an insight drawn from the literature on the economics of *agency relationships* with *asymmetric information.* One interesting direction for future research could be to take more advantage of this kind of literature for implementation analysis.

Good theoretical foundations are not enough to improve implementation analysis. We also need improvements in data collection, data quality and data availability. The EFFE project showed that, even at the *national level*, there are data gaps concerning information on programme implementation that would have to be filled.

We also need *panel data at the forest holding level* and *data at the village level* to examine the microeconomic (e.g. private benefits and private transaction and opportunity costs of

participating in public programmes) and spatial factors supporting and impeding implementation success of forest programmes for private forestry.

References

Mendes, Américo M. S. Carvalho. 2002a. Evaluation of supporting and impeding factors of National Forest Programmes. In: Cross-Sectoral Policy Impacts on Forests. Tikkanen, I., Glück, P. and Pajuoja, H. (eds.). EFI Proceedings 46. European Forest Institute. Pp. 141–150.

Mendes, Américo M. S. Carvalho. 2002b. Economic Instruments for National Forest Programmes. In: Cross-Sectoral Policy Impacts on Forests. Tikkanen, I., Glück, P. and Pajuoja, H. (eds.). EFI Proceedings 46. European Forest Institute. Pp. 119–140.

Mendes, Américo M. S. Carvalho. 2004. Implementation Analysis of National Forest Programmes. In: NFP Research: Its Retrospect and Outlook. Proceedings of the Seminar of COST Action E19 "National Forest Programmes in a European Context", September, 2003, Vienna. Glück, P. and Voitleithner, J. (eds.). Publication Series of the Institute of Forest Sector Policy and Economics, University of Natural Resources and Applied Sciences, Vol. 52, Vienna. Pp. 31–46.

Mendes, Américo M. S. Carvalho. 2004. Implementation analysis of forest programmes: some theoretical notes and an example. Paper presented at the EFI/IUFRO International Symposium "The Evaluation of Forest Policies and Programmes", Epinal, 27 June – 3 July 2004.

Marketing of Forestry Financing and Services in Forestry Centres for Finnish Non-Industrial Private Forest Owners

Mikael Dyggve and Jussi Leppänen

Finnish Forest Research Institute
Helsinki, Finland

Forestry Centres (FC) are semi-private organisations under administrative sector of Ministry of Agriculture and Forestry, having wide task as public authorities in forestry in Finland. The role of the FCs in controlling forest law, allocating financial assistance for non-industrial private forest (NIPF) owners and carrying out respective forest extension is based on special legislation on the organisation.

In the study, the marketing efforts of 13 regional FCs are analysed. Time series of the outputs and inputs were collected from annual reports to describe the performance of the regional FCs. A survey to employees of FCs, based on mail questionnaire, was made in order to find out the relations between marketing strategies, structures and functions with NIPF targeted advisory services, forest planning and financial assistance. The response rate of a sample of 325 employees was 54%, i.e. 174 responses with good representativeness (chi-test) were obtained into analysis. Both statistical and qualitative methods were employed for analysing the responses.

Results are presented according to advisory services, forest planning and financial assistance, and on general level. Advisory services and forest planning are marketed to all forest owners. Results suggests, however, that there are significant differences between NIPF owners reachability according to local rural residence, distant urban residence, joint ownership of estate and forest owner age. Financial assistance is seen to increase silvicultural works and collective investments significantly, but as importantly, NIPF owners need to be activated for delivering applications for financing. Measures supported in financial assistance policy also differ from each others remarkably. The easiest marketable financing packets are provided for tending of young stands, regeneration of unproductive forests and forest renovation ditching. The most difficult measures for marketing financial assistance were precribed burning, health fertilisation, environmental contracts and nature management services. Financing for construction and improvement of forest roads was rather neutral from marketing perspective.

Keywords: marketing, advisory services, forest planning, financial assistance

Heikki Pajuoja, Ludek Sisak and Krzysztof Kaczmarek (eds.)
Evaluating Forestry Incentive and Assistance Programmes in Europe – Challenges to Improve Policy Effectiveness
EFI Proceedings No. 54, 2005

Management of Public Forests in Finland and in Estonia – A Comparative Study

Jussi Leppänen[1], Paavo Kaimre[2], Risto Sirgmets[2] and Heikki Piiparinen[3]

[1]Finnish Forest Research Institute, Helsinki, Finland
[2] Estonian Agricultural University, Tartu, Estonia
[3] Ministry of Agriculture and Forestry, Finland

The main goal of the study is to compare the management of public forests and the respective influencing factors in two neighbouring countries – Finland and Estonia. The concept public forests refers here only to the forests managed by the state forests' management organisations – *'Metsähallitus'* in Finland and *'RMK'* in Estonia.

During the last decades the role of the state forestry in Estonian forest sector has been little bit stronger than in Finland, because of the traditions and relative share of state forests compared to private and municipal forests. When analysing the management of public forests, first, all the goals set for the organisations have to be considered. In Finland, the goal setting has been more precise and complex than in Estonia, where the mission of *RMK* is formulated as the efficient and sustainable forest management. In both countries the owner's interests are reflected in the State Budget – financial provision to the Budget is very important driving force of the activity in both organisations.

The indicators analysed in the study were supply of roundwood, employment and financial performance of the forest management. The area of protected forests, timber prices, interest rate and institutional changes were considered as the factors influencing the indicators. Econometric analyses are carried out to illustrate the significances of the these functions in both organisations.

Keywords: public forestry, roundwood supply, profit target, nature conservation, organisational reform, econometric analysis

Heikki Pajuoja, Ludek Sisak and Krzysztof Kaczmarek (eds.)
Evaluating Forestry Incentive and Assistance Programmes in Europe – Challenges to Improve Policy Effectiveness
EFI Proceedings No. 54, 2005

Nature Conservation Supply and Demand in Sweden

Paul Nouro and Jussi Leppänen

Finnish Forest Research Institute
Helsinki, Finland

Abstract

This study presents the public and private protected areas and the protection of productive forest areas, as well as government expenditures for the nature conservation in Sweden. Sweden has adopted 15 objectives concerning the quality of environment and most of them are to be achieved by the year 2020. One of the objectives is that a further 900 000 hectares of forest land is designated to be excluded from timber production by the year 2010.

At the end of 2002 almost 4.2 million hectares or 10.2% of the total Swedish land area had some level of legal protection. 760 000–785 000 hectares of productive forest land was protected at the end of 1999, corresponding about 3.2 % to 3.4 % of the total area of productive forest land in Sweden. Since adopting the national environmental quality objectives in 1999, about 813 000 hectares productive forest land, mostly in state ownership, has been excluded from timber production.

Forests can be conserved in several different ways. A strong and long-term protection is achieved by setting aside forest land as national parks or nature reserves on public lands. Small-size habitats can be preserved through habitat protection. High environmental values can also be protected through preservation contracts between private forest owners and the State. Specific areas can be also be conserved in accordance with the Forestry Act.

The yearly government expenditures for conservation and maintaining of protected areas during 1997–2004 has risen from 222 MSEK (24.3 MEUR) to 1 441 MSEK (157.5 MEUR). According to the new Budget there are plans for additional allocations. The National Board of Forestry is however pessimistic towards achieving the long-term goals, mostly because of insufficient funding.

Keywords: national parks, habitat protection, conservation contracts, nature conservation policy, productive forest land

Heikki Pajuoja, Ludek Sisak and Krzysztof Kaczmarek (eds.)
Evaluating Forestry Incentive and Assistance Programmes in Europe – Challenges to Improve Policy Effectiveness
EFI Proceedings No. 54, 2005

Programme

Monday 11 October

Opening of the Conference
Edward Lenart, Ministry of the Environment, Poland

Session 1: The Voice of Stakeholders
Chair: Ilpo Tikkanen (European Forest Institute)
Rapporteur: Olga Zyrina (European Forest Institute)

MCPFE's view on the new directions for sustainable forest management financing
Roman Michalak, MCPFE LU Warsaw

Strategic Investment, Policy an Research in a Highly Uncertain World
Odin Knudsen, The World Bank

Forest sector priorities for financial assistance in developing countries
Michael Martin, FAO Forestry Department

Investment in sustainability – how to make it work for European family forest owners?
Natalie Hufnagl, Confederation of European Forest Owners

International support in State Forests
Tomasz Wojcik, State Forest Service, Poland

One scenario of the future of forests in Europe
Tamas Marghescu, IUCN Europe

Heikki Pajuoja, Ludek Sisak and Krzysztof Kaczmarek (eds.)
Evaluating Forestry Incentive and Assistance Programmes in Europe – Challenges to Improve Policy Effectiveness
EFI Proceedings No. 54, 2005

Session 2: Economic, Environmental and Social Impacts of Forest Policy Measures
Chair: Andreas Ottitsch (European Forest Institute)
Rapporteur: Krzysztof Kaczmarek (European Forest Institute)

Government Investment Cost-Sharing for Non-Industrial Private Forestry in Finland 1963–2000: An Econometric Analysis
Linden Mika, University of Joensuu, Finland
Leppänen Jussi, Finnish Forest Research Institute, Finland

An Efficiency and Distributional Cost-Benefit Analysis of an Afforestation Programme in Poland
Nájera Tonatiuh, Monterrey Institute of Technology, Mexico

Private and social profitability of field afforestation in Finland
Pahkasalo Tapani, Finnish Forest Research Institute

The social and environmental benefits of forestry in Great Britain
Snowdon Pat, Forestry Commission, United Kingdom

Forest owners' acceptance of incentive based policy instruments in forest biodiversity conservation – A choice experiment based approach
Horne Paula, Finnish Forest Research Institute

Attitudes towards forestry and information needs among Estonian private forest owners – Implications for policy decision making
Toivonen Ritva and Järvinen Erno, PPT Forest Economics Group, Finland

Analysis of the Challenges of Forestry Financing Systems Implementation in the Czech Republic
Sisak Ludek and Pulkrab Karel, Czech University of Agriculture, Czech Republic

Hard lessons from funding forestry-related activities after catastrophic event: the case of the 1999 storm in the Vosges, France
Croisel Jean, ENGREF, France

Tuesday 12 October

Session 3: Forest Policy Measures from National and International Perspective
Chair: Heikki Pajuoja, Finnish Forest Research Institute
Rapporteur: Harri Hänninen, Finnish Forest Research Institute

International Forest Policy Dialogue: 'Economic aspects of forests'
Catalina Santamaria, UNFF Secretariat

Forest Landowner Incentive Programs in the United States
Hummel Susan, USDA Forest Service, USA

Evaluation of financial means in Swiss forest policy
Bisang Kurt and Zimmermann Willi, ETH Zentrum, Switzerland

The role of forestry funding programmes in supporting innovations in Central European countries
Bauer Anja, EFI PC Innoforce

Session 3: Forest Policy Measures from National and International Perspective (EFFE-project results)
Chair: Heikki Pajuoja, Finnish Forest Research Institute
Rapporteur: Jussi Leppänen, Finnish Forest Research Institute

The objectives of financing of forestry
Ziegenspeck Svantje, University of Freiburg, Germany

The financing of goods and services from Swiss forests: Results of a journey through the public forestry accounts
Baruffol Ueli and Baur Priska,Federal Research Institute WSL, Switzerland

European forestry incentive and assistance measures
Zyrina Olga and Kaczmarek Krzysztof, European Forest Institute

Implementation analysis of forest area enlargement in Flanders
Van Gossum Peter, UGent, Belgium

Session 3: Forest Policy Measures from National and International Perspective (EFFE-project results)(continued)
Chair: Heikki Pajuoja, Finnish Forest Research Institute
Rapporteur: Diana Feliciano, Portuguese Catholic University

EFFE presentations

Programme evaluation in a comparative perspective
Kaczmarek Krzysztof and Zyrina Olga, European Forest Institute

Policy implications and recommendations for public sector management (including results of Qualitative Comparative Analysis)
Ottitsch Andreas, European Forest Institute

Policy implications and recommendations for private forestry (including results of the implementation analysis)
Mendes Américo, Portuguese Catholic University, Portugal

Session 4: Conclusions and Further Research Needs
Chair: Birger Solberg, Agricultural University of Norway
Rapporteur: Even Bergseng, Agricultural University of Norway

Further research needs: Challenges for Policy Analysis
Tikkanen Ilpo, European Forest Institute

General conclusions from the Conference
Solberg Birger, Agricultural University of Norway

International Conference:

Evaluating Forestry Incentive and Assistance Programmes in Europe – Challenges to Improve Policy Effectiveness

10–12 October 2004
Warsaw, Poland

List of participants

1. Asgeirsson Sigvaldi	Aforestation project West-Iceland, Iceland
2. Baruffol Ueli	Federal Research Institute WSL, Switzerland
3. Bauer Anja	EFI PC INNOFORCE, Austria
4. Bergseng Even	Agricultural University of Norway, Norway
5. Carvalho Mendes Américo M.S.	Universidade Católica Portuguesa, Portugal
6. Croisel Jean	ENGREF, France
7. Feliciano Diana	Portuguese Catholic University, Portugal
8. Geirdal Agnes	South Iceland association of farmers in afforestation, Iceland
9. Gilsenan Rory	Canadian Forest Service, Canada
10. Hakkarainen Juha	MTK – Central Union of Agricultural Producers and Forest Owners, Finland
11. Hilska-Aaltonen Marja	Ministry of Agriculture and Forestry, Finland
12. Horne Paula	Finnish Forest Research Institute, Finland
13. Hufnagl Natalie	Confederation of European Forest Owners (CEPF), Belgium
14. Hummel Susan	USDA Forest Service, USA
15. Hyytiäinen Kari	Finnish Forest Research Institute, Finland
16. Hänninen Harri	Finnish Forest Research Institute, Finland
17. Jovic Predrag	Ministry for Agriculture, Forestry and Water Management of Serbia, Serbia and Montenegro
18. Kaczmarek Krzysztof	European Forest Institute, Finland
19. Kaimre Paavo	Estonian Agricultural University, Estonia
20. Kaliszewski Adam	Forest Research Institute, Poland
21. Knudsen Odin	World Bank, USA
22. Kokkonen Mirja	European Forest Institute, Finland
23. Leppänen Jussi	Finnish Forest Research Institute, Finland
24. Linden Mika	University of Joensuu, Finland
25. Marghescu Tamas	The World Conservation Union, Belgium
26. Martin R. Michael	FAO/FONS, Italy
27. Michalak Roman	Ministerial Conference on the Protection of Forests in Europe, Poland

Heikki Pajuoja, Ludek Sisak and Krzysztof Kaczmarek (eds.)
Evaluating Forestry Incentive and Assistance Programmes in Europe – Challenges to Improve Policy Effectiveness
EFI Proceedings No. 54, 2005

28. Najera Tonatiuh	Monterrey Institute of Technology campus Chihuahua, Mexico
29. Nouro Paul	Finnish Forest Research Institute, Finland
30. Ottitsch Andreas	European Forest Institute, Finland
31. Pahkasalo Tapani	Savcor Indufor Oy, Finland
32. Pajari Brita	European Forest Institute, Finland
33. Pajuoja Heikki	Finnish Forest Research Institute, Finland
34. Pulkrab Karel	Czech University of Agriculture Prague, Czech Republic
35. Riera Pere	MEDFOREX – Centre Tecnológic Forestal de Catalunya, Spain
36. Santamaria J. Catalina	United Nations Forum on Forest Secretariat, USA
37. Sierota Zbigniew	Forest Research Institute, Poland
38. Sinko Milan	University of Ljubljana, Slovenia
39. Sirgemets Risto	Estonian Agricultural University, Estonia
40. Sisak Ludek	Czech University of Agriculture, Czech Republic
41. Snowdon Pat	Forestry Comission, United Kingdom
42. Solberg Birger	Agricultural University of Norway, Norway
43. Tederko Zenon	The World Conservation Union (IUCN), Poland
44. Tikkanen Ilpo	European Forest Institute, Finland
45. Toivonen Ritva	PPT (European Economic and Social Committee), Finland
46. Tuomasjukka Tomi	DIDC / Ministry for Foreign Affairs of Finland, Finland
47. van de Velde Joost	European Commission, Belgium
48. Van Gossum Peter	UGENT-Laboratory of Forestry, Belgium
49. van Wijk Martijn N.	Alterra, The Netherlands
50. Wojcik Tomasz	General Directorate of State Forests, Poland
51. Ziegenspeck Svantje	University of Freiburg, Germany
52. Zimmermann Willi	ETH-Zentrum, Professur Forstpolitik und Forstökonomie, Switzerland
53. Zyrina Olga	European Forest Institute, Finland