# Economic Sustainability of Small-Scale Forestry

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Anssi Niskanen and Johanna Väyrynen (eds.)

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# Foreword

The European Forest Institute, together with the Central Union of Agricultural Producers of Finland and the Faculty of Forestry of the University of Joensuu, organised an International Symposium on 'Economic sustainability of small-scale forestry' on 20-26 March 2001 in Joensuu, Finland. The symposium was also a Working Group meeting of IUFRO 3.08.00 Small-scale Forestry. There were 84 participants from 25 countries, and there were 26 high quality presentations on small-scale forestry problems, development prospects, policies, extension as well as forest management planning.

We highly appreciate the assistance of those people at the European Forest Institute who helped us during the symposium. Their help was most valuable to the success of the event. We would like also to thank those who contributed in a valuable way to the field trip and post-conference tour of the Symposium: Mr Lasse Finér (North Karelia Regional Environment Centre, Joensuu), Mr Kyösti Hassinen (North Karelian Forestry Centre), Mr Jarkko Huovinen (Private forest owner, Tuupovaara), Mr Ari Karhapää (Forest Management Association, Ylä-Karjala), Mr Heikki Karhunen (Metsäliitto Ltd.), Mr Lasse Lóven (Finnish Forest Research Institute, Koli National Park), Mr Jari Parviainen (Finnish Forest Research Institute, Joensuu Research Centre), Mrs Marja Pitkänen (Private forest owner, Lieksa), Mr Reijo Svanborg (Tulikivi Ltd.), Mr and Mrs Tervo (Private forest owners, Nurmes), Mr Sakari Tikka (Centre of Forest Management Association, Joensuu) and Mr Ahti Ullgren (StoraEnso Ltd). We would also like to express our gratitude to scientific committee for selecting the voluntary papers to this proceedings, to keynote speakers on their excellent presentations, and to Mr Tim Green (European Forest Institute) for checking the language and helping prepare these Proceedings.

Our last and very warmest thanks go to the following organisations and foundations for supporting the Symposium in many different ways: Academy of Finland, Finnair, Metsämiesten Säätiö –Foundation, Metsäliitto Ltd., City of Outokumpu and Tulikivi Ltd.

Joensuu, May 2001

Anssi Niskanen
Symposium Chairman

Johanna Väyrynen
Symposium Co-ordinator

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# Special Session:
# Economic Sustainabiliy of Small-Scale Forestry
# – Perspectives around the World –

# Prospects for Small-Scale Forestry in Australia

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Natural and Rural Systems Management
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## Abstract

This paper discusses the prospects for small-scale forestry in Australia. The nature of forestry in Australia is reviewed, including the historical development and current status of farm forestry. A number of significant impediments exist to further development of farm forestry, the most significant of which are associated with the lack of a farm forestry culture, concerns over harvest rights, availability of markets, the long wait for returns and satisfaction with current land uses. Recent research has made significant contributions to the development of forestry. As a result, there has been progress towards overcoming impediments, with substantial increases in the establishment of new plantations on private land in the past two to three years. The prospects of small-scale forestry in Australia are bright.

*Keywords: Farm forestry, culture, impediments, conservation plantings*

## 1. Background

Traditionally, forestry activities in Australia have been based on the exploitation of the extensive eucalypt forests that existed at the time of European settlement. The native forest resource is finite. It has been depleted since European settlement, and large tracts of forest land have been withdrawn from timber production as a result of bitter public policy debate between the forestry industry and conservation groups. At present some 17.5 million ha are currently in conservation reserves (Table 1). It is likely that over the next ten years further significant areas of native forest will be placed within conservation reserves.

Control over the exploitation of the native timber resource has traditionally rested with the various state governments. However, the Commonwealth government has exerted increasing influence through a combination of economic incentives and the application of external powers provided by the constitution. Exploitation of Crown controlled native forests has been used as a means of achieving a number of social objectives such as regional development and

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**Table 1.** Area of native forest and plantation estate in Australia. Sources: State of Forests Report 1998; NPI (2000).

| Forest type | Area ('000 ha) |
|---|---|
| Native Forest[1] | |
| Conservation reserves | 17 580 |
| Multiple-use forests | 13 351 |
| Leasehold land | 66 103 |
| Other crown land | 15 597 |
| Private forests | 42 018 |
| *Total native forest* | *155 835* |
| Plantations[2] | |
| Softwood | 948 |
| Hardwood | 389 |
| *Total plantation* | *1 337* |

[1] As at December 1997
[2] As at September 1999

the provision of low cost housing materials in addition to timber production (see O'Regan and Bhati 1991 for a comprehensive discussion of the pricing and allocation of logs in Australia). The ready supply logs at artificially low prices from public native forests resulted in a past lack of interest in private plantation forestry and a corresponding high level of public ownership of the plantation resource.

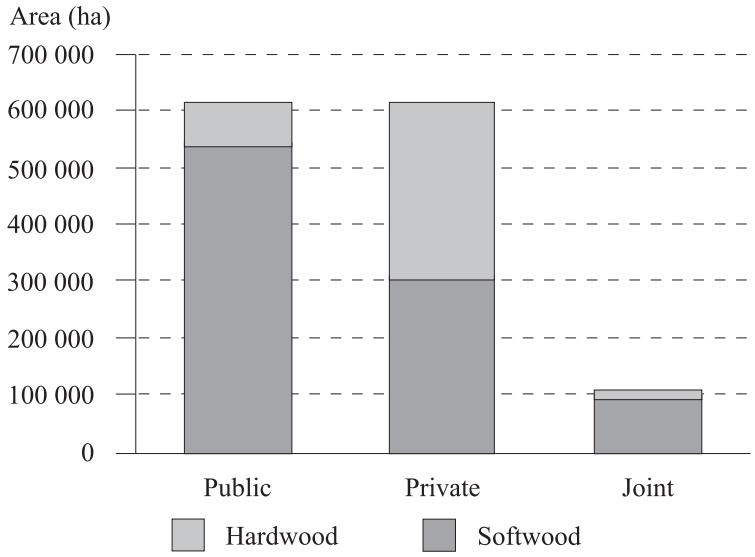


**Figure 1.** Total area under hardwood (HW) and softwood (SW) as at September 1999 by tree ownership. Source: NPI (2000). 'Joint' refers to plantations in which both private and public interests have some equity in the tree crop.

## 2. The Australian plantation estate

Domestic timber requirements are increasingly being drawn from the plantations. Softwood plantations currently comprise over 948 000 ha (over 70%) of the current plantation estate of 1 337 000 ha (see Table 1). The majority of the plantation estate in Australia is exotic softwood species and are owned almost exclusively by state governments and large industrial companies. A breakdown in the ownership and types of plantations is provided in Figure 1.

There have been significant efforts in recent years to expand the plantation estate. Under the 2020 Vision (a joint policy statement agreement between the federal and state governments) it is planned to triple the existing plantation estate to 3.3 million ha. As part of this agreement, no native forest is to be cleared in order to establish plantations. This thus dictates that most of the expansion in the plantation estate will have to be on freehold cleared land. As such, the 2020 Vision has important implications for an increased role for the private sector, including farm foresters. This represents a major shift away from the current state domination of the forestry sector.

The efforts to expand the plantation estate are reflected in the recent rate of plantation establishment. In 2000, it is estimated that almost 150 000 ha of new plantations would be established, of which almost 129 000 ha were to be hardwoods (NPI 2000, Figure 2). This represents an increase in the plantation estate of more than 10% in one year. The vast majority of new plantations were established on private land (Figure 3), which is a major shift away from the previous focus of establishing softwoods on public land by state forestry organisations. Most of the new plantation establishment occurred in Western Australia, Tasmania and Victoria (Figure 4).

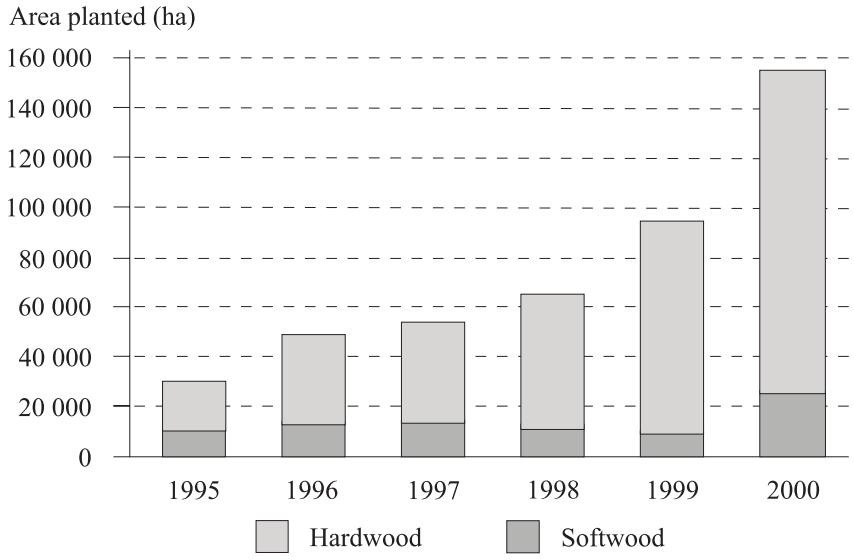


**Figure 2.** Annual areas of new plantations established in Australia 1995. Source: National Plantation Inventory (2000).

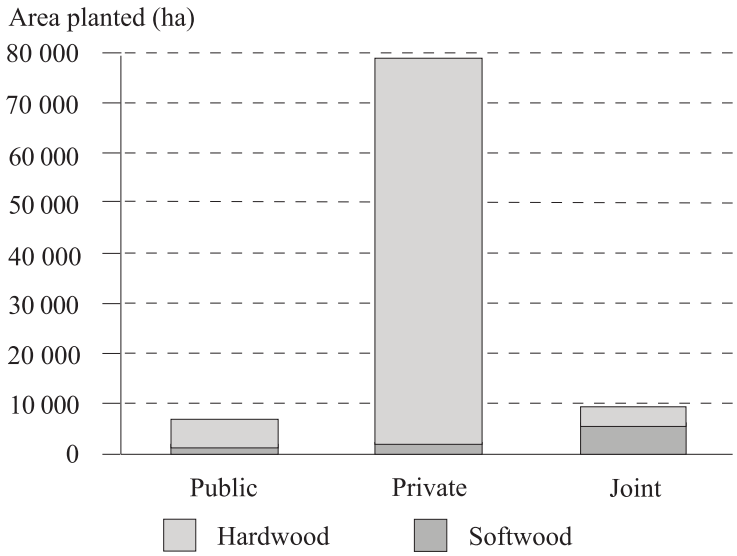


**Figure 3.** New areas planted to hardwood and softwood in 1999 (up to September) by tree ownership. Source: NPI (2000).

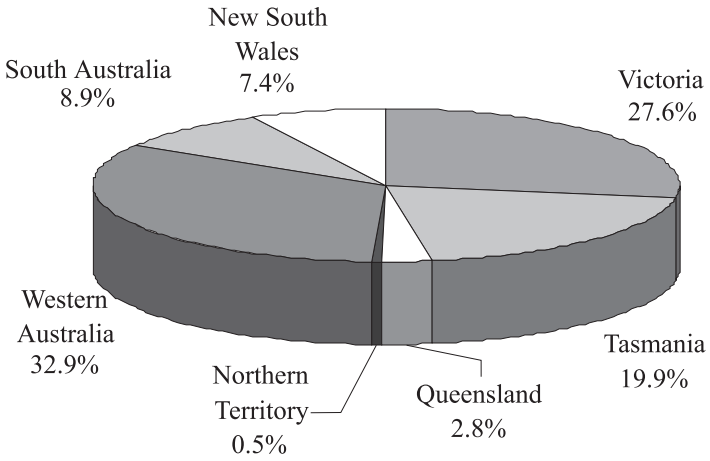


**Figure 4.** New areas of plantations established in 1999 (up to September) by State/Territory. Source: NPI (2000).

## 3. Private forestry in Australia

Three common types of private forestry can be identified in Australia based on the motivations for participation, which range from predominantly environmental to a very strong production focus (Figure 5).

Large-scale industrial plantings established primarily for timber production constitute by far the largest areas of plantation establishment. These plantations are managed primarily for wood production. Private large-scale plantations are typically owned by large forestry companies; or alternatively established under joint venture arrangements, either with forestry

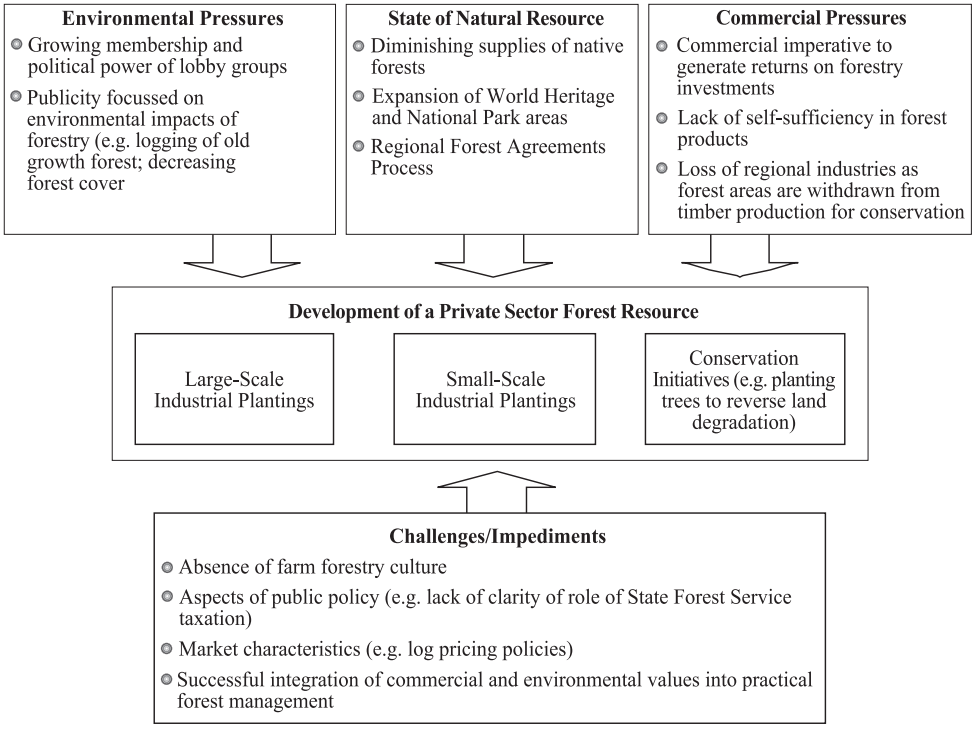


**Figure 5.** An overview of the factors influencing the development of small-scale forestry initiatives in Australia. Source: Herbohn et al. (2000).

companies or government. There is also an increasing number of forestry investment companies establishing large-scale plantations.

Conservation plantings or initiatives are at the other end of the production/environment spectrum. These planting tend to occur in environmentally sensitive areas such as along water courses. They are commonly established to ameliorate environmental damage such as stream bank erosion, and rising water tables leading to salinity caused by past poor land management practices. A significant proportion of the conservation planting in the past ten years in Australia has occurred under the umbrella of 'Landcare'. Landcare is an Australian community-wide program with strong government support at all levels and currently involves over 4000 autonomous groups (Marriott et al. 2000). Most groups are comprised of farmers and other landowners restoring land and increasing sustainability, and to a lesser extent groups based in towns and cities. Marriott et al. (2000) have observed that increasingly landcare members are focussing on whole catchments and regional themes, rather than confining themselves to their own properties. Many groups have amalgamated into loosely bound, but highly task-orientated and opportunistic regional networks. There are also a large number of other groups active at a regional level that promote or assist in tree planting for environmental purposes, which are not directly associated with Landcare. Due to the high establishment cost, limited financial support and a lack of direct economic returns (at least in the short term) conservation plantings tend to be small in area. While timber production is not excluded as a potential forest use, the environmental sensitivity of many of the areas established, or significant non-wood benefits generated from these areas suggest that it is unlikely that these will produce significant volumes of timber.

Small-scale forestry involving the establishment of woodlots as an integrated part of farm activities is growing in popularity, although accurate figures on the extent of planting are difficult to obtain. There are also some 42 million ha of native forest under private ownership (Table 1). Logging of these areas is often ad hoc and uncontrolled. The importance of these areas for conservation and as a source of sustainable timber production has recently been recognised and programs have been developed to improve the management of these forests.

## 4. The nature and extent of small-scale (farm) forestry in Australia

The nature of small-scale forestry differs from country to country (see for example Harrison et al. 2000) and it is difficult to define what is meant by small-scale forestry. Harrison and Herbohn (2000) suggest that large-scale forestry is typically owned or managed by government or large companies, and has a focus on large, even-aged, single species blocks, with plantations of varying ages. The aim of large-scale forestry is to provide regular volumes of timber over time in a cost-effective manner with minimal labour input to supply established long-term market contracts. In contrast, small-scale forestry typically consists of a single or smaller number of planting blocks, non-professional management and often a lack of silvicultural skills, with little planning for future marketing.

The term 'farm forestry' is commonly used in Australia, although its meaning is poorly defined. The common interpretation is simply ‘forestry undertaken on farms’, which involves small-scale farm woodlots, but may also include windbreaks and shelterbelts, agroforestry and ‘break of slope’ plantings. These activities are consistent with the interpretation of small-scale forestry outlined by Harrison and Herbohn (2000). Figure 6 illustrates the overlap between land protection plantings, farm forestry plantations and industrial plantations. It is clear from this figure that farm-based forestry may also involve large-scale planting of monocultures under joint venture arrangements, and the leasing of farmland to industrial forestry companies for industrial plantations. These latter activities are more consistent with the definition of large-scale forestry suggested by Harrison and Herbohn (2000).

Plantation data from the National Plantation Inventory (NPI) discussed above is based almost exclusively on large-scale plantations of 1000 ha or greater, although it appears that some plantations of smaller size are included in this data set. As such, it is difficult to obtain accurate estimates of the current extent of small-scale forestry in Australia. This situation has recently improved however, with the establishment of National Farm Forestry Inventory (NFFI) project as a subset of the NPI database. Future reporting of Australia’s plantation estate will recognise and attempt to quantify farm forestry plantings, as a subset of the overall plantation figures. More detailed analysis of the farm forestry resource will also be reported under the NFFI (NPI 2000). The NFFI will focus on plantations whose owners hold total estates less than 1000 ha.

Preliminary NFFI data (Table 2) indicates that there are 76 250 ha of small grower plantations in Australia, most of which are found in the states of Victoria, New South Wales, Western Australia and Tasmania. Queensland, despite very favourable growing conditions and an abundance of suitable land, has few small-scale forestry plots. Table 2 does not contain data on the large number of individual landholders who have entered into farm forestry via joint venture agreements or leasing arrangements with commercial tree grower companies. This is significant because it is likely that up to 20% of Australia’s total plantation resource has been established via joint venture arrangements (Stephens 2001). Early analysis of data collected through the NFFI suggests that the size and nature of plantations can vary significantly between regions (Stephens 2001).

**Table 2.** Small grower plantations in Australia. Source: National Farm Forestry Inventory (2001), Bureau of Rural Sciences.

| State/region | Total Area (ha) | Main species planted |
|---|---|---|
| Victoria | 24 000 | *Eucalyptus globulus, E. nitens, E. cladocalyx, Pinus radiata* |
| New South Wales | 16 000 | *E. nitens, E. grandis, Corymbia maculata, P. radiata* and cabinet timbers |
| Queensland | 3 000 | Numerous eucalypt species and cabinet timbers, *P. caribaea* |
| Western Australia* | 13 000 | *E. globulus, P. radiata, P. pinaster*, mallee species |
| Green Triangle, Vic/SA | 3 300 | *E. globulus* and *P. radiata* |
| Mt Lofty, South Australia | 1 900 | *E. globulus*, *C. maculata* and *P. radiata* |
| Tasmania | 15 000 | *E. globulus*, *E. nitens* and *P. radiata* |
| Northern Territory | 50 | *E. pellita*, sandalwood (*Santalum* sp.) and *Acacia* spp. |
| Total | 76 250 | |

*includes 6 000 ha of oil mallee

## 5. Major impediments to small-scale forestry

A number of impediments exist to the further development of farm forestry in Australia. A detailed discussion of the impediments to farm forestry in Australia is beyond the scope of the current paper; however, a number of the more significant impediments are worth brief mention.

No one study comprehensively identifies, ranks and discusses the impediments to farm forestry in Australia. The most comprehensive study undertaken (Alexandra and Hall 1998) used a series of workshops and informal discussions to identify a total of 24 impediments operating to restrict farm forestry. While that study produced a rich source of information about the range and nature of impediments restricting the uptake of farm forestry, no formal ranking of the importance of each of the impediments was obtained. Other studies have produced rankings of impediments, but have been restricted to one region and a particular stakeholder group (usually landholders), and have often used closed lists of impediments for participants to rank.

One of the most significant factors hindering the development of the vibrant farm forestry sector identified by Alexandra and Hall is the lack of a farm forestry culture (i.e. the culture is the sum total of the knowledge, beliefs, experience and skills throughout the community). Unlike Scandinavian countries and Japan, where farm forestry has been practised for many generations and sometimes in excess of 300 years, farm forestry is a relatively new phenomenon in Australia, with the majority of farm forests being early in their first rotation. The lack of an established industry and the associated cash flows and economic benefits flowing to farmers, acts as a major disincentive for participation in farm forestry. Furthermore, the lack of a farm culture also extends to agricultural and forestry professionals and to state agencies, which are potential sources of advice to landholders and investors. Alexandra and Hall suggest that the lack of skills and experience impedes adoption where opportunities exist, and the lack of successful farm foresters ensures that the industry has few success stories and even fewer practitioner advocates.

Emtage et al. (2001a) have comprehensively reviewed previous surveys (including Harrison and Sharma 1994, Emtage 1995, Wilson and Yannick 1995, Herbohn et al. 1998a, Specht and Emtage 1998) that have examined landholders' perceptions of constraints to tree planting. The most highly ranked constraints in these studies are remarkably similar, with the

most important concerns being associated with harvest rights, availability of markets, the long wait for returns, satisfaction with current land-use, and for some the perception that forestry is not a legitimate activity for agriculturally productive land. Taxation disincentives in the recent past have made it difficult to establish a secondary market for immature plantations (see Smorfitt et al. 2001a for further discussion of taxation related impediments and recent changes in taxation legislation).

Another key constraint to farm forestry has been the traditional dominance of the forestry sector by the state forestry agencies in Australia. In the past, state governments have often set royalty charges for extraction of timber from public forests at artificially low levels in order to achieve social goals (e.g. affordable housing, regional development and employment). These artificially low royalties were used as a base for setting stumpage prices paid for timber from private land because of the dominance of the state as a producer. The dominance of the State as a supplier combined with the lack of obvious and genuine markets in many regions, led many farmers to perceive current log markets as distorted or unfair. The past dominance of the State as the major timber supplier also led to perceptions in some sections of the rural community that forestry is only an activity appropriate for governments and corporations (Emtage et al. 2001a).

## 6. The role of research

The importance of research in the development of a vibrant farm forestry sector in Australia cannot be overstated. Up until ten years ago, a relatively scant amount of research had been undertaken. Most research relating to forestry had been focussed on native forest management and on the silviculture and performance of industrial conifer plantations. With the decreasing importance of native forest logging, and the substantial increase in the rate of establishment of native hardwood plantations, there has been a corresponding shift in traditional forestry research emphasis towards the genetics and silviculture of native hardwoods. There has also been a significant increase in farm forestry research, both from a silviculture and socio-economic perspective. This research, while still at a relatively early stage has provided important information that has greatly assisted the development of the farm forestry sector.

There are a number of Commonwealth funded agencies that either undertake farm forestry research or act as funding providers for other organisations to do so. Two notable examples are the Joint Venture Agroforestry Program (JVAP) that draws funds from three separate Commonwealth funding agencies and the Forestry division of Agriculture, Fisheries and Forestry – Australia (AFFA). At least two Cooperative Research Centres (CRC for Tropical Rainforest Ecology and Management; CRC for Sustainable Production Forestry) are also undertaking research relevant to farm forestry. Various state agencies have undertaken important farm forestry research. For example, in Queensland, the Queensland Forest Research Institute and the Queensland Department of Natural Resources have undertaken a number of farm forestry studies in such areas as plant breeding, silvicultural systems, management of private native forests and some socio-economic research.

The breadth and extent of recent farm forestry research is indicated by publications which span such diverse study areas as:

- the identification of suitable areas for farm forestry (e.g. Stephens et al. 1998);
- planting systems and trials (e.g. Abel et al. 1997; Lamb and Borschmann 1998; Lamb and Keenan 2001);

- integrating biodiversity and farm forestry (e.g. Dames and Moore NRM/FORTECH 1999; Herbohn et al. 2000);
- financial models and information systems (e.g. Herbohn et al. 1998b, 1998c; Norman et al. 2000; Emtage et al. 2001b);
- landholder attitudes and extension (e.g. Harrison et al. 1995; Herbohn et al. 1998a; Black et al. 2000; Emtage et al. 2000; Emtage et al. 2001a);
- markets for farm forestry products (e.g. Smorfitt et al. 2001a. In Press);
- processing timber on farms (e.g. Hanson and Stewart 1997; Smorfitt et al. 1999; McCormak et al. 2000);
- taxation (e.g. Smorfitt and Berry 1997; Smorfitt et al. 2001); and
- various other social aspects of forestry (e.g. Race 2000).

Apart from these completed projects there are a large number of projects currently in process which will provide information which to further assist the development of a vibrant farm forestry industry (e.g. RIRDC 2001). There have been a number of recent efforts to ensure dissemination of information relevant to farm foresters (e.g. the market report compiled by U.N. Bhati at the Australian National University) and to more widely disseminate research results (e.g. publishing of conference proceedings by Race 2000; Herbohn et al. In Press; the web-based forestry publications of RIRDC).

## 7. Prospects for the future

There is scope for further expansion of the farm forestry sector in Australia. Fargher (1996; cited in Hanson and Stewart 1997) has estimated that the soils, climate and landscape of more than 18 million ha of cleared land is suitable for farm forestry, of which 5 million ha is highly suitable. Furthermore, attitudes are changing and there are increasing numbers of landholders who are at least willing to consider farm forestry as a land use option. It would seem that the prospects for overcoming impediments restricting the development of farm forestry are promising.

More competitive log markets and pricing has been introduced in many states. Further, under the National Competition Policy (NCP), states are no longer permitted to use monopoly powers and regulatory roles to disadvantage private growers. The Australian Competition and Consumer Commission (ACCC) has the power to examine the operations of the states to ensure compliance. The increased extent of private sector plantation establishment, combined with a decrease in state planting, means that the state influence over timber markets will decrease. Some states (e.g. Tasmania, Victoria) have moved to allay sovereign risk fears by introducing legislation to guarantee harvest rights. Given sufficient political pressure, other states are likely to introduce similar legislation. Markets for farm grown timber are still thin, however such markets are likely to develop when increased supplies become available. Some regional grower cooperatives have already been established to assist in the marketing of farm grown timber. A comprehensive analysis and discussion of the solutions to many of the impediments to the development of farm forestry, along with the progress being made in solving these, is provided in Alexandra and Hall (1998). Further, more recent, discussion of the progress in solving important impediments is provided by Creighton and Vise (2001).

The development of a farm forestry culture will take time. Much is currently under way to address the lack of a farm forestry culture within the farming community, although Alexandra and Hall (1998) reported consistent calls from growers to improve the transfer of information between regions and stakeholders. There have been changes in forestry education provided by universities. For example, the forestry program at the Australian National University has undergone changes which has broadened the curriculum, and the former Department of

Forestry has now been merged with the Department of Geography to form a broadly based natural resource management school. The Forestry Department at Melbourne University has developed the Australian Master Tree Grower program in conjunction with the Joint Venture Agroforestry Program. Southern Cross University has introduced a broadly based sustainable forestry degree while the School of Natural and Rural Systems Management at The University of Queensland has recently developed a similarly broad-based tropical forestry program which is based in the multi-disciplinary School of Natural and Rural Systems Management. A short course in farm forestry has also been run by James Cook University. The culture of the various state agencies remains a problem. The culture is changing in relation to farm forestry, albeit slowly, with a small but growing number of passionate advocates of farm forestry. The culture of these organisations is likely to change gradually as graduates who have completed broader-based courses are employed within these organsiations.

Significant steps have been made towards identifying and addressing impediments such as the traditional dominance of the forestry sector by state forestry organisations, taxation issues, harvest security and the lack of farm forestry skills by forestry professionals. More needs to be done to address the remaining impediments such as the lack of a farm forestry culture and some remaining taxation impediments. Progress on addressing the current impediments will mean that landholders previously not interested in farm forestry will now consider it as a land use option, but may not have the technical or financial capabilities to exploit the potential opportunities available. As such a new suite of challenges will need to be faced as the farm forestry industry develops. Overall, the prospects for farm forestry in Australia are bright.

## Acknowledgements

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# Prospects for Small-Scale Forestry in Europe

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## Abstract

The future challenges for European small-scale forestry stem from all the three aspects of sustainability: economic, social and ecological. Small-scale forests play a key role in supplying raw material to the increasingly global forest products industries. The importance of competitiveness and cost efficiency in production will increase. The income from forests can play an important role in maintaining a sound social structure, and forestry can contribute to the overall economy of rural areas. The land ownership structure and management goals for forestry are heterogeneous and becoming even more so. One of the biggest issues will be the privatisation taking place in former socialist countries in Eastern Europe. A major future issue in addressing the concern on environment is the allocation of the costs of nature protection. In the ongoing debate, forest certification and the role of forests in implementing the Kyoto Protocol have raised much discussion. The implications of certification, and even more, those of Kyoto Protocol, remain unclear.

*Keywords: Small-scale forestry, Europe, sustainability, rural development, forest policy*

## 1. Increasing trend in forest resources continues

The European continent, excluding the former USSR, has nearly 215 million ha of forest and other wooded land, accounting for nearly 30% of the land area. Forest cover is high in the Nordic and Baltic countries (Sweden and Finland alone account for more than 50 million ha of forest cover) and some parts of Central Europe. Forest cover is low in Southern Europe and in the densely populated northwestern areas, such as the UK and the Netherlands (FAO 1997).

Forest land is characterised by a huge variety of climatic, geographic, ecological as well as socio-economic conditions. Coniferous forests cover about two-thirds of the forest area, being dominant in the Northern region (at nearly 90% of area), and in the mountainous areas of the Central Europe.

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While the forest area has remained fairly stable during recent decades, the stock volume has steadily increased, being about 22.6 billion $m^3$ in 1995. The increase has occurred in virtually all European countries and is expected to continue.

Sweden has the highest growing stock (2.5 billion $m^3$), followed by Germany (2.2 billion $m^3$) and France and Finland (both about 1.7 billion $m^3$). The mean volume in 1995 was approximately 140 $m^3$/ha for all of the European countries, and the net annual increment 711 million $m^3$.

Of the total forest area, 85% is considered 'exploitable', i.e. with no legal, technical or economic restrictions on wood production. Thus, almost all of Europe's forest is managed, although with widely differing management objectives and intensity.

Since the 1950s, fellings have consistently been less than net annual increment. This has enabled the European forests to supply ever greater quantities of wood while simultaneously increasing the growing stock of forest capital. After 1970 fellings have been stable at around 450 million $m^3$, but the annual increment has increased significantly. Possible reasons for this increase include changes in forest structures as a result of forest management, changes in definitions of increment, earlier under-estimation of the increment in the course of forest inventories and environmental changes (Eurostat 1998; FAO 1999).

## 2. Competitiveness is the main concern

From the economic viewpoint, the most crucial future challenge is to maintain the competitiveness of small-scale forests in timber production. Small-scale forests play a key role in supplying raw material to the increasingly global forest products industries. The forest-wood chain will meet the global competition in all its phases from timber growing to final product customer behaviour. The importance of cost efficiency in production will increase.

Overall, forest land ownership is approximately equally distributed between public and private owners. However, in Western Europe two-thirds of forest land is privately owned, whereas in Eastern Europe forests are mainly public domain, though this is changing with privatisation taking place in former socialist countries (Figure 1).

The majority of countries have large numbers of small holdings. In the 15 member countries of the European Union (EU), there are approximately 12 million private individuals that can be classified as forest owners. In France and Belgium, more than 90% of the holdings are under 5 ha (Figure 2). This is in contrast to the situation in Sweden and Finland where 25% and 14% of plantations, respectively, are larger than 50 ha.

The land ownership structure and management goals for forestry are heterogeneous and becoming even more so, with descendants of former farmers living increasingly in urban areas and depending on sources of income other than primary production.

The significance of forest resources for owners, as well as for public, varies tremendously within the European countries. One indicator of relative importance of forests is the forest area per capita, which ranges from 0.2 ha in the Netherlands to 4.0 ha in Finland. It is clear that the owner's expectations as well as public values related to forests cannot be the same in these two countries (Eurostat 1998).

In general, forest owners are well organised in Europe. In most countries forest owners' associations (with varying legal bases and organisational arrangements) have been established to promote sustainable forest management. The associations serve as a link between forest owners, represent them in forest policy making, and also provide help in timber sales and silvicultural operations. The Confederation of European Forest Owners (CEPF) is the most

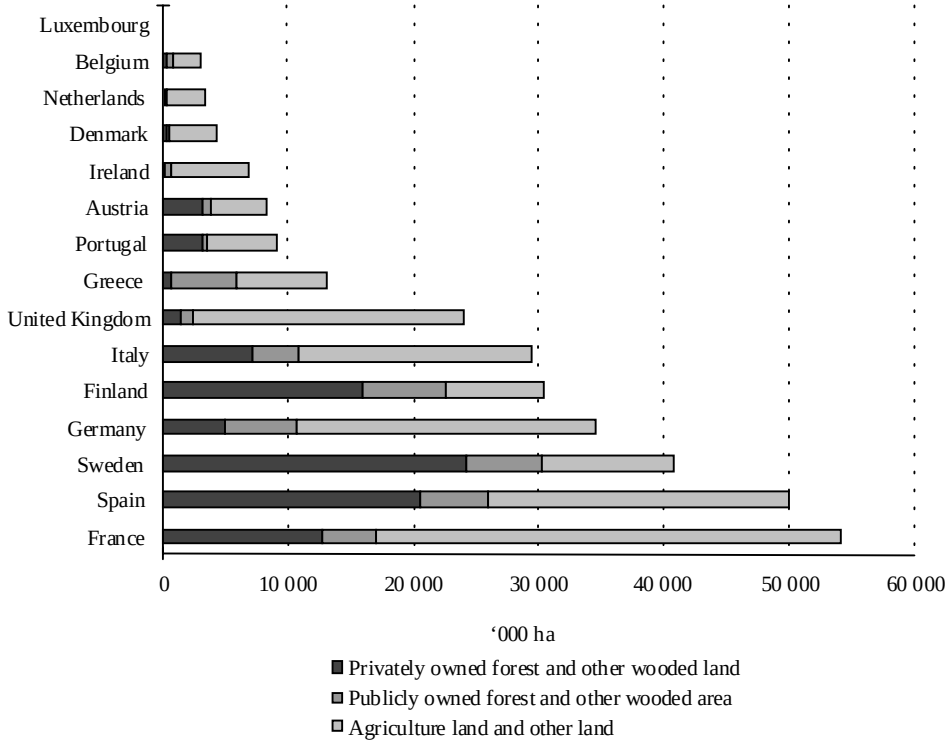


**Figure 1.** Ownership structure of land area in EU countries ('000 ha). Source: Liaison Unit in Lisbon, 1998.

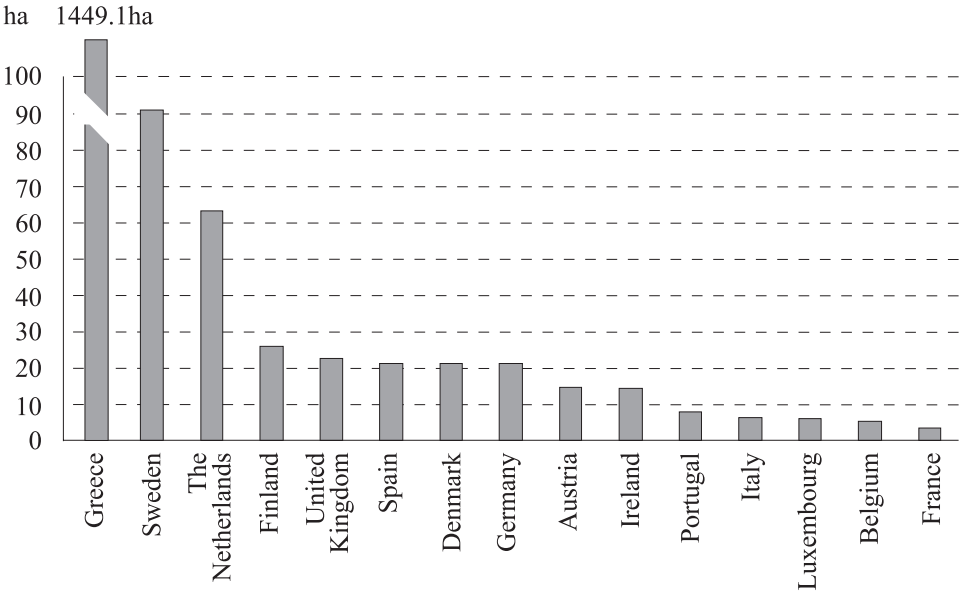


**Figure 2.** Average size of forest holdings ownerships in EU countries (ha). Source: European Commission 1998.

representative umbrella organisation of national forest owner organisations in the EU member countries, although several other international forest owner organisations also exist.

## 3. Forest policy issues and objectives are in move

In the past, the main emphasis of forest policies in many European countries was to ensure a constant flow of timber resource to the processing industries. In recent decades, a growing environmental consciousness has raised the ecological perspective to a more central position in forest policies.

European countries have been active in taking on many commitments concerning the protection, development and sustainable management of forests. A crucial step in this direction was the United Nations Conference on Environment and Development (UNCED) held in Rio de Janeiro in 1992. The UNCED has given forests an increasingly important role in the context of sustainable development and environmental conservation. The concept of sustainable forest management has been recognised as a fundamental guiding principle by all participating countries.

At the European level the major achievement so far has been the series of Ministerial Conferences on the Protection of Forests in Europe (Strasbourg 1990, Helsinki 1993 and Lisbon 1998). The resolutions of these Conferences represent a joint response and a political commitment by the countries of Europe to the sustainable management and conservation of forest resources, as suggested in Agenda 21 and in the non-legally binding 'Forest Principles' adopted at UNCED. The specific conditions and needs of Europe’s forests have been taken into account in the formulation of the resolutions.

Since the resolutions of the Helsinki Ministerial Conference for the Protection of European Forests in 1993, many countries have completed or are undertaking efforts to identify criteria and indicators of sustainable forest management, to collect information on the indicators, and to assess the implications of certification for forest policy. During the follow-up process, the main emphasis was on ecological aspects of sustainability. More recently, socio-economic aspects have gained increasing attention, and most recently, in the resolutions of the Lisbon Ministerial Conference in 1998, socio-economic sustainability was given the main emphasis.

Probably the most important socio-economic aspect related to small-scale forestry is that the income from forests can play an important role in maintaining a sound social structure, and forestry can contribute to the overall economy of rural areas. Farm forests are concentrated in rural and mountainous areas, which are economically disadvantaged compared with industrialised areas, and undergoing depopulation. Therefore, farm forestry has a key socio-economic role relevant to policies at regional, national and international levels.

Attention is paid not only to the traditional questions such as the continuing viability of individual farms, to which the production of timber and other products can contribute, but also to more recent questions such as the contribution that the landscape value of attractive woodlands can make to the rural economy through tourism. The contribution that forests can make to the environment in such diverse areas as water catchment protection, habitat creation and conservation, recreation, and so on is now widely recognised. Increasingly, forest owners are either required by statute or influenced by financial incentives to alter their management practices to increase these environmental benefits, or to decrease environmental costs.

In the ongoing debate on forest policies, forest certification and the role of forests in implementing the Kyoto Protocol have raised much discussion. Numerous proposals have been made for forest certification. In autumn 1999, the Pan-European Forest Certification Standard (PEFC) was launched and the first certificates are now being given. The forest policy implications of certification, and even more, those of Kyoto Protocol, remain unclear.

## 4. The role of the European Union is increasing

Treaties on European Union make no provision for a comprehensive common forestry policy, and the majority of the EU member countries have not supported the development of such a policy. The main argument has been that forest sector has traditionally worked well with the rules of market economy, and hence regulation and support mechanisms have not been necessary. Furthermore, differences in the forestry conditions and practices among the member countries would make agreement on a common policy difficult.

Notably, references to the management, conservation and sustainable development of forests can be found in the common policies in many other fields, including the Common Agricultural Policy and the rural development, environment, trade**,** internal market, research, industry, development co-operation and energy policies.

Especially, forest related policies aimed at promoting rural development have recently been highly recognised in the EU. When Austria, Finland and Sweden joined the Union at the beginning of 1995, forestry matters gained more importance, and the need for increased co-ordination of forest-related matters became more evident.

The recent formulation of the forestry strategy for the EU (CEC 1998) is a sign of development in this respect. Forestry measures are now being more recognised also in the Commission funding mechanisms (e.g. to promote rural development and research on forests). A separate unit has been established to manage the Commission matters dealing with forest industries. According to the Commission document on the EU Forestry Strategy, the bases for action under existing responsibilities in accordance with the terms of the Treaty are:

- with their many functions, forests are essential to rural areas and constitute a major component of an integrated rural development policy, particularly because of their contribution to income and employment and their ecological and social value;
- forests and their diversity are an important part of the European natural environment and their protection and conservation falls within the scope of a number of Community policies and is the subject in particular of specific environmental issues such as the EU Biodiversity Strategy, Natura 2000 and the implementation of the Climate Change Convention; and
- for forest products, and in particular wood (as well as cork and resins), the rules of the Internal Market apply, including the normal EU competition rules on state aid, mergers and cartels.

Indeed, a number of important actions within existing Community policies have a considerable impact on forests. On the other hand, direct and indirect linkages exist between Community and national forestry policies. Therefore, the Community has a vital role to play in achieving the objectives laid down by the Member States and the Community in the framework of the strategy.

## 5. National forest policy instruments still in key role

The EU forestry strategy emphasises that, in line with the principle of subsidiarity, the Member States are responsible for planning and implementing national forest programmes or equivalent instruments. The European Commission proposal on rural development policy in the context of Agenda 2000 enables the Community to support the implementation of national and sub-national forest programmes or equivalent instruments in line with the objectives of rural development and in accordance with the principle of subsidiarity. This mechanism forms the basis for the legal and financial activities of the EU in forestry.

The role of the EU is mainly co-ordinative. The member countries have the full authority and responsibility to formulate their national forest policies and to decide on the forest policy means to be adopted in each country. Certain financial instruments for forest policy implementation are available at the EU level, mainly within the rural development measures, but in the majority of the cases the support is partial only, and the role of national policies is more essential. In most cases, the contribution of forest owners is also required.

Considerable differences exist in forest policy instruments between European countries (see e.g. Hyttinen et al. 1999). What can be said is that the whole rangeof policy means (normative, financial, material and informative) have been adopted in most countries. However, the policy instruments are modified by so many conditions and variations that it is not possible to draw simple comparisons.

A fundamental review and reappraisal of forestry legislation has recently been or is currently being undertaken in most European countries, in the light of new priorities identified during the widespread debate on sustainable forest management. Taxation and subsidies strongly influence the economic performance of small-scale forests. Differences can be observed concerning the balance between property taxation and income taxation, as well as indirect taxes such as value-added and fuel taxes. In this connection, special mandatory fees connected to timber sales have to be mentioned, as well as the general tax burden on income, including social security fees (which influence labour costs).

In general, financial support for forestry measures is at a rather low level, and normally only part of the costs of forestry measures can be covered by public support. Partial public support is typically available for measures such as regeneration of harvested areas, non-commercial thinning of young stands, forestry road building and maintenance, and forest fire protection.

One of the major concerns in many European countries has been the extent to which agricultural land can and should be converted to forestry or woodland, and the policy measures which would achieve this. In almost all European countries there are policies to support farmers who convert their agricultural land to forestry.

Extension services, distribution of information and education are becoming increasingly important forest policy tools by activating forest owners' own contributions, and thus compensating for the reduced direct financial support for forestry measures. Indirect subsidies can be found in various forms, the most common example being the provision of management consulting services to small-scale private landowners by members of the forest service or foresters employed by semi-governmental institutions. Systematic forest management planning is seen as being one of the most important and efficient tools in many countries in this respect.

Most European countries are making efforts to increase public participation in policy making and decision making. National forest programmes have become an important tool in the preparation of the future strategies for forestry. One of the key principles of the programme preparation has been the 'bottom up' approach.

The economic performance of small-scale forests is of importance for the various policy objectives, but the availability and comparability of the information required to assess economic performance is not sufficient and varies widely from country to country within Europe. Hence, evaluation of the efficiency of the policy tools is difficult. Indeed, the recent economic and political developments suggest a need for a more comprehensive information base and analysis on the socio-economic situation of small-scale forestry.

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# The Economic Situation of Small-Scale Forestry in Japan

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## Abstract

Small-scale forestland owners and enterprises dominate Japanese forestry. However, 80% (80 million $m^3$) of all wood used in Japan is imported, and Japanese forestry is threatened by such imports flooding the local market. Fragmented ownership, steep terrain, rapid growth of weeds, and high labor costs have all contributed to the decline of domestic forestry. In addition to such unfavorable conditions, another obstacle has been the exchange rate. The purchasing power of the Japanese Yen has become very strong in recent years, and the decreasing prices of imported timber have depressed the prices of domestic timber, eroding profits in small-scale forestry. Consequently, the lower the timber price, the fewer small-scale owners produce timber. In spite of these difficult circumstances, there are several interesting new developments in Japanese forestry. One is the revision of the Basic Forestry Law, through which the Japanese government is steering forest policy from timber production to environmental services. Because of this change, new ways to assist rural forestry activities will become available in the near future. Another change in Japanese forestry is the certification movement. Recent examples of Japanese companies acquiring ISO 14001 and FSC certifications provide hope to depressed domestic forestry activities. In particular, FSC group certification is useful in motivating small-scale forest owners to implement and maintain sustainable forestry practices.

*Keywords: Basic Forestry Law, exchange rate, forest certification, profitability, small-scale forestry*

## 1. Introduction

In the past 30 years, the Japanese Yen (JPY) has gained in strength. Until 1971, the US dollar (USD) was worth 360 JPY, whereas in 2000 it was valued around 110 JPY. This was primarily a result of strong domestic industries, such as the automobile and electronics

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industries; as a consequence, foreign goods, including timber and wood products, have become less expensive in Japan.

On the other hand, industry in Japan has been suffering pressure from abroad. Consumption of foreign wood and fiber, including pulp and paper, is almost four times higher than that of domestic products. The share of sawn domestic timber for housing construction is slightly higher, but is still only a half that of imported timber. Under such market conditions, the prices of timber products are likely to be determined by imported products, and forest owners in Japan must unwillingly accept cheap prices. As discussed later, the price of Japanese cedar logs has decreased constantly over the past two decades, regardless of increasing costs. Thus, the economic situation of small-scale forestry is somewhat critical.

This paper aims to assess the current economic situation of Japanese forestry, in which most stakeholders are involved in small-scale forestry. The market structure for domestic logs and timber is discussed, price and income trends are shown, and the production costs of construction timber are analysed. Finally, the prospects for Japan's small-scale forestry are considered.

## 2. Overview of Japanese forests and forestry

Two-thirds (66.5%, Figure 1) of the land surface of Japan is covered by dense closed forest. Because the islands are oriented north to south, and high mountains are found on the major islands, the climate varies from sub-alpine to sub-tropical. In addition, most of the islands are located in monsoon areas. These conditions make Japan rich in tree species, and different kinds of forestry and forest industry activities have been practiced for centuries.

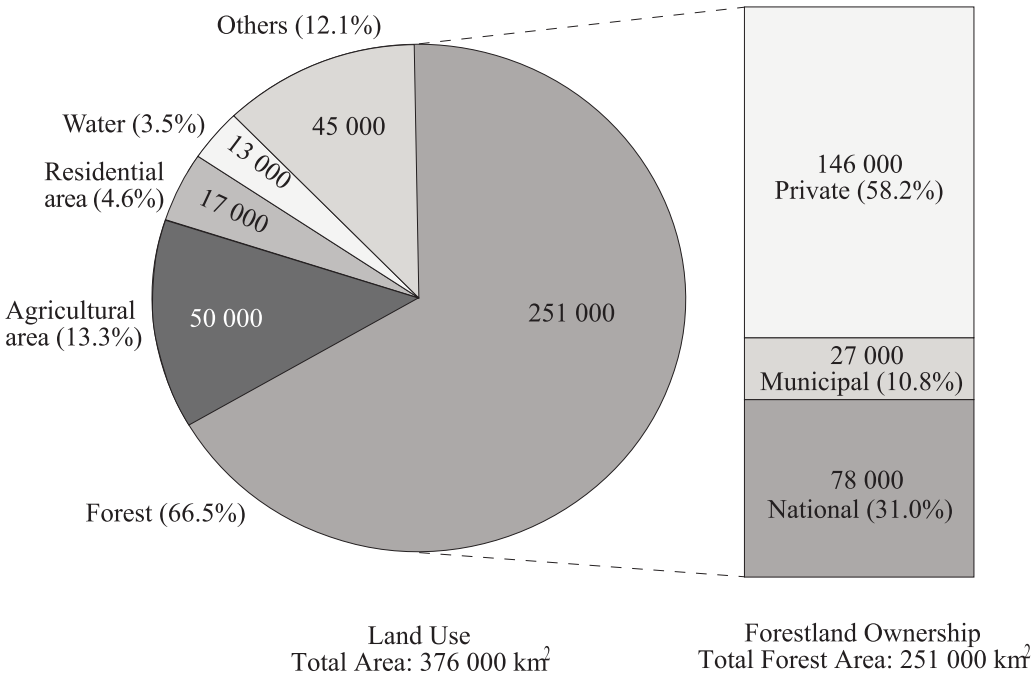


**Figure 1.** Land use and forestland ownership pattern of Japan (1997).

Timber production is concentrated in private forests, which make up 58.2% of the total forested area. Almost 75% (14.4 million $m^3$) of the total timber harvested (19.3 million $m^3$) in 1998 was from private forestlands. In recent years, the private sector has become increasingly important in forestry, because of drastically decreased timber production in national forests.

A special feature of Japanese forests is the large stock of artificial plantations, which comprise 10 million out of 25 million ha of total forestland. Most of these plantations are even-aged conifer stands, planted after the initial harvest of hardwoods following the energy revolution in the 1950s, when families' energy source changed from charcoal to coal or oil. The total timber stock is about 3.5 billion $m^3$, of which 1.9 billion $m^3$ are held in artificial conifer plantations, and another 450 million $m^3$ are held in natural conifer stands. Two of the most common species in artificial plantations are Japanese cedar (Sugi) and Japanese cypress (Hinoki). The average rotation age for Japanese cedar is between 40 and 70 years, and that for Japanese cypress is slightly longer.

Most private forest holdings are small. Table 1 shows the distribution of forest ownership by private households. Of the total of 2.5 million forest households, 1.5 million hold <1 ha, and another 780 000 hold 1–5 ha. Nearly 90% of forest holdings are thus categorized in the <5 ha class, and the national average for the area of forest owned is 2.7 ha. The other major types of private ownership are 'company' and 'communal' land, but these are also small in scale: the average forest area of company holdings is 34.6 ha and that of communal holdings is 19.3 ha. No large forestland holding companies are currently active in Japan.

## 3. Profitability of private forestry

Production of domestic timber has been decreasing steadily since the late 1960s. The current level of production is only about 40% of its maximum. In contrast, the volume of imported wood has been increasing. Figure 2 shows the trend of domestic production and imported wood volumes over the past 4 decades. The Japanese consume ca. 100 million $m^3$ of wood fiber annually. Therefore, the decreased domestic production has resulted in increased volumes of imported wood, and decreased self-sufficiency to a rate that is now just over 20%.

Figure 2 also shows the trend of the USD/JPY exchange rate. The purchasing power of the Japanese currency has tripled since 1971. The timber market situation in the 1980s–1990s

**Table 1.** Distribution of forest ownership by private households in Japan (1990). Source: International Agricultural and Forestry Census 1990.

| Class | Number of households | | Area | |
|---|---|---|---|---|
| | (houses) | (%) | (ha) | (%) |
| 0.1–1 ha | 1 452 255 | 57.89 | 560 797 | 8.31 |
| 1–5 ha | 777 207 | 30.98 | 1 624 273 | 24.06 |
| 5–10 ha | 150 661 | 6.01 | 973 948 | 14.42 |
| 10–20 ha | 79 281 | 3.16 | 1 014 582 | 15.03 |
| 20–30 ha | 23 294 | 0.93 | 527 311 | 7.81 |
| 30–50 ha | 14 664 | 0.58 | 520 710 | 7.71 |
| 50–100 ha | 7 490 | 0.30 | 478 931 | 7.09 |
| 100–500 ha | 3 376 | 0.13 | 612 095 | 9.07 |
| >500 ha | 377 | 0.02 | 439 474 | 6.51 |
| Total | 2 508 605 | 100.00 | 6 752 121 | 100.00 |

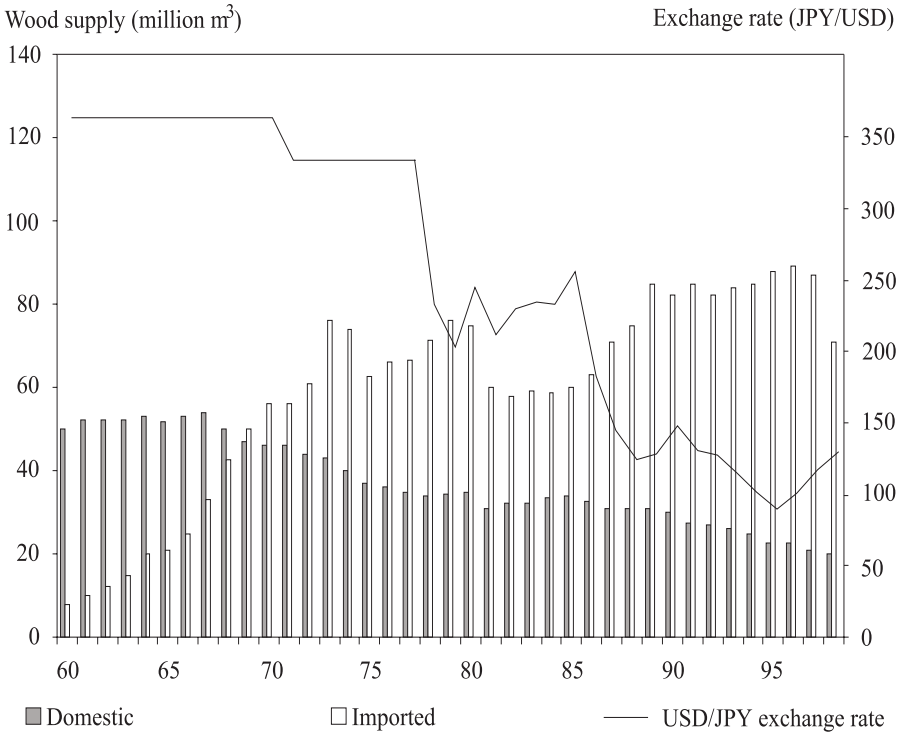


**Figure 2.** Trend of Japanese domestic production and imported wood volumes and USD-JPY exchange rate (1960–1998). Source: Table for Demand and Supply of Forest Products, Statistic Bureau of the Nippon Bank.

was very different from that in the 1960s–1970s, when timber was in short supply and the government requested trading companies to import more wood to support expanding economic growth, causing the volume of wood imported to increase dramatically. Since the late 1970s, the Japanese have been able to purchase wood either from domestic or foreign sources, and price has thus become the driving market force. Imports have continued to increase with the increased strength of the JPY.

For instance, trying to see a relationship between exchange rate and imported volume by simple regression analysis, two variables show quite strong correlation as below:

Import = 98.940 - 0.142 * Exchange
(t) (22.133) (-5.843)

Where
Import: Volume of imported wood (million $m^3$)
Exchange: Exchange rate between USD and JPY (JPY/USD)
Calculated period: 1977–1998 (22 years)
Adjusted $R^2$: 0.612
DW: 0.878

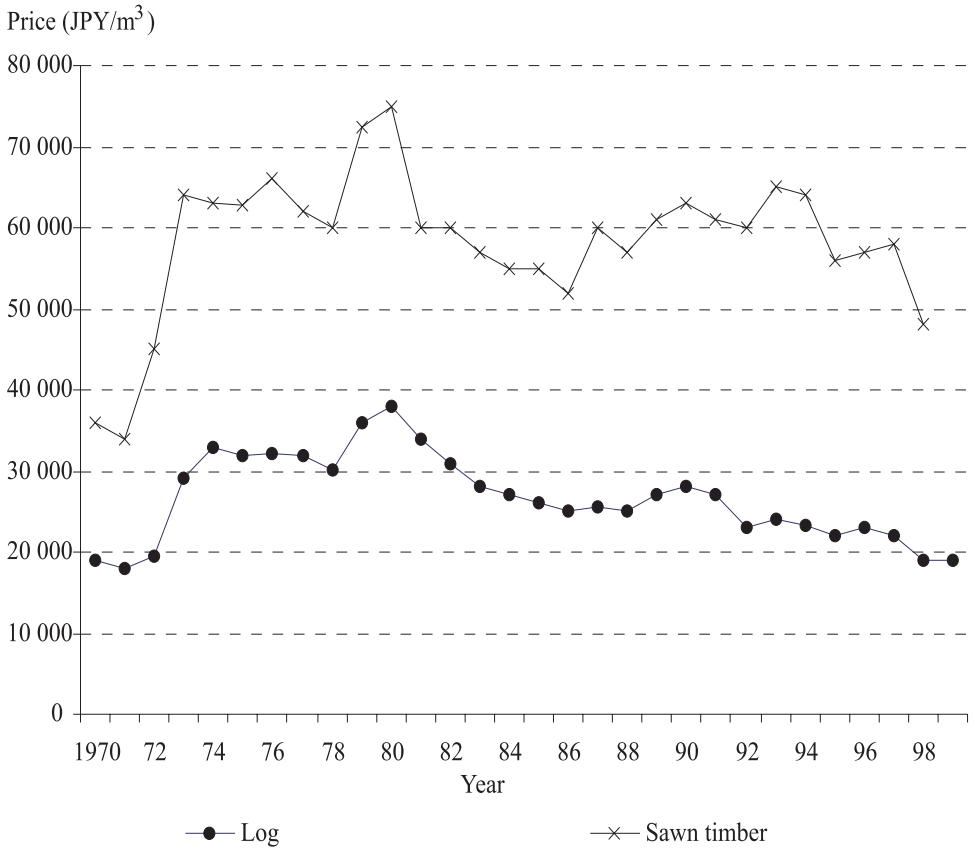


**Figure 3.** Average log and sawn timber prices of Japanese cedar (1970–1999). Source: Table for Demand and Supply of Forest Products (each year).

Figure 3 shows the trend of log and sawn timber prices of Japanese cedar. The log price here is the average sawmill price of medium-sized logs (14–22 cm diameter, 365–400 cm long), and the sawn timber price is the average price of typical construction timber lengths (10.5 x 10.5 x 365–400 cm long) at retail. Disregarding the influence of the second oil shock in 1979, log prices fell constantly, while sawn timber prices increased between 1986 and 1994. However, because of sharp decreases in timber prices since 1997, the difference between the price of timber and the price of logs is now relatively small.

To illustrate the declining values of wood production during this period, Table 2 lists real log prices and nominal prices, as well as the Wholesale Price Index. Increases of nominal prices in the 1970s were mostly offset by increases in the Wholesale Price Index. The real price was fairly stable during this decade, but it began decreasing rapidly thereafter. Nominal prices in 1999 were almost the same as in 1970, but the real price of a Japanese cedar log decreased from 32 530 JPY/$m^3$ to 19 442 JPY/$m^3$.

Table 3 shows the average annual profit of forest owner households in three size classes: 20–50 ha, 50–100 ha, and 100–500 ha. Almost all of the owners in the 20–50 ha class and most in the 50-100 ha class do not consider forestry their principal occupation. Typically, these owners are farmers who are also employed elsewhere. In all size classes, profits have fallen below 50% in the past 10 to 15 years, and forest owners have been unwilling to

**Table 2.** Nominal and real log prices of Japanese cedar. Source: Table for Demand and Supply of Forest Products (each year) Statistic Bureau of the Nippon Bank.

| Year | Nominal price | W.P. Index | Real price |
|---|---|---|---|
| | (Yen/m$^3$) | | (Yen/m$^3$) |
| 1970 | 18 900 | 58.1 | 32 530 |
| 1975 | 31 800 | 91.2 | 34 868 |
| 1980 | 39 700 | 120.3 | 33 001 |
| 1985 | 25 600 | 119.7 | 21 387 |
| 1990 | 26 700 | 108.5 | 24 608 |
| 1995 | 21 700 | 100.0 | 21 700 |
| 1999 | 18 800 | 96.7 | 19 442 |

**Table 3.** Average annual profit of forest ownership in three different classes in Japan (1975–1998). Source: Summary of Forestry Statistics (each year).

| Year | 20–50 ha | 50–100 ha | 100–500 ha |
|---|---|---|---|
| 1975 | 521 | 1 185 | 3 585 |
| 1980 | 708 | 1 508 | 4 719 |
| 1985 | 542 | 1 372 | 4 370 |
| 1990 | 574 | 627 | 4 115 |
| 1995 | 477 | 723 | 2 181 |
| 1998 | 259 | 539 | 1 576 |

harvest their stumpage under such unfavorable market conditions. Their profits have decreased significantly, and overall, the share of income from forestry within total household income has dropped from 27% in 1985 to 13% in 1998.

Of course, the exchange rate is not solely responsible for the slump in Japanese forestry. The small and fragmented holdings, unbalanced age distribution of artificial plantations, high planting and logging costs on steep terrain, technological improvements of logging and sawing abroad, development of engineered wood products in North America and Europe, and many other reasons have all contributed to this market situation. However, the main reason for the recent rapid rise in sawn timber imports from northern Europe (mainly spruce for laminated lumber) has been the strong relationship between the JPY and the Euro. One Euro was equivalent to 183 JPY in 1990, while it was worth 133 JPY in 1998. This 30% increase in purchasing ability has aggravated the problems of domestic industries, including forestry. Whereas a company such as Toyota can transfer its automobile factory to anywhere that has good access and cheaper labor, small-scale forest owners have no such opportunities.

## 4. A detailed account of stumpage and sawn timber sales: two case studies

Illustrating the flow of logs and sawn timber distribution in Japan is not a simple task. Traditionally, there are many intermediate agencies and complex routes to and from these agencies, because people prefer a variety of species from particular areas, and special features of wood quality. Figure 4 is a simplified chart of the distribution of logs and sawn timber in Japan.

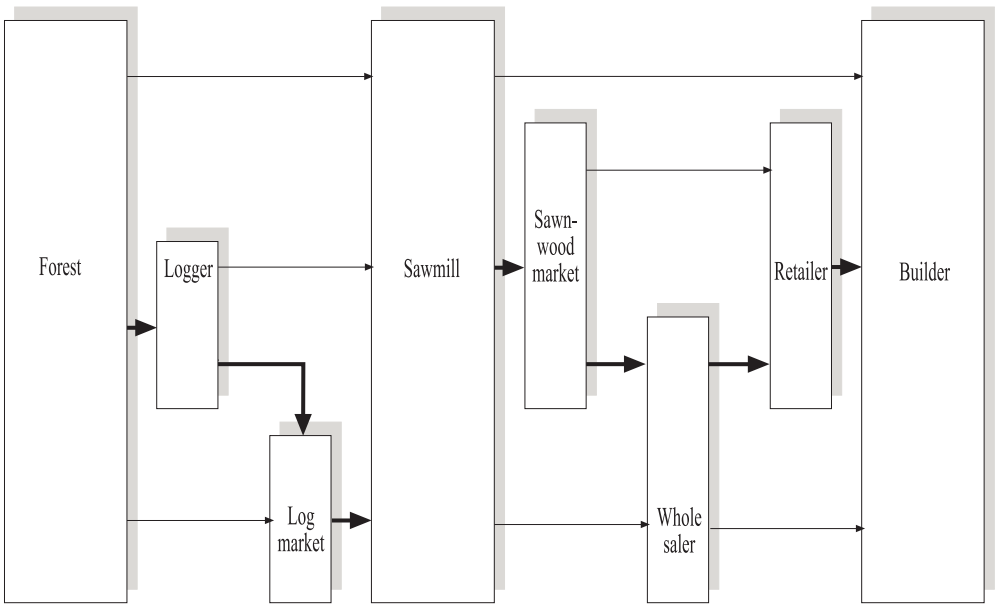


**Figure 4.** Typical distribution of domestic logs and sawn timber in Japan.

The most popular route from the forest to house builders is indicated by the thick arrow. Logs are harvested and yarded by loggers, transported to log auctions, and purchased by sawmills. Sawn timber is priced at timber markets and distributed to builders through wholesalers and retailers. The prices of logs and sawn timber, especially construction lengths, are determined by species, tree ring density, surface color, texture, number of visible knots, and several other factors.

Although there is sufficient supply and demand at log auctions and sawn timber markets to create competitive market conditions, the price of domestic logs and sawn timber is strongly influenced by the price of imported substitutes. For example, the retail price of Japanese cedar construction lengths cannot much exceed the price of western hemlock construction lengths from North America. Therefore, suppliers of domestic logs and sawn timber are controlled by the cost of imported timber, except those who supply certain specialized products, such as the decorative poles that are used in traditional Japanese features.

To reveal the real economic situation of small-scale forestry, a series of surveys was conducted for sales accounts of stumpage and sawn timber. The surveys were initiated in a small sawmill located in Wakayama Prefecture. Japanese cedar construction lengths (10.5 x 10.5 x 300 cm) were chosen as an example, and details of transactions were recorded.

Figure 5 summarizes the results of the first survey, conducted in 1994. A log was purchased at a local auction market for 25 000 JPY/$m^3$. The log, cut from a 55-year-old plantation tree, was sawn and planed without kiln drying. The timber was then sent to a timber market in Tokyo and priced at 73 000 JPY/$m^3$. The detailed account was as follows: 2400 JPY/$m^3$ for transportation costs (including the cost of the transaction at the log auction); 16 800 JPY/$m^3$ for the yield when converting from log to sawn lengths; 13 100 JPY/$m^3$ for sawing; 5200 JPY/$m^3$ for transportation to the timber market in Tokyo; and 7600 JPY/$m^3$ for the transaction cost at the market. These costs amount to 45 100 JPY/$m^3$; subtracting this amount and the purchasing price of the log (25 000 JPY/$m^3$) from the sales price (73 000 JPY/$m^3$), the sawmill made a profit of 2900 JPY/$m^3$.

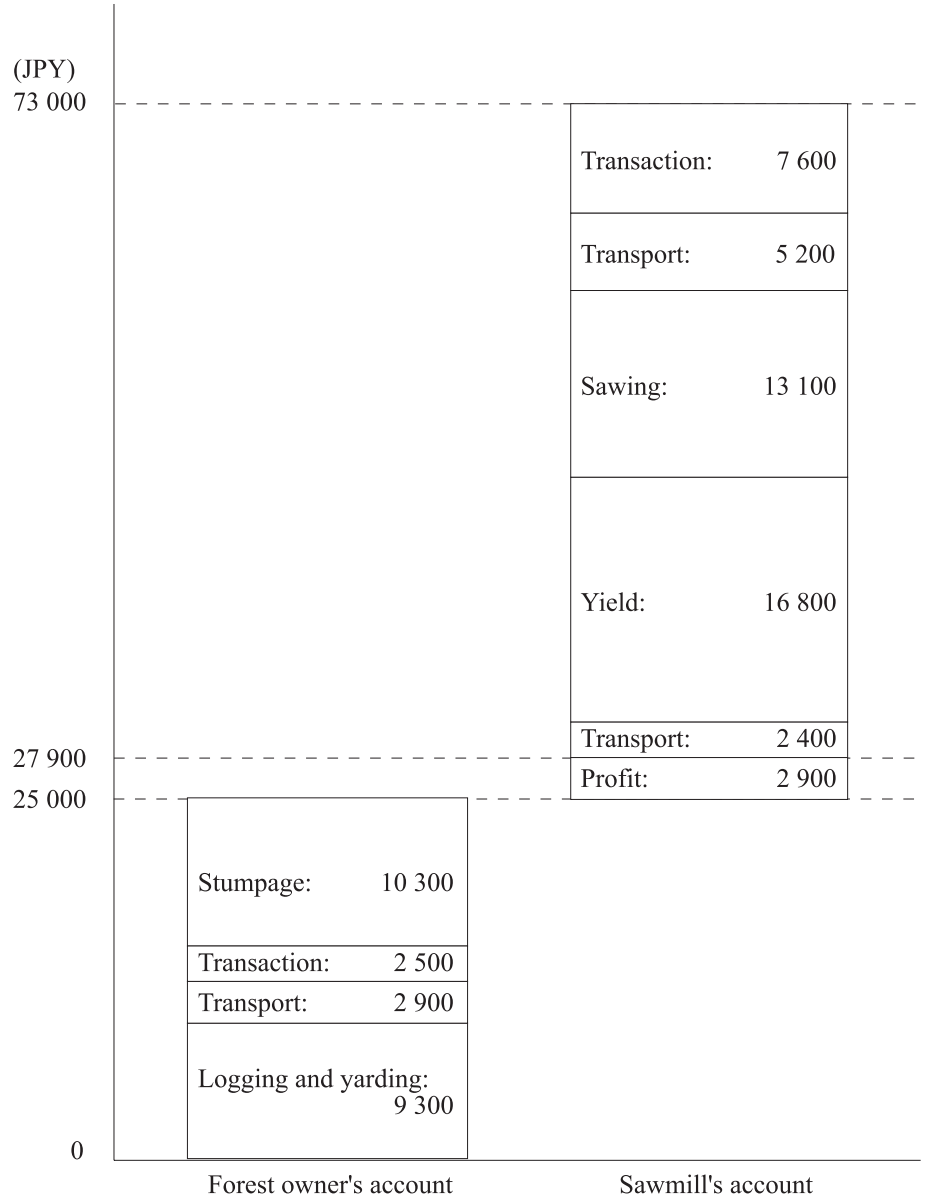


**Figure 5.** Accounts of a forest owner and a sawmill for construction lengths from 55-year-old Japanese cedar in 1994.

The survey was continued at the auction and with the contract logger. In this example, trees were harvested by the crew of the forestry cooperative that supervised the auction market. Transaction costs were therefore very low compared to those of other private loggers. The log was harvested from a small-scale forest ownership in the same village as the auction. The logging and yarding cost was 9300 JPY/$m^3$, transportation to the auction was 2900 JPY/$m^3$, and the market transaction cost was 2500 JPY/$m^3$. Subtracting these costs from the sale price, the final stumpage price collected by the forest owner was 10 300 JPY/

$m^3$. In this case, the logging cost was relatively low because of the location of the site. The average logging and yarding cost in this area was nearly 15 000 JPY/$m^3$, and the average stumpage price was approximately 5000 JPY/$m^3$.

Figure 6 shows the results of the second survey, conducted in 2000. The data are not based on a single sale, but rather on the average for sales in September and October 2000. The market price of a 70-year-old Japanese cedar log was 23 000 JPY/$m^3$. By subtracting the costs of logging and yarding, transportation, and transactions, the stumpage price was calculated to be 4300 JPY/$m^3$. Forest owners can only gain some profit from stumpage if the trees are old enough; in other words, trees under 55 years old would not be profitable now.

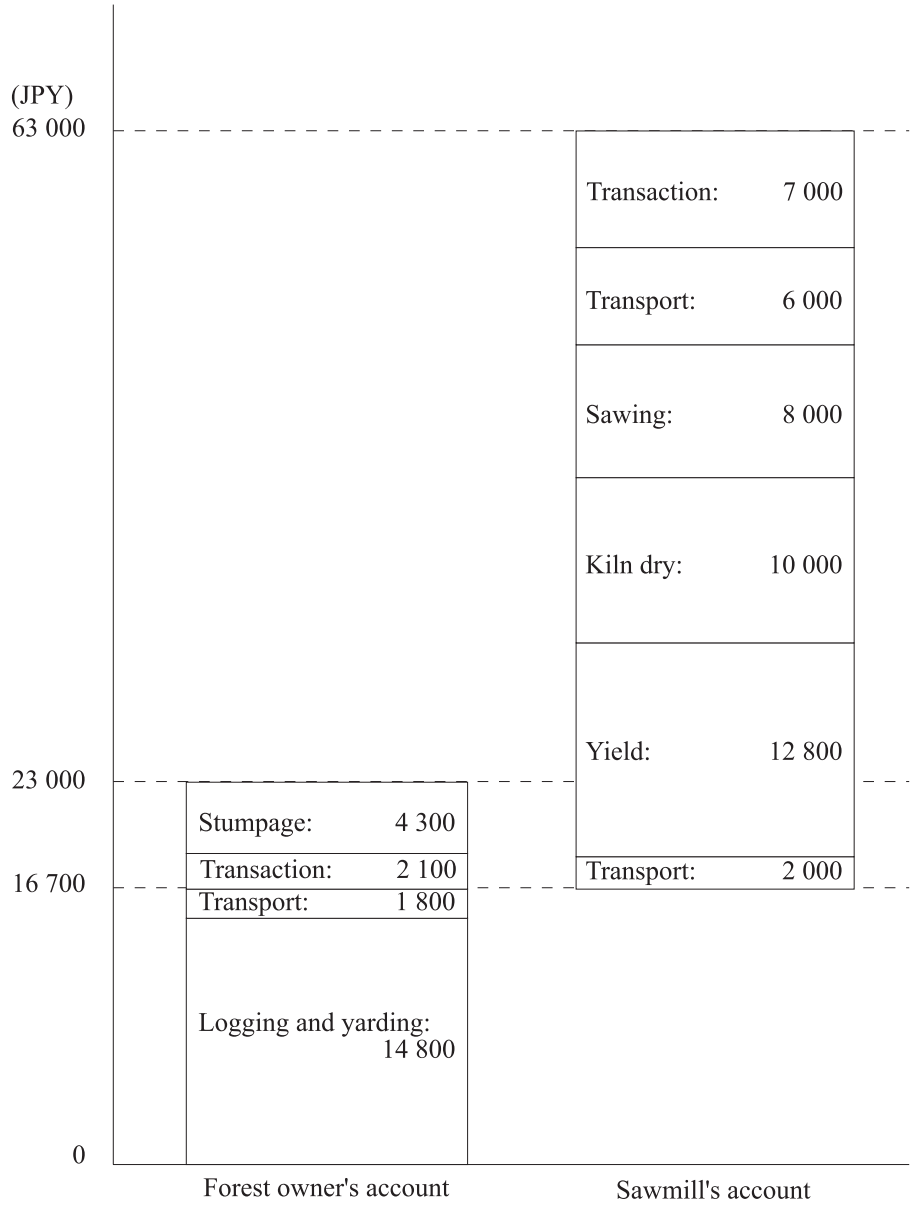


**Figure 6.** Accounts of a forest owner and a sawmill for construction lengths from 70-year-old Japanese cedar in 2000.

The sawmill account is more complicated. The market price for construction lengths was 63 000 JPY/$m^3$, and the sum of costs was 46 300/$m^3$: 7000 JPY/$m^3$ in transaction costs; 6000 JPY/$m^3$ for transportation to Tokyo; 8000 JPY/$m^3$ for sawing; 10 000 JPY/$m^3$ for kiln drying; 12 800 JPY/$m^3$ for yield; and 2000 JPY/$m^3$ for transactions in and transportation from the log auction. Subtracting these costs from the price of construction lengths, the acceptable price for a log should be about 16 700 JPY/$m^3$. However, it cost 23 000 JPY/$m^3$ at the log auction. In other words, the sawmill did not make any profit from this operation at all, and this calculation implies a further decrease of log prices in the near future. Construction lengths are one of the main products of many small sawmills in this area, but the business is in a very difficult situation.

## 5. Discussion

The economic situation of small-scale forestry is becoming more difficult. It will be hard for the industry to break this 'vicious cycle' of low prices and reduced production. To revitalize domestic forestry, a strong trade policy would be desirable. However, this is almost out of the question, given the world-wide trend of globalism. The Japanese government is therefore trying to find another solution.

The direction of current forest policy in Japan is changing. The Basic Forestry Law of 1964 was intended to promote timber production as the primary objective of national forest policy, but the situation today is far from the ideal foreseen by the law. Therefore, a new forestry law is to be implemented in 2001.

Small-scale forestry has survived with the help of government subsidies based on the policy of the Basic Forestry Law. For example, forest owners may be subsidized by up to 68% of the cost of new planting and pre-commercial thinning. In addition, every year the government pays large sums to support roads or machinery to enhance rural forestry. In the 1960s and 1970s, when forestry was strong, forestry practices realized both timber production and environmental services at the same time, which was referred to as 'pre-established harmony' in forestry.

However, harmony has since disappeared, because appropriate practices are now lacking. Abandoned plantations on steep terrain can easily cause environmental disasters such as wind throws, soil erosion, or landslides. Unfortunately, the number of such abandoned forests is gradually increasing because small-scale owners can no longer afford to maintain their forestland.

The primary objective of forest policy under the forthcoming new basic law will be to implement various environmental services. In addition to the above-mentioned domestic reasons, the law is also influenced by an international movement for sustainable forest management practices following the 1992 Earth Summit in Rio de Janeiro. Timber production will thus officially have to relinquish its position of primary importance, although in reality it has not held this position for some time. Forestry will continue to play an important role in land stewardship and will no longer be concerned merely with timber production.

The role of small-scale forestry may or may not change. Because forestry practices are necessary in maturing plantations, government assistance to forest owners must not be discontinued. Although integration of forest management by accumulating dispersed holdings is planned, in most cases small-scale owners will continue to manage their own forestland for as long as possible. Direct income compensation or similar public support systems for forest owners are under consideration. With this kind of help, small-scale forestry may have a chance to continue to play a leading role, as before.

Another new movement is towards forest certification. Just before the turn of this century,

several Japanese forestry enterprises acquired international forest certification. In 1999, Sumitomo Forestry Co. successfully acquired ISO 14001 certification for their 40 000 ha of forest land. Even though ISO 14000 series have been very popular among Japanese industries, this was the first example of the forest sector having obtained environmental certification. Forest certification has since become quite popular.

In 2000, Hayami Forestry and the Yusuhara Forestry Co-operative were both FSC certified. The former is a company run by a single large forest owner with ca. 1000 ha of forestland holdings in Mie Prefecture. It is also one of the country's leaders in sustainable forest practices, and this first trial of FSC certification has received much attention from the forestry sector. The Yusuhara Forestry Co-operative in Kochi Prefecture was the first forest management group to obtain FSC certification in Japan. It manages about 2250 ha of forestland belonging to 97 different, primarily small-scale, owners. The Yusuhara Forestry Co-operative is one of 1290 forestry co-operatives in Japan, but this new challenge brought with it sudden fame. This co-operative proved that even small-scale forest owners can be internationally certified, providing hope for domestic forestry.

Forest certification may be advantageous to domestic forestry, because a lot of timber is still imported from countries that have unsustainable production methods. If people become more conscious of sustainability issues in forestry, then domestic forest products may become preferred, regardless of higher prices.

## 6. Conclusion

Japan imports a lot of wood every year, even though the inventory of domestic timber is large and increasing. This is not the result of a positive policy to seek foreign resources, but rather the result of a lack of appropriate trade and domestic forest policies. The profitability of Japanese private forestry is decreasing rapidly, which is easily explained by Richard's comparative advantage theory. However, such an interpretation is not useful to struggling small-scale forest owners. A responsible policy is necessary to maintain both forest health and timber production in the future.

The forthcoming new Basic Forestry Law and the forest certification movement are examples of constructive actions toward sustaining domestic forests and forestry. To use domestic resources efficiently with environmentally sound practices is one of the key actions that developed countries can implement to solve global environmental problems. In the 21st century, forest policy and environmental policy will converge, and I hope that Japan will set an example in enhancing environmentally sustainable small-scale forest production.

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# Small-Scale Forestry in Canada
# or
# Mammals Living Amongst Governments and Dinosaurs

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## Abstract

Canada is a nation of vast spaces, with extensive forests that cover 418 million hectares. Most of the forests are owned by the public (i.e. not private), with 71 percent owned by the provinces and an additional 23 percent owned by the federal (national) government. The remaining 6 percent of the forests are privately owned with varying degrees of corporate and small-scale forestry across the country. Harvesting rights to much of the public forests are awarded by a range of tenures (a form of license) by the provincial and federal governments.

The forests have a number of roles or uses ranging from heritage forests (left in their natural states) to forests primarily managed primarily for timber production. Forestry plays a key role in the Canadian economy. The scale and scope of forestry operations varies tremendously across the country, with various provinces and territories having a wide range of small-scale versus large corporate forestry operations. This paper will investigate the state of small-scale forestry across the country. It will specifically address some of the challenges that small-scale forestry faces such as: capitalisation and bidding on timber; larger forestry companies refusing to purchase logs; forest policy drawn up with a large-scale forestry bias; land-ownership or tenure design that can penalise the small-scale forestry operation; inadequate forestry extension; taxation regimes that penalise the small-scale forestry owner; and a growing demand from the public that small-scale forestry owners have to address social and ecological needs for which they are not always compensated. The paper also addresses some of the strategies that associations and individual forestry owners have taken to address these challenges. Community forestry, a relatively recent development in the country will be included in the study of small-scale forestry.

*Keywords: Community forestry, economics, markets, funding, strategies*

Anssi Niskanen and Johanna Väyrynen (eds.)
Economic Sustainability of Small-Scale Forestry
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## 1. Overview of Canadian forestry

*Canada, like other Nation-States, suffers from a contradiction between its public mythologies and its reality. Perhaps we suffer more than most. Perhaps the explanation is that, while all countries are complex, the central characteristic of the Canadian state is its complexity (Saul 1997).*

Canada is the second largest country in the world, with a total area of 997 million ha and a population of 30.6 million (Natural Resources Canada, Canadian Forest Service 2000). The country was founded by two Old World Nations (England and France) whose pioneers discovered a vast wilderness inhabited by a virtual myriad of First Nations with vastly different cultures and languages. Conflict between the two 'founding nations' and their allied First Nations led to an eventual victory in 1759 by the English over the French on the Plains of Abraham and the country becoming part of the British Commonwealth.

Canada is an evolving federation in which governance is divided between a central (federal or national) government and ten provinces and three territories (a regional government in which some control still rests with the federal government). This complex form of governance of shared power, along with varied resource endowments, physio-geography, demographic factors, transportation and trade networks all contribute to the country's tremendous diversity in its socio-cultural, political and economic make-up.

Canada is often symbolised as a country of vast spaces and an abundance of natural resources – particularly the forests that cover nearly half the nation's land area. Forests and biodiversity are inextricably linked. There is growing recognition of the role of tropical forests which cover only 7% of the earth's land surface yet contain an estimated 50–90% of earth's species (Miller and Shores 1991). Temperate and boreal forests are also biologically rich, and within Canada it has been estimated that approximately two-thirds of the country's 300 000 species of animals, plants and microorganisms are forest dwelling (Boyle 1991). This is not surprising, as a forest contains 'greater environmental volume' and when this is stratified, such as is the case with the herb, shrub, and tree layers – a wide variety of ecological niches are created – all with unique factors supporting a range of biodiversity (Bunnell and Chan-Mcleod 1998).

While Canada's forests literally do stretch from coast to coast, the ownership patterns, economic values, and forest types all contribute to a forest base, that in many ways is as complicated as that of all of Europe, and as such is hard to characterise within a single short paper.

This paper will not be able to definitively address all of the challenges that small-scale forestry faces across the vast physical, economic, environmental, social, cultural and political spectrum of Canada. Instead, it will focus on general concerns and will draw in specific examples to demonstrate some of the arguments.

Canada's 417.6 million ha of forest accounts for approximately 10% of the earth's forests. Of this forested land base, 235 million ha or approximately 56% is considered to be commercial and capable of producing timber, pulp, paper and other forest products such as maple products (syrup, sugar, etc.), Christmas trees and other specialty craft products. Today, the forests on 119 million ha (51% of the commercial forest land base) or approximately 28.5% of the total forest area are managed primarily for timber, while the remaining commercial forests are either not currently economically accessible or have not been allocated (Natural Resources Canada, Canadian Forest Service 1999).

Some 71% of the country's forests are provincially owned with an additional 23% being owned federally (by the national government) with the remaining 6% of the forests being privately owned (Canadian Council of Forest Ministers 1998). Private land ownership in

Canada is unusually low when compared with other developed countries, especially those within Europe.

Table 1 provides details on forest areas, harvest volumes, and ownership patterns across the country. The operability of the various forest land bases is determined by slope, distance to mills, geology, environmental sensitivity, wildlife and ecological values, socio-economics, cultural and other values and factors.

Actual ownership patterns vary tremendously across Canada's provinces and territories, with essentially 100% of the forests in the Yukon and Northwest Territories owned by the federal government. In sharp contrast to this, the provinces (which have more self-jurisdiction than the territories) have ownership that varies from Newfoundland and Labrador's 99% provincial and 1% private, to Prince Edward Island's 92% private, 1% federal and 7% provincial.

There is the greatest level of regulation over forestry practices over the federally and provincially controlled forestlands, with British Columbia's Forest Practices Code being one example of provincial forestry legislation. In many cases, privately owned forests lands are subject to no direct forest legislation, with the powerful federal Fisheries Act offering only a limited amount of comfort in ensuring that good forestry is practised.

Forest types also vary tremendously across the country. Canada's 15 terrestrial ecozones (based largely on climate and landform variations) have been broken down into 194 different ecoregions, in turn further subdivided into 1020 ecodistricts. Eleven ecozones have in excess of 15% forest cover, with distinct variations in the mixes and numbers of species. There are approximately 180 indigenous species in Canada with approximately 100 species found in the Mixedwood Plains ecozone (Natural Resources Canada, Canadian Forest Service 2000). Some introduced species, such as Scots pine (Pinus sylvestris) have become naturalised and self-reproducing (Farrar 1995). A broad breakdown of forest types across the country is provided in Table 2.

**Table 1.** Forest areas, harvest volumes and ownership across Canada. Source: Canadian Forest Service 2000.

| Province/Territory | Forest Area (million ha) | Harvest (million metres$^2$) | Federal Land | Provincial Land | Private Land |
|---|---|---|---|---|---|
| Yukon | 27.5 | 0.183 | 100 | 0 | 0 |
| Northwest Territories | 61.4 | 0.253 | 100 | 0 | 0 |
| British Columbia | 60.6 | 76.9 | 1 | 95 | 4 |
| Alberta | 38.2 | 17 | 9 | 87 | 4 |
| Saskatchewan | 28.8 | 4.1 | 2 | 97 | 1 |
| Manitoba | 26.3 | 2.1 | 1 | 94 | 5 |
| Ontario | 58 | 23.8 | 1 | 88 | 11 |
| Quebec | 83.9 | 41.4 | 0 | 89 | 11 |
| New Brunswick | 6.1 | 11.5 | 1 | 48 | 51 |
| Nova Scotia | 3.9 | 5.8 | 3 | 28 | 69 |
| Prince Edward Island | 0.29 | 0.5 | 1 | 7 | 92 |
| Newfoundland and Labrador | 22.5 | 1.9 | 0 | 99 | 1 |

**Table 2.** Forest types across Canada. Source: Canadian Forest Service 2000.

| Province/Territory | Coniferous | Mixed-wood | Deciduous |
|---|---|---|---|
| Yukon | 79 | 19 | 2 |
| Northwest Territories | 33 | 58 | 9 |
| British Columbia | 89 | 8 | 3 |
| Alberta | 44 | 23 | 33 |
| Saskatchewan | 39 | 25 | 36 |
| Manitoba | 59 | 20 | 21 |
| Ontario | 50 | 27 | 23 |
| Quebec | 58 | 23 | 19 |
| New Brunswick | 47 | 29 | 24 |
| Nova Scotia | 45 | 22 | 23 |
| Prince Edward Island | 35 | 35 | 30 |
| Newfoundland and Labrador | 91 | 8 | 1 |

## 2. Federal forest policy

Under section 92 of the Canadian Constitution, the provinces have responsibility for forest management (Natural Resources Canada, Canadian Forest Service 2000). There is currently underway a devolution of control over forestry from the federal government to the government of the Yukon Territory, with such a transfer to Nunavut and the Northwest Territories already having been completed.

The federal or national government does have a large degree of potential influence over forestry through its control over international trade and treaties. There have been a number of clashes between the provincial and federal governments over forestry, and the recent expiry of the Canada-US Softwood Tariff Agreement has created increased federal-provincial tension in terms of effective strategies on how to address the tariff challenge. During this period of tension the special needs of the small-scale forester have essentially been forgotten by both levels of government.

Another means for the federal government to influence provincial and territorial forestry policy is through funding and research. The two multi-year Forest Resource Development Agreements (FRDA), which represented partnership funding between the federal and provincial governments, led to extensive silviculture, research and development for the forestry sector across the country – with both large-scale and small-scale forestry benefiting.

There are nine stated strategies under the current 1998–2003 National Forest Strategy (Canadian Council of Forest Ministers 1998):

1. Forest Ecosystems: Multiple Values;
2. Forest Management: Practising Stewardship;
3. Public Participation: Many Voices;
4. The Forest Industry: A Global Competitor:
5. Forest Science and Technology Movement: A Team Approach;
6. Communities and the Workforce: Living with Change;
7. Aboriginal Peoples: Living with Change;
8. Private Woodlots: A Growing Opportunity;
9. The Global View: Canada on Stage.

While all of the federal strategies have an impact on small-scale forestry, an obviously important one is the eighth strategy on woodlots. There are more than 425 000 woodlot owners in Canada, owning in excess of 18 million ha of commercial productive forest land (greater than 12% of

Canada's total). These woodlots provide an annual harvest of 39.6 million $m^3$, or roughly 21% of the annual national harvest. They also generate 4 million $m^3$ of firewood, 4 million Christmas trees, 15 million litres of maple syrup, and other food, medicinal and ornamental products are growing in importance (Canadian Council of Forest Ministers 1998).

Woodlots obviously contribute a great deal to Canadian society and its economy, and yet the federal government has not made addressing the special needs of woodlot owners a priority – despite the rhetoric. A graphic example is the 1992 review of the federal income tax system's perverse impacts on woodlots, and for which there has been limited (read inadequate) support for implementation of the review's recommendations (Canadian Council of Forest Ministers 1998). Over-harvesting and reduced funds for silviculture across most of Canada increase the importance of removing the tax disincentives – the government should instead be creating tax incentives for the more sustainable management of woodlots. Failing to act on a widely supported review of woodlots does not demonstrate a serious commitment to addressing the needs of Canadian small-scale forestry. The reduction in staffing and budget for the Canadian Forest Service over the years also demonstrates a lack of appreciation and support for what was once a world famous research and extension organisation.

## 3. Provincial forest policy

Provincial forest policy varies widely across the country, with regulation in British Columbia arguably being the toughest in the country with the Forest Practices Code, and also the most diverse and challenging forestry due to the province's challenging geography, social values, ecological and biodiversity values and First Nations concerns.

With the end of the Forest Resource Development Agreements, there has been a country-wide reduction in the levels of silviculture and services for the transfer of education and knowledge to small-scale forestry owners that the provinces have failed to address. Provincial funding of forestry research and development, silviculture and extension has never reached levels adequate to meet the real needs of the woodlot owners. Even the Forest Renewal BC program of British Columbia, while making some very progressive policies and investments for value-added manufacturing, has failed to aggressively address the needs of the small-scale forester, instead focusing on the large-scale forestry sector with its commodity focus. While the large-scale forest sector does create more revenue for the government coffers, it does not create the same revenue and number of jobs as the small-scale forestry accomplishes per cubic metre of wood. Arguably, large-scale forestry is not as sustainable as small-scale forestry based on this lower production per cubic metre of wood.

## 4. Small-scale forestry challenges

Forestry is arguably the most complicated of all the resource-based industries to operate within and manage (Mitchell-Banks 1994a). There have been significant changes in scientific knowledge, economic and technological change, and evolving social values (Drushka 1992). There is also a growing appreciation that forests are inter-connected webs that focus on the production of the whole ecological system and not just parts or certain products of the forest (Hammond 1992). Some of the challenges of forestry include, but are not limited to (Mitchell-Banks 1994a):

- Long time frames
- Future uncertainty
- Economics
- Social needs/desires
- Problems and symptoms and the challenges of separating them
- Governance and changes in political situations
- Technological change
- Climate
- Knowledge
- Resources for management
- Resources that have to be considered (often dictated by social values)
- Accuracy in measurement
- Accuracy in evaluation
- Carrying capacity
- Cumulative impacts
- Complexity of habitat or environment
- Equity
- Power and authority (strategically and tactically related to governance).

Small-scale forestry management challenges incorporate all of the above general forest management challenges with additional challenges created by the small size of the operation. One such challenge is demonstrated by the proportionally greater financing challenges that a small-scale forestry operation faces than a large industrial operation. As a banker, I had to work far harder to justify lending money to a small business or small-scale forestry operation than I did for a large-scale business or forestry operation. This inverse relationship between the size of the loan and the work needed to obtain funding is well-known within the lending sector. The small-scale forestry operation would have to go to greater lengths to demonstrate the viability of their business, while in corporate banking the lending was often done on the 'name' or reputation of the business. Difficulties in obtaining financing for small-scale forestry not only create challenges in establishing the business, but also in obtaining operating or revolving loans for ongoing expenses.

Small-scale operations are also faced with the challenges of securing market intelligence and presence. Often the small-scale forester is primarily focussed on the challenges of the forestry operation, and the business aspect – which requires a completely different set of skills – is something that presents a completely different set of obstacles. Marketing the harvested wood is obviously critical to ensuring that the operation is profitable. Extension, already mentioned as having been greatly reduced in Canada by the governments, not only has to address forestry skills, but also basic business skills for the small-scale forester.

Challenges in undertaking more effective forestry management are compounded by the large number of small-scale forestry owners and the generally lower quality of land-based information than is found on public land (generally operated on by the large-scale forestry sector). This lower quality of information about harvesting and silviculture levels available for the small-scale forester has led to difficulties in effectively estimating and managing for sustainable yields on private lands. This lack of adequate information has contributed to over-harvesting and conversion of forest land into agriculture land (Canadian Council of Forest Ministers 1998).

Certification, and the growing demand from the public for forest products to be certified, are creating growing demands for small-scale forestry owners, and there are initiatives to pursue 'group certification' as has been the case in forest owner associations in Nordic countries. Certification is an expensive and time-consuming process, and without the ability to 'group-certify' the small-scale forestry operation is at a disadvantage because of the smaller land base and ability to fund the evaluation and auditing required under certification.

Log yards, in which logs are collected from the surrounding forests and then sold to the highest bidder offer a potentially greater market for the small-scale forester. Unfortunately, the large-scale forest sector often dominates the purchasing of the logs (thus reducing not only the potential number of buyers but also reducing the potential benefits of market diversification for the small-scale forestry operation). Another potential downside in Canada, is that increasingly large-scale forestry companies are establishing log yards – and in one community in BC, a local forestry company has established a log yard in direct competition with that of the community forestry operation (Mitchell-Banks 2000). The large-scale forestry company took this action in an apparent attempt to shut down the community forestry operation as it is successfully selling logs for a higher price than the large-scale forestry operation would prefer. Situations like this are akin to the small-scale forestry operation being invited to dinner by the large-scale forestry operation and then discovering that the host intends to consume them – akin to the behaviour of Hannibal Lecter towards some of his dinner guests.

In this paper, small-scale forestry includes both community forestry and woodlot forestry, often referred to as Non-Industrial Private Forestry (NIPF) in Europe. Community forestry is centred around the concept of local control and decision making (Mitchell-Banks 1999b) and has proven to be an effective planning tool in addressing local concerns (Mitchell-Banks 1994b). Community forestry faces the same small-scale forestry challenges as the private landowner, but with the additional challenge of having to meet the needs of the majority of the community residents. Community forestry management thus often needs to incorporate far more social values than do other small-scale or large-scale operations. At the community level, there is often an emphasis on visual impact, recreation, spiritual values, local employment and investment, local economic growth and stability, quality of life concerns and even water quality if the community forestry operates within the community's watershed – which is not uncommon.

There are many common challenges for both small-scale forest owners and community forestry that the large-scale forest sector does not face. A limited number of examples are provided below, with brief explanations.

Forest tenures (the assignment of forest rights) are often designed with a large-scale timber harvesting bias (Mitchell-Banks 1999b), in which the scale and scope of the small-scale or community forestry operation are not adequately provided for, or sometimes not even considered. This is demonstrated by the inclusion of cut control (required levels of harvesting) in tenures. Cut control favours the large-scale integrated forestry operation and their need to keep their capital intensive mills operating (Mitchell-Banks 1999b). Cut control can penalise the small-scale tenure holder when they are forced to sell their timber in a depressed market and do not have the extensive capital resources of the larger operators to cover the net losses incurred during the period of low timber prices.

In British Columbia (in which there are a greater number and variety of tenures than for any other Canadian province), the recent community forest pilot project has fallen short of what it either should or could have addressed. An essential failure was the refusal of the government to address extension to the community forestry operations (Mitchell-Banks 1999a). Given the shortcomings of this pilot, the ongoing larger scope and scale tenure review process is viewed with some uncertainty in making major headway in terms of effective tenure design.

Small-scale and community forestry face numerous challenges in dealing with governments, who historically have focused on the large-scale, high employment (read unions and voter influence) and commodity-based forestry operations. International agreements or initiatives (such as the Convention of Biodiversity, North American Free Trade Agreement, General Agreement on Tariffs and Trade and Multilateral Agreement on Investment) all have a large-scale industry focus with all kinds of unexpected outcomes and negative consequences for small-scale business such as small-scale forestry.

Large-scale forestry businesses are continually lobbying and influencing forestry policy development and related initiatives, and small-scale forestry operations are not within either the scope or expertise of the lobbyists. This lobbying effectively ensures that forest policy is often developed with a large-scale bias. Historically the free-rider principle limited the amount of small-scale forestry lobbying, but there have been woodlot owner associations established in nine provinces (Canadian Council of Forest Ministers 1998). These woodlot owner associations are neither as well organised nor as effective in either lobbying or marketing than the forest owner associations in countries such as Sweden or Finland. The associations continue to evolve and attract some very talented and committed individuals, but they face a hard fight to reach the kind of political and economic influence of their Nordic colleagues. Even community forestry operations are beginning to see the advantages of mutual co-operation, and the first associations are beginning to evolve.

Small-scale forestry in Canada faces increasing challenges in dealing with the large-scale sector, which continues to consolidate with fewer corporations. This is very obvious in British Columbia, in which consolidation continues to effectively reduce market competition for either the supply or purchase of logs. The consolidation also results in overall forestry management and control residing in the hands of fewer and fewer players (Mitchell-Banks 1999b). Fewer players reflect a narrower perspective on forestry opportunities and objectives, and the large-scale forestry sector are often slow to respond to market opportunities and changes – at times behaving like dinosaurs. It is often the small-scale forestry operation that takes advantage of niche or short-term opportunities that the slower and less focussed larger-scale operation either does not notice or is too slow to capitalise on.

In British Columbia, large-scale forest operations often engage in surrogate bidding for the logs sold under the provincial government run Small Business Forest Enterprise Program (SBFEP). Surrogate bidding involves a large-scale forestry operation financially backing a ‘nominal’ small-scale business operator who essentially ‘fronts’ for the larger company. On average, bid prices for the logs sold under the SBFEP are higher than the average of those purchased under the large-scale tenures. The large-scale forestry operators take advantage of their lower average log costs and purchase the margin volumes obtained under the surrogate bidding often at higher bid costs than genuine small-scale operators can afford. It is a perverse and inadequately enforced system in which the taxpayer is effectively subsidising the large-scale forestry operation to squeeze out the small-scale operator (Mitchell-Banks 1999b).

The small-scale forestry operator can be likened to being a mammal having to survive the governments and dinosaurs of the large-scale forestry sector. The governments often create forest policy that favours the dinosaurs, and creates additional pressure on the mammals to evolve new adaptation strategies. Evolutionary strategies such as log yards are now being challenged by industry entering similar arrangements. The small-scale operators are beginning to discover that there is strength in numbers, so associations are growing in both size and number – although they are far less developed than their European counterparts.

## 5. Facilitating small-scale forestry

It is in everyone’s interests for the mammals to survive the evolutionary pressures that they face. As previously mentioned, the mammals create more timber from a smaller landbase than the dinosaurs, and in the case of community forestry also more effectively address the challenges of evolving social values. Small-scale forestry also can create a more diverse forest mosaic that not only can create ecological diversity but also minimise economic risk (Mitchell-Banks 1999b).

Government plays a key role in ensuring that the small-scale operations thrive and expand in number. Federal and provincial governments need to address the following issues:

1. Government recognition of scale and scope. The governments need to recognise that small-scale forestry is not simply a smaller version of large-scale forestry. An example of this is that small-scale forestry in Canada is generally less-mechanised than large-scale forestry (Canadian Council of Forest Ministers 1998) – very different from the processors and forwarders often used by the Finnish and Swedish forestry owners;
2. Government recognition of the value of small-scale forestry. Both levels of government need to recognise the disproportionate value of small-scale forestry not only to the supply of timber and related forest products, but to the economy and social well-being of the country as a whole;
3. Explicit incorporation of small-scale forestry concerns into federal and provincial forest legislation, policy and taxation. Today, large-scale forestry dominates all of these issues, and the dinosaurs end up having a great deal of influence over the survival chances of the mammals – an evolutionary incongruity;
4. Education and extension. There needs to be co-ordinated education and extension programs established, ideally through forest owner associations that receive funding support from both levels of government. Small-scale forestry addresses a wide range of needs and it would not be inconsistent for the small-scale sector to also receive government support that is often extended to the large-scale sector either directly or indirectly;
5. Public education. The provincial and federal governments need to assist the Canadian public to learn more about the value of the forests and the roles of the small-scale forester. It is through public education that the residents of the country will become increasingly sensitive to where Canadian forestry mythology begins and ends.

Addressing these issues will go a great way to ensuring that, at the end of the day, the mammals survive.

## Acknowledgements

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# Special Session:
# Small-Scale Forestry Development in Central and Eastern European Countries

# Preparedness of Private Owners for the Management of Forests in the Slovak Republic

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## Abstract

This paper discusses the process of restitution of non-state forests, development of ownership structure, results of an opinion survey on preparedness of private forest owners to manage their forests and identification of the main problems and constraints in the private forestry sector. The share of non-state forests is 57% of the whole forest area. Private forest owners partake by 15% and community forests by 25%. The process of restitution of owner's rights has not been completed. At the beginning of 2000 only 5% of forests were managed by private owners. Most private forest owners own very small forest holdings (on average less than 2.8 ha). Problems with the settlement of ownership's relations by relevant documents testifying ownership of private owners and identification of holdings in the field are the main problems in the process of restitution. Another constraint is that private owners are insufficiently professionally, technically and financially prepared for the management of forests. There is also a lack of a complex system of support to non-state forest owner. Poor organization of associations of non-state forest owners was also identified as constraints in management of private forests. Extension services to private forest owners should be established to strengthen management of private forests on the principles of sustainability.

*Keywords: restitution of forests, private forests, forest management*

## 1. Introduction

An important part of the reforms after the year 1989 is a transformation of the ownership relations to forests. The reform consists of restitution of property to original owners and to a larger extent mainly of restitution of users' rights to owners who have not been formally withdrawn from the property.

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In the process of forestry transformation in the Slovak Republic, Act No. 229/1991 (concerning the modification of ownership relations to land and other agricultural property) created conditions for the restitution of owner's and user's rights to forests by former owners. A process of restoration of former owner's and user's structure has started under completely new conditions. During the last 40 years the forest has changed similarly to accommodate the requirements of society for timber. The claims for fulfilling public-beneficial forest functions have been enforced. Social circumstances as well as living conditions of former forest owners have changed. Mean age of forest owners has also increased. Thus these forest owners are unable to manage their forests through self-employment. Therefore, the land is being leased, or forest operations are being carried out on a contract basis by private companies or other family members.

Community forests (forests of former feudal land) have disintegrated after the cancellation of user's rights. The shareholders had dispersed or moved to cities. Thus their physical participation in restored communities was impossible. More than 40 years absence of the management of private and community forests by their former owners have unfavorably altered the pre-conditions for proper and sustained management of private and community forests. Owners who handed over their former holding have only low or no pre-conditions for the management of the forest. To enforce and direct the support for the private sector it is necessary to know the present state of owners' preparedness to ensure the management in forests and to identify the greatest problems the owners are facing.

## 2. Development of ownership to forests

There was an intention at the beginning of the restitution process to finish it by the end of 1998. This intention has not been completely fulfilled as in most of the unsettled cases, the property is derelict, frequently in the ownership of shareholders, on cadastral territories with insufficient descriptive and geodetic information. Up to 31 December 1998, 86 746 owners had requested the restitution of ownership and use relations to forest lands concerning an area of 984 000 ha. Forest lands with an area of 812 000 ha were handed over to 40 322 owners. There are still 46 424 unsettled requests concerning an area of 171 325 ha. The trend in the process off restitution is shown in Table 1.

According to the Permanent Forest Inventory, the structure of forests according to ownership and use as of 31 December 1999 was as stated in Table 2 and in Figure 1.

The process of restitution has slowed down in last two years, because of problems with cadastral documentation, identification of forest holdings in large forest complexes. Some non-state owners have leased restituted forests to state forest organisations. Problems with

**Table 1.** Trend in forest restitution (Report on Forestry …, 1999).

| Year | State | | Non-state | | Total |
|---|---|---|---|---|---|
| | '000 ha | Proportion | '000 ha | Proportion | '000 ha |
| 1990 | 1 976.5 | 100.0 | – | – | 1 976.5 |
| 1995 | 1 337.7 | 67.2 | 650.2 | 32.8 | 1 987.9 |
| 1996 | 1 281.4 | 64.5 | 706.5 | 35.5 | 1 987.9 |
| 1997 | 1 249.0 | 62.7 | 741.6 | 37.3 | 1 990.6 |
| 1998 | 1 235.5 | 62.1 | 753.9 | 37.9 | 1 989.4 |

**Table 2.** Ownership structure of forest land (Report on Forestry …, 2000).

| Ownership | Situation as of 31 December 1999 | | | |
|---|---|---|---|---|
| | Area in ha | | Proportion in % | |
| | Ownership | Use | Ownership | Use |
| 1. State | 808 164 | 1 195 181 | 42.1 | 62.1 |
| 2. Private | 289 424 | 101 795 | 15.1 | 5.2 |
| 3. Community | 486 961 | 404 923 | 25.4 | 21.1 |
| 4. Church | 65 752 | 47 368 | 3.4 | 2.5 |
| 5. Agriculture co-operatives | 2 183 | 4 249 | 0.1 | 0.3 |
| 6. Municipal | 184 843 | 168 435 | 9.6 | 8.8 |
| 7. Unknown | 84 843 | – | 4.4 | – |
| 8. Total | 1 921 951 | 1 921 951 | 100.0 | 100.0 |

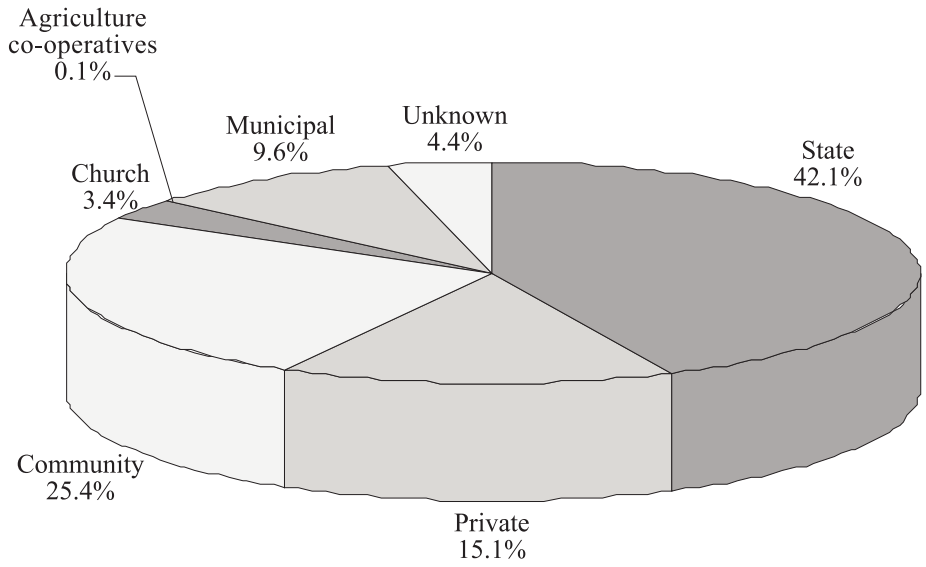


**Figure 1.** Forest ownership in the Slovak Republic.

completion of restitution are mainly in private forests. Most private owners own very small holdings. More than 80% own forests with an area less than 5 ha; the average private forest holding area is only 2.8 ha. It can be seen from Table 2 and Figure 2 that restitution has been completed in practically all types of forest ownership, except for private forests, where only one-third of them are being used by owners.

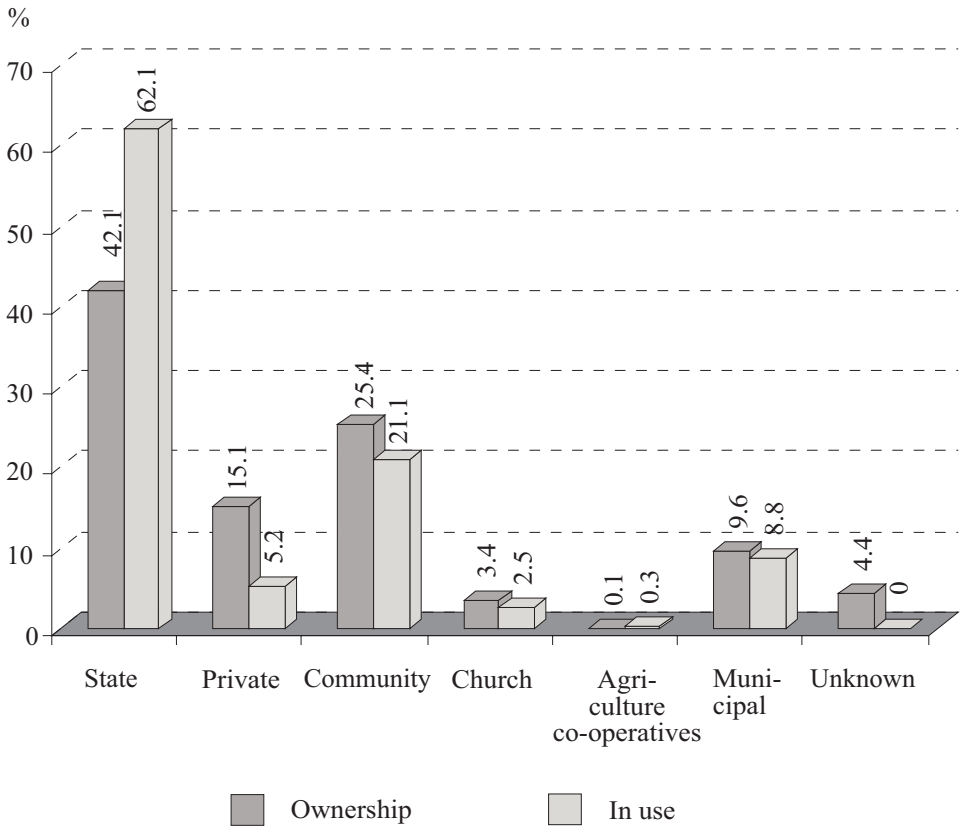


**Figure 2.** Differences between ownership and use of forests as of 31 December 1999.

## 3. Preparedness of private owners for the management of forests

In the framework of FAO project TCP/SLO/6712(A) 'Assistance for Harmonisation of Legislation and Strategy for Development of the Forestry Sector' an opinion survey was conducted to obtain information from private forest owners on their preparedness to manage forests and to identify the main problems and constraints that would hinder them from managing their forests properly (Ilavský et al. 1999).

### 3.1 Methodology

The survey sample consisted of 1000 respondents from a set of 9201 people who manage their own private forest holding. From 2285 community owners, 500 were selected for the needs of survey. The questionnaires were sent by mail with enclosed stamped return envelope. The questions were intended to obtain information on the technical, professional and financial preparedness for management, the reasons of self-employed management of forest, difficulties in management, opinions of the owners regarding the task of professional forest manager, possibilities for the improvement of professional/technical preparedness of the owners, as well as revival of the sale of timber, particularly from the 'small forest'. The response rate for the questionnaires was 30%.

### 3.2 Results of the survey

Private and community owners had several reasons for self-employed management of their forest holdings. In the group of community forests more than half of the respondents stated that the decisive reason for self-employed management was preservation of hereditary rights for their heirs. Regarding private forests almost three-quarters of the owners confirmed that it is a family holding and they wish to preserve their family holding for their heirs. Although one-third of community owners replied they expected profit, financial forest benefits and benefits in kind ranked second.

A basic pre-condition for proper technical preparedness of private and community forest owners for the management of forests is the area of forest holding. The greater the area, the more urgent is the need of forest machinery. At the same time larger forest holdings provide a certain guarantee of finances from timber logging for the purchase of forest machinery. As the forest management is still at a very early stage for many private owners and communities, technical preparedness of most of the owners is being limited only to manual equipment and chainsaws. It was 65% for private owners, and was about half for owners of community forests. Larger forest holdings are also being equipped by a greater number of saws. Only 6% of owners had tractors. Only 4% of owners had trucks. Purchase of forest machinery is not at all advantageous for the owners and users of small forests, particularly if they do not need timber for their own consumption; occasional works can be performed on a contract basis by private entrepreneurs or small traders.

Professional preparedness of forest owner is a pre-condition for him to be able to carry out the management in forest in the interest of permanent preservation of production and public-beneficial forest functions. In private forests only one-quarter of the owners has secondary or higher technical forestry education. Regarding community forests, more than one-third of these had one or more foresters. Professional preparedness of owners, co-owners and shareholders for forest operations in silviculture, logging and forest protection is different. In community ownership about 43% have shareholders with secondary forestry vocational education or they completed technical courses for forest machinery operators. In private forests, only one-fifth of forest holdings had a graduate of a vocational school. Some 42% of private owners or users reported self-study. This proves that private owners try at own initiative to obtain professional knowledge. A proper orientation of the tools of forestry policy and forest extension should support such initiatives.

Financial preparedness of forest owners and users is a necessary pre-condition of successful management, particularly in its initial stage. Only a small part of private owners had cash money available for management. More than a half of the forest owners expects that they will obtain necessary finances from the sale of timber. In municipal forests, with tens or hundreds of shareholders, logging had been, for example, carried out on a contract base by state forest organizations, private companies or small traders.

Profit was used for minimal technical preparedness, to cover the fees of professional forest managers, taxes and related expenses. The rest was divided among the shareholders. Private owners with no mature stands covered the most necessary expenses through collecting money from the co-owners and shareholders.

In three out of four private forest holdings the forest was managed by the family of the owner/co-owners. Two-thirds of municipal forests realized mostly silvicultural, and partially also logging operations, by its own people – shareholders. In privately owned and community owned forests, timber logging and other operations requiring heavy machinery, were carried out on contract by private companies. They also asked other non-state owners for assistance; for example, urban and communal forests. They also used the services of professional forest managers. The share of private and community owners mentioned above is a sufficient reason

for technical professional extension as well as financial assistance to be aimed at this set of owners. A future of their forests and following fulfilment of public-beneficial forest functions is directly related with their preparedness for the management of forest.

The timber felled was used by almost two-thirds of municipal owners for sale and also for self consumption. In private forests more than one-third of owners used the timber for sale or self consumption. About 16% of municipal and 22% of private owners only sell their timber. Timber logging was not carried out by about 29% of private owners and 11% of municipal owners.

Employment of a professional forest manager is being acknowledged as a tool of successful management in private, but particularly in community forests. With an increasing area of forest holdings, the need for the services provided by professional forest managers is growing. The number of respondents aware of the need to preserve professional forest management in the forests was large. In private and community forests, a key problem is lack of finances for management. The process of management restoration is being hindered mainly by problems at timber market and low timber prices. Therefore almost a half of community owners and one-quarter of private owners think that it is necessary to establish a network of purchasers who should ensure timber markets. Other significant requirements include: assistance for heavy machinery, establishment of associations, permanent presence of a forester in forest holdings, and availability of information on the management of forest.

## 4. Identification of main problems and constraints in management of private forests

*Problems with the settlement of ownership's relations.*
For more than the last 45 years all forests were managed by state forest organizations. In spite of this, their ownership was not cancelled officially and attention was not paid to issues of ownership. The ownership was formally transferred to one of heirs or it was not transferred at all in cadastral documentation. Therefore, most small private owners do not have relevant documents proving their forest ownership.

*Most private forest owners own small areas of forest.*
The average area of private forest holdings is only 2.8 ha. As in the last decades of the past economic system, the ownership issue has not been settled, and currently small area forest holdings may have several owners. This may mean that the average area of private forest is even smaller than 2.8 ha. This fact is contradictory to sustainable forest management.

*Problems with identification of private forest in the field.*
In the last decades most of the land-marks, which demarcated particular plots of private forests, have disappeared. Therefore, today it is very difficult to identify the borders of small private forests within a large complex of such forests. State authority makes efforts to resolve this problem by providing support to associations of small private forest owners. Due to some psychological barriers of private forest owners, namely reminiscence of socialistic collectivization, private forest owners do not positively accept this support from the state.
*There is a lack of a complex system of support to non-state forest owners.*

In the previous system, the state authority had a mainly controlling role. The state authority is not prepared to deal with personal, financial, technical or organizational aspects to fulfil its other functions (first of all extensional and educational functions) for owners of small private forests.

*Functionality of the associations of non-state forest owners is low.*
Only the association of owners of larger forests function well, as they have clear organizational structures, particularly concerning forests of churches and communal forests. Other non-state forest owners established associations on regional principles, but they do not have direct contacts with small private owners and do not provide forest extension and information for practical management of forests.

*Private owners are insufficiently professionally, technically and financially prepared for the management of forests.*
Only 14% of private owners have some kind of forestry education. Frequently, they do not have practical experience of forest management. In most cases, the only machinery owned by private forest owners is chainsaws (65% of forest owners). Almost 30% of private owners do not carry out any forest operations. Only a small number of private owners have funds necessary for the management of forests. Some 51% of the owners assumed that they could obtain funds from the sale of timber.

*Positive perception of forest ownership as a special property is lacking.*
Most private owners perceive their own forests as a source of income from the sale of timber. Positive perception of sustainable management of forests is absent.

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# Current State and Conflicts of Small-Scale Forestry in Hungary

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## Abstract

Information is presented on the reformulation of Hungarian private forest management after the political and economic changes of the 1990s. As a result of privatisation, the area of private forests exceeds 763 000 ha of which 135 000 ha belong to small-scale forestry (predominantly individual forest owners). As a result of unfinished ownership changes, almost 50% of private forests are still unmanaged. Development prospects of small-scale forestry in Hungary show reasonable differences compared with the current European situation. The current economic situation and the future prospects are evaluated in this article. A comparison of economic performance between private and state forest management is also included. Afforestation, as the main source of enlargement of individual forest ownership category, will also be evaluated in the context of small-scale forestry.

*Keywords: private forestry, small-scale forestry, Hungary, afforestation*

## 1. Introduction

One of the effects of the significant political and economic changes in Hungarian forest policy that occurred in the 1990s has been the appearance of privately owned forests. However, the changes, the lack of former traditions, the fragmented estate system have meant that previously unidentified problems have arisen. The present article seeks answers to the questions of what lessons can be drawn from the modification of property system, and what are the possibilities concerning advancement of the nascent private forestry (and the embedded small-scale forestry).

The term small-scale forestry is not used in Hungary. However, individual forest management is a significantly analogous concept, owing to the fragmented property structure. The following outline shows the typical problems of small-scale private forest management in Hungary.

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## 2. Historical backgrounds, economic and site conditions of private forestry

### 2.1 Forests in Hungary

After the plough-land, forested land is the second largest area of cultivation in Hungary. The total area of the country is 9 303 000 ha. The population is 10 million. Hungary is in the temperate zone of fronded forests. Unlike the average European conditions, 85% of the forested land is deciduous forest, and 15% is coniferous forest. About 57% of the forest is of native tree species, and 43% consists of exotic or naturalised tree species (black locust, pine) or cloned species (improved poplars) (Gál 1999).

Oaks, Turkey oaks, hornbeam and other hard broad-leaved species, native poplars, willows, alders, linden-trees and other soft broad-leaved species of tree constitute the native forest assets. The main non-native species are black locust, improved poplar and some exotic pines. Preservation of the natural forest ecosystem of native species through reforestation, in case the habitat conditions are favourable, and creation of forests containing these species is an accentuated objective in forest policy, which is also confirmed by the forest laws.

### 2.2 Changes in property relations in the 20th century

The changes in property relations of forested areas in Hungary are summarised in Figure 1. On the basis of scientific research it is thought that at the time of the Hungarian conquest (in the 10th century) the area of forest cover in the Carpathian Basin was more than 50%. In the past centuries the territory of wooded country has gradually and considerably decreased.

The main stages of the changes in the 20th century were as follows: in 1920 on account of the Trianon peace agreement, the area of forests fell from 7.4 million ha to 1.2 million ha. This radical reduction was accompanied by the fact that the remaining forest area was predominantly low productivity areas. The 11% proportion of forest cover was amongst the lowest in European countries.

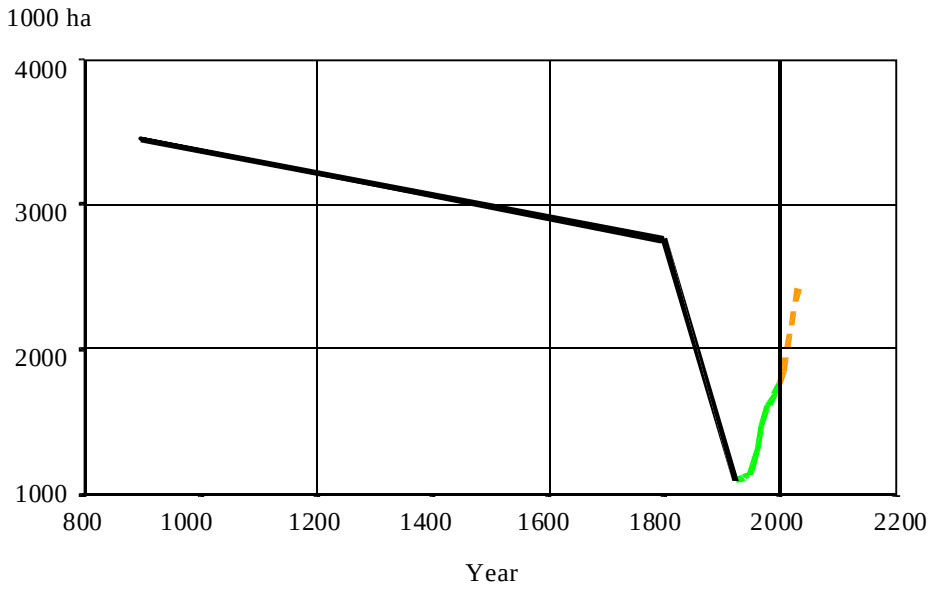


**Figure 1.** Changes of the forested area in Hungary.

After World War II, in 1945, the forests larger than 58 ha were nationalised. As the second step to nationalisation in 1946, forests exceeding 6 ha were also nationalised. From 1960 owing to collectivisation the previously privately owned small forest lots were also taken into public ownership (Figure 2).

In the early 1990s during the socio-economic transformation, the property relations basically changed due to privatisation. While before the change of regime the percentage of privately owned forests was less than 1%, now 40% of the forests are in private hands, and only 60% is state property. As a point of interest, only one of the six political parties that were formed after the disintegration of the one-party system has set alteration of property structure as a major political goal. This large-scale modification of property structure is a result of a decision of the constitutional court that declared that any discrimination between different former grievances is anti-constitutional.

The main characteristics of privatisation are:

- Disregarding the value of forest assets;
- Limitations concerning the participants to native Hungarians;
- Possibility of bidding downward on privatisation auctions;
- Absence of minimum limit of property size (1 $m^2$ estate might as well be given in one's property);
- Predominantly undivided common properties coming into existence during the compensation process.

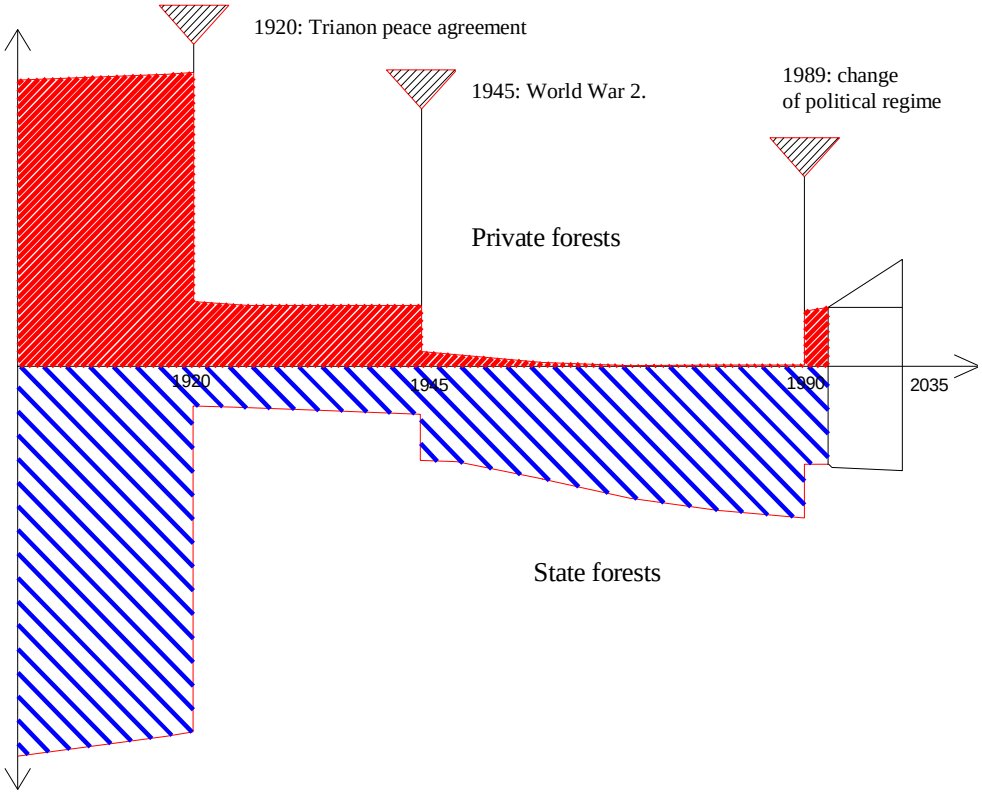


**Figure 2.** Changes of ownership structure in 20th century in Hungary.

During the transformation of the property relations in consequence of lacking long-term plans, a fragmented estate structure has emerged and the usage of the landed property is separated from the land ownership structure. The proportion of the unmanaged lands increased because most of the new land owners did not have capital, financial knowledge or working tools.

### 2.2 Characteristics of forest owners

The current structure of the forest ownership in Hungary is rather heterogeneous (Table 1). Besides the owners possessing several hundred hectares of forest, a large number (thousands) of small owners having some tens of hectares is typical. As the land registry recording was not able to keep abreast of the rapid changes of ownership, we can only estimate that 250 000 to 300 000 new forest owners have to be taken into account. In some cases, the owners are not even aware of the location of their forests. Most of the new owners have not dealt with forestry before, and the shortage of forestry knowledge may have a negative effect on the forests. Especially the forests under afforestation are at risk of neglect, and the lack of professional care and cultivation may lead to degradation of these forests.

Significant divergences can be observed in the intentions of the owners concerning the forests. Besides those wanting to deal with forestry, a considerable number of them do not have any long-term conception. They do not intend to perform forest management, they bought the forest just because it seemed to be a profitable investment, or it was the only way to utilise their privatisation tickets.

### 2.3 Various forms of forest management

Basically two forest management models have developed in the private forests. In the various forms of joint forest management, the economic organisation functions as a property manager (joint-stock company) and settles up with its members annually. The profit or loss is realised by the members in accordance with their share of the forest. In the case of individual forestry management, the owner is responsible for the organisation, file keeping and planning tasks in connection with forest management, as is common in Europe.

**Table 1.** Distribution of forested area by owners and management forms (2000).

| Ownership and management forms | Productive forests ha | Other forests ha | Other managed area ha | Total area ha |
|---|---|---|---|---|
| 1. State forestry companies | 770 894 | 264 411 | 105 369 | 1 140 674 |
| 2. Public forests | 5 110 | 5 555 | 2 259 | 12 924 |
| 3. Private forests | 592 689 | 128 131 | 43 268 | 764 088 |
| Jointly owned private forests | 205 407 | 31 777 | 10 036 | 247 220 |
| – forest tenures | 90 331 | 13 232 | 3 686 | 107 249 |
| – forest associations | 61 390 | 12 235 | 3 160 | 76 785 |
| – private companies | 53 686 | 6 310 | 3 190 | 63 186 |
| Independently owned | 110 325 | 15 593 | 9 974 | 135 892 |
| Unsettled private forests | 276 957 | 80 761 | 23 258 | 380 976 |

The joint forest management came into existence mostly as a result of pressure from the forestry authorities since the large number of individual forest owners could hardly fit into the former official system. Moreover the general opinion of the foresters is that sustainable forest management was difficult to accomplish in small areas.

## 3. Main conflicts of private forestry

### 3.1 Legal framework of regulations

The basis of regulations concerning forestry is the forest law of 1996. Apart from forestry laws on nature conservation areas every forestry intervention also requires approval of the natural conservation authorities. Recently partnerships, legal entities, companies are not allowed to own agricultural land and forest in Hungary. The regulation petition of the state of Hungary in this direction might be one of the key issues of the accession negotiations.

From 1996, the forest law used to restrict private small-scale forestry strictly, as the fundamental principle of forestry policy was to deal with forest bodies collectively. The alteration of the forestry act in 1998, when lot number has become its 'fundamental unit', has to be considered advantageous in any case. Obviously there was no reason for the previous practice, when it was obligatory to establish associated forest management in the existing forests, while in the new afforestation, individual forest management was permitted.

### 3.2 Continuance of the property settlement

The obligation of associated forest management has raised numerous problems and, except in some regions, it has not proved to be a common remedy to the emerging problems of private forestry. In heavily forested regions such as Bakony, where there were existing traditions of associated forest management, new owners were able to build up the models of the joint forestry as well. But from the point of view of the owners it was not greater effectiveness of the join management that served as a primary argument for the associated silviculture here either. Instead it was the unity of forests instead (to be more precise, it is impossible to divide forests equitably). On the other hand, in a considerable part of the country, even one decade after the beginning of privatisation, there are no forest managers working on half of the area of private forests.

### 3.3 Partnership compulsion

In recent years the forestry authorities have found resolution of the problems deriving from fragmented property structure in initiating the form of associated management. Those arguing for it mostly bring up sustained yield or size of forestry as justification. This argument is contradicted by the fact that almost 100% of forestry activity is within entrepreneurial frames so the previous importance of size of management units has decreased significantly. Moreover, forestry does not serve as a main source of income for most of the owners, which is why annual yield is not claimed either.

Consequently, the idea of associated forestry normally creates aversion in the owners. It is also proved by the fact that the greatest problem for the owners is the dictation of the association management system. Collective forestry could be implemented principally where it has had traditions of previous centuries, particularly in the area of densely wooded (40–

**Table 2.** Statistical data of private forest management bodies in Hungary.

| Private management forms | Total area ha | Average area ha | Number of management items |
|---|---|---|---|
| Forest tenures | 107 249 | 97.0 | 1 100 |
| Forest associations | 76 785 | 276.0 | 280 |
| Private companies | 63 186 | 86.0 | 730 |
| Independently owned | 135 892 | 3.5 | 38 800 |

45% forest cover) mountains. There are several reasons for the low rate of willingness to associate; the most substantial ones have roots in emotional, organisational and economic standpoints (Table 2).

In order to define the system of management, economic reasons proved to be insufficient because the owners are not just motivated by economic factors in decision-making. Also, even if the association is practical from an economic point of view, it is by no means certain that the members are willing to associate. Moreover, in most of the cases, the association is not unequivocally favourable concerning economic considerations either, whereas the created form of management will not have the suitable plant size, but it is a source of a significant annual constant charges not required by the owners. We must emphasise that mainly most of the owners living in rural areas perform agricultural production as well, so dealing with one or two hectares of plantation-like forest will not cause any problem to them.

### 3.4 Profitability in private forestry

Since private forests generally have more adverse conditions than state forests, efficiency calculations were estimated using the more unfavourable figures. The calculations do not include overheads and implicit costs. The expected period results (EUR/ha) of the examined stocks modified with subsidisation show significant deviation depending on the tree species. According to the figures, it is possible to make a profit cultivating any of the examined tree species. Presumably, the considerable indirect costs in the forestry will be lower in the case of the individual forest owners, compared with state forestry. However the exact level of overhead rates in private forestry is still an open question. (Figure 3).

The annual profit can be calculated from the examined facts and figures. In case the artificial regeneration cost is considered to be an investment for one rotation period, the refund of expenses can be obtained at a normal interest level (13%) only for improved poplars (the rate of inflation is still above 10% in Hungary). This is followed by indigenous poplars at 5.4%, and pine at 3.5%. Black locust and oaks have a low return 2.5% and 1.9%, respectively. Still black locust is the most popular species of tree for afforestation at present, which can be explained by the fact that black locust is suitable for planting on poor land, and the timber of black locust is suitable for several purposes, which is a major advantage if the timber is to be used by the forest owner. (Table 3).

Since prices in timber-industry have almost reached the European standards and the wages are going to grow as a result of the union affiliation, for medium-term further decrease of profitability in private forestry can be forecast (Stark 1999). Owing to the fall of raw timber prices sale problems have also arisen in recent years. As a consequence of unsettled circumstances the private forest owners fall a victim to so-called errant dealers who cream off the considerable amount of the profit. (Table 4).

**Table 3.** Overall income of various forest types in Hungary (III yield class).

| Main species | Income from final cut EUR/ha | Costs of regeneration EUR/ha | Total income EUR/ha |
|---|---|---|---|
| Oak | 3 268 | 700 | 2 568 |
| Black locust | 1 068 | 324 | 744 |
| Improved poplar | 3 240 | 180 | 3 060 |
| Indigenous poplar | 1 492 | 316 | 1 176 |

In case of associated management tax burden cause serious financial difficulties as the length of production cycle in silviculture which may exceed even a hundred years, is not taken into consideration. The capability of the existing forests for producing employment is low and through mechanisation it is getting even lower. At present it has been difficult to find the labour force necessary for forest work, even in the regions hit by unemployment.

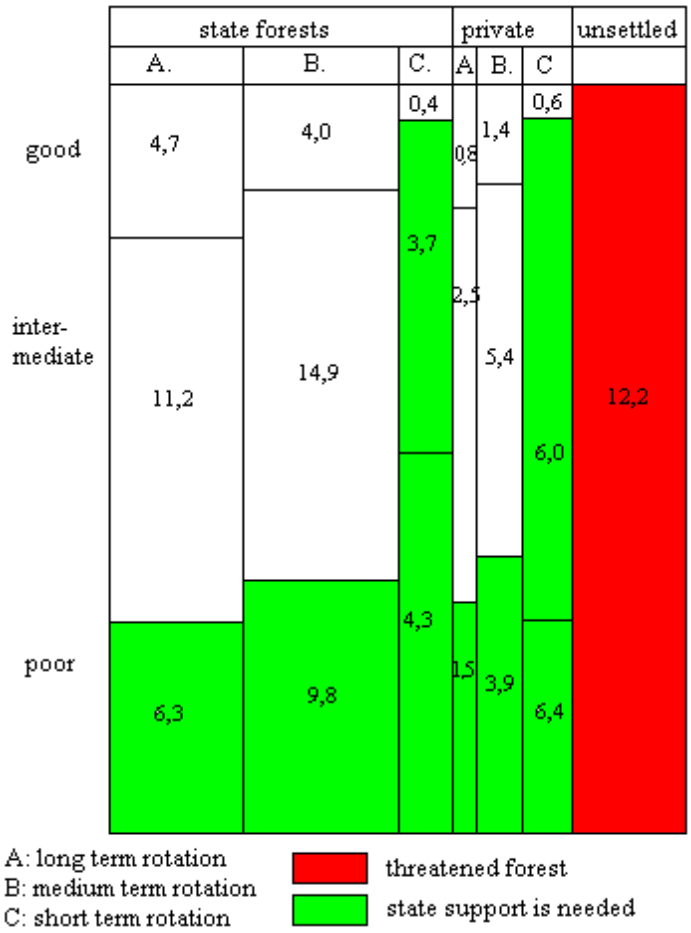


**Figure 3.** Economic performance of Hungarian forests (%).

**Table 4.** Annual yield of various forest stands in Hungary (III yield class).

| Species | Income from wood production EUR/ha | Production cycle years | Annual yield EUR/ha |
|---|---|---|---|
| Oak | 2 569 | 83 | 30.9 |
| Black locust | 744 | 30 | 24.8 |
| Improved poplar | 3 060 | 20 | 153.0 |
| Indigenous poplar | 1 176 | 30 | 39.2 |

Further economic problems are caused by the fact that except for inconsiderable number of cases the owners have not obtained hunting-rights, even after the introduction of the new game law in 1996 as the minimum size of hunting territories was declared as 3000 ha.

Compared to state forest companies in case of small, fragmented forest areas private owners can manage their forests at a lower cost level. However, due to other economic factors (Labour costs, market possibilities, wood prices) the area of private forests below the economic threshold is expected to enlarge in the future. Concerning these regions it is necessary that the government take shoulder a burden to a greater extent in order to provide sustainable forest management and conservancy of forest-land.

In summary, it is observable that management of the existing forests is not of significant importance in economic terms of rural population.

## 4. Further possibilities of private forestry

The development of private forestry is influenced by external and internal factor elements as well, such as state support, sources of finance or market movements, timber prices, the changes in property structure and changes in approach.

### 4.1 Changes in state support

Despite having 18% share in territory, forestry is granted only 2% of agrarian subsidies. Within this the importance of the afforestation program is reflected by the rapid growth in subsidies for afforestation in recent years (Lett 1999). More than two third parts of the total subsidies granted to forestry are in related to afforestation. However, subsidy for regeneration and particularly for conservation of the existing forests is of low level. Compared with agricultural subsidies the amount of investment grants for afforestation (560–1320 EUR/ha) is equivalent with the average continuous subsidies (approximately 40 EUR/ha/year) having been granted to agriculture in the past 20 years. (Table 5).

### 4.2 Integration or co-operation

Fragmented property structure is apparently disadvantageous in regard of private forestry. At the same time, the ownership structure that can be found in Europe gives evidence of the fact that it is practicable to carry out sustainable forest management on 1–2 ha of forest properties. The role of forest property size in sustained yield has significantly decreased in the past decade as forestry activities are managed by entrepreneurs, both in state and private forests. Accordingly, the demand for creating economic entities of several thousand hectares is not

**Table 5.** Changes of afforestation costs and state subsidies between 1997 and 2000.

| Forest types | Costs | | | | State subsidies | | | |
|---|---|---|---|---|---|---|---|---|
| | 1997 | 1998 | 1999 | 2000 | 1997 | 1998 | 1999 | 2000 |
| | EUR/ha | | | | EUR/ha | | | |
| Black locust | 588 | 712 | 816 | 924 | 440 | 560 | 560 | 600 |
| Improved poplar | 532 | 636 | 748 | 860 | 440 | 600 | 600 | 680 |
| Indigenous poplar | 664 | 768 | 916 | 1036 | 560 | 720 | 720 | 800 |
| Black pine | 728 | 836 | 1 000 | 1152 | 600 | 840 | 840 | 920 |

indispensable concerning economic considerations either. The possibility of private management should be guaranteed for those owners possessing farm territory and equipment.

Supporting integration by the forestry administration in the last years should be esteemed as an outstanding change. Smallholders do not have to create a joint organisation, but they conclude a co-operation agreement with a larger forest owner, so-called forestry integrator that co-ordinates occurring activities. If emotional attitudes/concerns are also taken into consideration, forest integration has a great difference compared to other forms of associated forest management. In case of an association, the formulation of a joint estate is evaluated by the owners as a loss of their property. In case of forest integration the owner may regard himself as the 'real owner'.

The extra expenditure of the integrator is granted through state support in the proportion of the handled territory.

### 4.3 Afforestation

The rate of private forests and within this the percentage of individual forest manager is expected to grow in the future because more than 80% of the agricultural land is privately owned, and therefore the forthcoming afforestation can be in private ownership above all (Mészáros 2000).

Although the ability of the forests to create employment has not been verified by scientific surveys so far, afforestation on the territories out of agricultural production – until the end of restocking process – obviously improves rate of employment. Long-term, afforestation on approximately 700 000 ha is projected, half of which is in the Great Hungarian Plain, and the rest is in Transdanubia and Northern Hungary equally.

Previous surveys concerning rural population proves that in connection with afforestation 20% of the owners intend to carry out afforestation assuredly, another 20% might do so. (Jager, L. 2000) It must be emphasised that more than 80% holds the agricultural land in their own, and considerable number of them performs agricultural production as well, at least to a supplementary extent. This fact indicates that the farm-structure which had been destroyed during the communist regime may be formulated again. Owners having agricultural land as well show a significantly higher demand to manage their forest independently and they are usually against to be a member of a forest association. Since a great part of agricultural production is produced in the Great Hungarian Plain, where there is a dominance of plantation-like forests (black locust, improved poplars). This is why the independent management rights are demanded in connection with forest plantations first, where simple forest management techniques can also be applied. Oak, beech forests in hilly regions are usually managed on an associated way. By all means, the distribution of species of tree is going to increase to the advantage of black locust and the share of improved poplar will be growing probably as well.

The importance of afforestation is also intensified by Hungary’s objective to join the European Union.

### 4.4 Land consolidating, property structure

Although there is such a state compensation at which land property purchase targeting land consolidating is free of taxes and granted 20% state support; this devolution of property is compensated by fragmentation on account of inheritance. The long production cycle, the complicated evaluation of forests, the great number of co-owners of common properties render improvement of property structure more difficult. Absolving periods of grace concerning land purchase and giving permissions to foreigners to purchase land would have a favourable effect on ownership structure.

### 4.5 Non wood forest products, tourism

According to the forest law, public access into private forests can not be limited, but the yield of non-wood products belongs to the owner. Considering the high proportion of plantation forests conflicts between the society and the private forest owners are not typical since poplar and black locust forests less suitable for recreational purposes than long term species. From this point of view the 50% plus proportion of state forests is also beneficial as the location of state forests is dominantly in tourist regions. The public utilisation of non-wood products not exceeding the personal needs in state forests is not limited. In the future, expansion of this kind of problems between the society and the private owners cannot be predicted.

## 5. Summary

The above mentioned problems can be tackled only in the distance of decades. In spite of this, the long-term effects of privatisation are basically sensible. Contrasting with the previous opinions there have not commenced any changes to a considerable extent in the privately owned forests by the new owners. On the contrary, during the transient period a decreasing amount of felling was typical, consequently, in private forests a considerable surplus of allowable cut can be experienced.

But the mistakes that are made, for example lack of limitations concerning the minimum size of obtainable land induce problems that may need decades to tackle. The most important problem is the high proportion of non-managed forests, for the settlement of which a change in approach and attitude in forest-administration and judge-made law is required by all means. Accordingly, extensive spreading of private small-scale forestry is probable in the future in Hungary.

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# The Economic and Social Role of Small-Scale (Private) Forest Holdings in Poland

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## Abstract

The condition of private and state-owned forests in Poland, as well as the methods and effects of managing these forests vary considerably. One of the aims of this paper is to present differences between the private and state forest holdings by comparing: (a) the structure of stands; (b) organization of forest holdings; (c) methods of forest management and forms of supervision; (d) legal and economic measures supporting forest management; (e) the range of management tasks; and (f) the effects of execution of the National programme for the augmentation of forest cover. Different conditions of management in private and state-owned forests determine economic effects, as well as their social and environmental significance. The other aim of the paper is to present the role of small-scale forest holdings in implementing the model of the sustainable, balanced and multi-objective forestry. They are an important element of the economic transformation of the country, especially of the balanced development of rural areas. It was reflected, among others, in the principles laid down in the National policy on forests, National forest programme and National programme for the augmentation of forest cover.

*Keywords: small-scale forest holdings, Poland, economic and social functions, private forests*

## 1. The state and structure of forests in Poland

The total area of land in Poland is 31.2 million ha of which 18.4 million ha (59%) are agricultural land. More than half (17.8 million ha) of the total land in Poland are individual holdings including: 15.4 million ha (86%) of agricultural land; 1.4 million ha (8%) of forests; and 1.0 million ha (6%) of other land (GUS 2000). Individual holdings play a dominant role in the land-use in Poland. The average area of these holdings ranges from 3 ha in southern

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**Table 1.** The ownership structure of Poland's forests is as follows (GUS 2000).

| | |
|---|---|
| Public forests | 7 331 000 ha |
| – State Treasury-owned forests | 7 252 000 ha |
| State Forests" National Forest Holding-managed forests | 6 936 000 ha |
| National Parks forests | 182 000 ha |
| State Treasury Agriculture Holding Agency -managed forests | 62 000 ha |
| Other state forests | 72 000 ha |
| – Local authority (commune)-owned forests | 79 000 ha |
| Private forests | 1 519 000 ha |
| – Ownership of natural persons | 1 424 000 ha |
| – Ownership by land co-operatives | 69 000 ha |
| – Ownership co-operatives | 10 000 ha |
| – Other private forests | 16 000 ha |

Poland to 18 ha in northwest Poland. In 1999, the average size of an individual holding in Poland was 7.8 ha of which 88% was agricultural land.

As of 31 December 1999, the forest areas (forests and land associated with forestry management) in Poland amounted to 9.0 million ha including nearly 8.8 million ha of forest and 0.2 million ha of land associated with forestry management (roads, compartment lines, ditches, forest nurseries, etc.). Forests and forest lands (woodlands) cover 3.8 million ha or 12.2% of the total area of the country. The forest cover of Poland calculated as the ratio of the forest area to the total country's area, accounts for 28.3% and is lower than the European (32%) and world (31%) average. The average forest area per inhabitant was 0.23 ha, ranging from 0.08 in the Silesia Province to 0.67 ha in the Lubuskie Province. In Finland the figure is 4.68 ha, in Germany 0.13 ha, and in the Netherlands 0.02 ha (GUS 2000) (Table 1).

The distribution of private forests in Poland is very uneven. Most private forests are located in the eastern and southern part of the country. In the Provinces of Malopolska, Mazowsze, Lublin and Podlasie public forests cover an area of 900 300 ha, which is equivalent of 60.2% of the total private forests in Poland.

Private forests in Poland are fragmented and scattered. The average size of a private forest holding covers little more than 1 ha (in the EU countries this figure ranges from 30 to 60 ha). Even on such small holdings, the forests may be fragmented and the actual area of forest may be much smaller.

Private forests grow on soils of poorer quality (they are less fertile and more moist habitats) as compared with the state-owned forests. The total share of poor quality habitats in private forests accounts for 42.1%, and in state-owned forests 31.3%. The share of moist habitats is higher in private forests than in the state-owned forests by 3.7%. Significant differences can also be found in the species structure of state and private forests. In private forests the share of conifers is lower than broadleaves by 4.1%. The share of alder (*Alnus spp.*) and fir (*Abies alba*) is higher in private forests (9.0% and 4.5%, respectively) than in the state-owned forests (4.3% and 2.0%, respectively) (Glaz 1999).

The area structure of the youngest stands (up to 40 years) is considerably higher (58.4%) in private forests than in state-owned forests (36.6%). This phenomenon is illustrated by the average age of stands, which in private forests is 37 years and 55 years in state-owned forests (Glaz 1999).

There is also a great difference in standing volume, which for all age classes amounts to 114 $m^3$/ha in private forests, while in the state-owned forests it amounts to 196 $m^3$/ha. The difference in average standing volume primarily reflects the greater proportion of older age classes in state-owned forests. The lower average standing volume per hectare in private

forests results not only from the estimation method applied and lower site quality (probably more degraded sites), but also from forestry management methods; private forests are frequently heavily thinned when young.

This brief comparison of private and state-owned forests will suffice to make a statement that in general the condition of private forests is worse than that of the state-owned forests.

## 2. Public functions (protective and social) of private forests

The awareness of the important role of forests resulting from rational management of natural resources is taking ever greater significance for both man's living conditions and natural features of forests including the aesthetic, scenic and culture values that serve restoration of man's physical and mental condition. Therefore, forests play an important role in providing non-productive (mainly protective or pro-ecological and social) functions.

Identification of the protective forests is a manifestation of the influence of forests in shaping the natural environment (especially the climate, water and soil relations) and fulfilling man's health-related, recreational and aesthetic needs. Depending on the main functions of forests (recreational, etc.), the silvicultural system used in the protective forests should be modified through the departure from clear-felling, prolongation of the felling age, and adjustment of species composition of stands.

However, such an approach cannot be fully related to private forests until the Forests Act of 28 September 1991, which imposed the duty to distinguish the protective forests on private forests holdings. Nevertheless, the measures taken with this respect are of marginal importance. According to the data collected from all county offices in 1998, only 67 000 ha (4.4%) of the total forest area had the status of the protective forests, while the protective forests in the state-owned forests accounted for 48.2% of their total area.

In the light of the above, it seems reasonable to conclude that the implementation of the provisions laid down in the Forests Act with regard to the identification of the protective forests (i.e. application of the rules depending on the functions the forests play) are not being fully executed. Private forest owners fear losses in revenue caused by limitations imposed on exploitation of protective forests, as there is no system of compensation for potential losses as a result of designation as a protective forest.

## 3. Supervision of the forest economy in private forests and forms of state assistance

The law concerning forests (The Forests Act) defines forest economy goals and principles, and the connections between forestry and other sectors of the national economy in a manner uniform for all forests regardless of their form of ownership. This law imposes certain duties on forest owners connected with the general protection of forests, ensuring their permanence and sustainability, as well as with increasing forest resources. Exact forest economy tasks with regard to private forests are specified by: forest management plans (drawn up to the end of 1991); simplified forest management plans (developed since the beginning of 1992 for forests of over 10 ha); and administrative decisions (for forests broken up into areas of up to 10 ha), issued on the basis of an inventory of forest condition. The above mentioned documents have been developed for over 90% of the total area of private forests (currently, 56% of these forests have plans).

The variation in the forest sector in Poland, with public forest ownership prevailing, has meant the need to introduce into forest law specific tools that serve the achievement of forest policy goals in private forests that are accepted by society. This relates particularly to the adopted model of a system of state supervision of private forests, whose tasks, apart from legally assigned administrative operations, also include activities aimed at the creation of conditions favourable to the completion of the duties and tasks faced by the owners of these forests.

Supervision of the economy in private forests has been assigned, in the form of government administration tasks or tasks on one's own initiative, to county (district) managers, and within the scope defined in the Forests Act, to Provincial Governors. The supervisory bodies for the forest economy in private forests have been authorized to entrust the implementation of supervisory affairs to specified managers of the State Forests organizational units (i.e. Provincial Governors to the directors of regional directorates of the State Forests, and county (district) managers to the head of forest districts) after ensuring the appropriate funds are available for this purpose.

County managers, constituting the basic links in the State system of supervision of private forests, may organize their own forest services (in 1999, these made up approximately 266 000 ha of private forest) or may order this supervision to be conducted in their name by the head forester of the State Forests district – this being the general practice (in 1999, the State Forests superintended approximately 83% of the total area of private forests).

The State Forests, in accordance with good traditions, have been empowered in a system of assistance provided to owners of private forests. The tasks involved are primarily the duties of the head forester as defined by the Forests Act with reference to private forests. Additionally, the State Forests are also charged with a range of tasks that support the activities of the appropriate authorities in issues concerning supervision of the forest economy in private forests. This refers among other things to:

- the preparation of periodic large-scale inventories concerning the condition of private forests and updates concerning the condition of the private forest resources;
- the maintenance of a database concerning forest resources and the condition of private forests;
- providing their professional opinion of projects for simplified forest management plans for private forests.

An important and generally effective tool in the shaping of the forest economy in accordance with forest policy goals is financial assistance from the State, which, in most European countries, the private sector especially requires. One of this policy's instruments is a tax system. This is also true in Poland, where forest economy revenues are not subject to income tax. This lack of income-tax charges is especially important for the private forest sector, because incomes from these usually rather small estates are periodic by nature, whereas this tax is most often calculated on the basis of a model evaluation of annual forest economy revenues (for example, in agriculture – according to the size of land areas and soil qualities), without regard to whether or not such revenues were forthcoming in a given year.

The comparatively modest forest tax existing in Poland is calculated on the basis of the area of stands, uniformly for all categories of forest owned. This tax relates only to stands over 40 years old. Additionally, timber raw materials are covered by VAT of just 7%. Thus these taxes do not constitute too great a limitation to the achievement of forest economy goals, including those of the private sector.

Another tool supporting the private forest economy in Poland takes the form of direct and indirect subsidies from the state budget. The legal system in force has provided for many ways of ensuring financial assistance to the private forest sector in situations where insufficient revenues from the forest economy to owners of small forest areas could threaten the very survival of forests or else the achievement of non-productive forest economy goals. State assistance for

owners of private forests involves in particular the state budget covering the following costs (Zajac 1999):

- maintenance of supervisory services in non state-owned forests – a sum of PLN (Polish Zloty) 14.5 million;
- development of simplified forest management plans for private forests belonging to private individuals and land-owning communities, and the execution of inventories concerning the condition of forests in diffuse forest areas – a sum of PLN 1.3 million;
- afforestation of the poorest agricultural land and waste land (costs partially or entirely covered) – a sum of PLN 1.8 million.

In addition, the Forests Act provides for the following forms of assistance for owners of private forests:

- the State Forests covering the costs of interventions aimed at combating or protecting against any factors damaging forests to a degree that threatens their sustainability;
- complimentary forest economy advisory services provided by the State Forests – at the request of forest owners;
- the possibility of the State Forests providing complimentary planting stock for the purpose of forest regeneration;
- the possibility of obtaining assistance from a special State Forests fund (the forest fund) for afforestation work.

## 4. The economic importance of private forests

The economic importance of private forests depends on their condition and distribution, the level of interest shown by their owners, the level of advisory assistance and supervision by the State, local traditions, etc. Use of these forests depends to a large extent on the needs of their owners (construction, repairs, fencing, etc.) and the demand for timber. Any considerable fragmentation of private forest creates unfavourable conditions for their rational management. Thus the productivity of such forests is poor and the prospects for its intensification appear limited.

The production from private forests as a proportion of total forestry production is small and lower than the proportion of private forest area in Poland. The value of total forestry production carried out in 1994 (in current prices) in the private sector was approximately PLN 250 million, which constituted 14% of the total value of all forestry production. This represents PLN 167/ha of private forests (with timber harvested alone representing only PLN 65/ha), while this same figure for state-owned forests amounted to PLN 250/ha. Likewise the share of private forests in total timber harvested is not proportional to their share in the total surface area of Poland's forests.

During the period 1980–1995, the share of private forests in the harvest of large timber (the harvesting of slash is not statistically recorded for this form of forest ownership) was 6–7% of the country's total harvest of large timber. The degree of variation in the amounts of timber harvested in forests with different forms of ownership is best characterized by the average harvest of large timber on 100 ha of forest. In private forests over the last 15 years, this coefficient has been about three times lower than in State Forests.

The variations in timber harvests indicate that private forests are at an even greater disadvantage, if the proportion of high quality wood harvested is considered in relation to the proportion of fuelwood harvested. Private forests harvested a considerably greater percentage of fuelwood than the State Forests. In 1995, approximately 18% of the total large timber

harvest in private forests was for fuelwood. In State Forests this figure was somewhat less than 6%. However, the share of deciduous large timber harvested in private forests in 1995 amounted to approximately 25% and was very close to the volume of this type of timber harvested in State Forests (26%).

In addition, attention should be drawn to the large share of saw timber in the large timber volume harvested in private forests. In 1995, approximately 60% of the total large timber harvest was saw timber, which was considerably higher than in State Forests (45%). This may suggest an irrational use of timber by private owners, who probably include more precious varieties under the heading of saw timber, for example plywood, veneer or matchwood.

Timber harvesting in private forests, taking into account the imperfection of the statistics, is considerably less than their (full) productive potential. In 1999, the harvesting of timber in private forests amounted to 1.2 million $m^3$. During that time, the real productive capacity of these forests was estimated at 2.7 million $m^3$ of large timber annually. This means that, according to GUS (Poland's Central Statistical Office) figures obtained from regional offices of state administration, the harvesting of timber in private forests has been about 45–48% less in the last few years than the volume specified in forest management plans. This phenomenon is even more distinct in the Lublin and Podlasie Provinces, where the harvest was as much as 70% less than the volume planned.

## 5. The social importance of forests and afforestation on private land

The specific role of forestry (including private forest holdings) is a consequence of the function of forests as places of work. Forest production is characterized by the fact that it is very labour intensive. This partly reflects the insufficient level of fixed assets in private forest holdings, especially machinery and equipment. The coefficient of investment in technology used in forestry, and in particular investment in machines and equipment, is six times lower than in other sectors of the national economy.

In spite of the labour intense nature of the work, the potential of the forestry sector to quickly provide employment is low. Because forestry's economic activities are as a rule long-term, forest sub-districts have only limited possibilities for additional employment. These possibilities include the direct control of this sector by the state, the comparatively labour intensive nature of forestry work, along with strong relationships to the repair and servicing of technical forestry equipment, and relationships to the transportation and processing of timber. Transportation of forest products over large distances is expensive, and this encourages production and processing of forest products near to the location of use. This in turn favours the economic stabilization of small rural communities.

In private forest holdings characterized by stands of younger age classes and land unsuitable for agricultural production, there exist considerable possibilities for the creation of additional jobs. Increasing the area of private forests by means of the afforestation of former farmlands may contribute to the professional activation of rural populations. Forest economy favours the creation of new jobs as a result of:

- the relatively high degree of labour intensity of forestry work;
- the low degree of capital intensity involved in the creation of new jobs;
- the strong connection with the services (repair and servicing of technical equipment), transport and wood processing sectors;
- the possibility of using less qualified (and therefore cheap) labour in most forestry work.

The above mentioned features of forest production and the economic considerations (the high prices of forest products and services for the benefit of forestry) contribute to the development of rural areas and the economic stabilization of local communities. The features of jobs created in the forest economy correspond to the social and economic conditions of the areas in which a large part of the land intended for afforestation is found. This is especially the case in the macro-region of northwest Poland, which is characterized by a large supply of state-owned land fit for afforestation and a high degree of structural unemployment caused by the liquidation of state-owned farms.

Apart from the above mentioned positive features of the forest economy, there are also negative features that hinder the creation of jobs. These include: considerable dispersal of production over large areas; the many years required to grow stands of trees; and the seasonal nature of forestry work, making it impossible for the workers employed to obtain social welfare benefits.

As a result of research by the Department of Forestry Economics and Policy of Forest Research Institute, the volume of labour required for afforestation of former farmland over the period 2000–2020 has been estimated (Zajac 2000). The number of new jobs (calculated in terms of full-time posts) has been estimated on the basis of the 'Catalogue of standard norms for forest management works' applied in the 'State Forests' National Forest Holding. Afforestation is planned for 250 000 ha of state-owned land and 350 000 ha of non-state-owned land during the period 2000–2030. Most of the state-owned land will be afforested in Northwest Poland, while most of the non state-owned land will be in the macro-region of Central Poland. Annual labour requirements for the preparation of soils and afforestation will amount to 1282 full-time posts, including 730 on state-owned land.

The volume of direct employment in every sector of the economy (including forestry and afforestation on former farmlands) has the following effect on the creation of additional jobs:

- indirectly – through increased demand for the products and services of other sectors and branches of the national economy;
- by induction – through expenditure by domestic households that obtain their incomes from work in the forest sector.

Research by the Department of Forestry Economy at the Warsaw Agricultural University has shown that as a result of direct employment of one person in the forest economy, 0.09 jobs will be created by indirect employment, and 0.15 by employment by induction. In practice, this means that for example a forest area of approximately 60 000 ha creates 520 new jobs: including 417 persons in direct employment, 39 in indirect employment, and 64 in employment by induction (Plotkowski 1999).

## 6. Summary

The share of 18% of private forests of the total forest area in Poland proves their significant contribution not only to the natural environment but also to the economic condition of small-scale forest holdings and social development of rural populations. These forests differ from the Treasury-owned forests as well as from private forests in other countries.

The most characteristic features of private forests in Poland are:

- considerable dispersal of private holdings (0.90 ha of forest per owner, often on several separate parcels of land);
- average young age of private forests (37 years) and relatively low timber resources (114

$m^3$/ha), which brings negligible profit to the owners, and in effect lessens interest in cultivating their forests;
- disinterest in organising unions or associations by private owners with the aim to collectively manage the forests.

The forest economy in Poland is first of all regulated by the provisions laid down in the Forests Act. This law defines forestry and forestry management system in a manner uniform for all forests regardless of their form of ownership. According to the Act, supervision of private forests is entrusted to the representatives of the state administration. The supervision can be contracted to specialists from the State Forests against payment or provided by special services appointed for this purpose. The costs of the supervision are not fully covered because there is a lack of funds in the province's budgets. This causes limitations in executing management tasks of small forest holdings.

The supervision system of private forests should be supported by the state by creating legal and organizational conditions for private owners to form voluntarily unions and associations. They can constitute a kind of self-government of forest owners representing their interests in relation to state supervision. Financial subsidies and tax breaks are necessary to stimulate forest owners to form voluntarily unions and associations.

Forest economy based on forest management plans is an important issue resulting from articles of the Forests Act. These plans define not only the condition of forests, but also set tasks among others for the management and exploitation of forest. For private forests there are so called simplified forest management plans. However, it must be emphasised that the deficiency in the state's budget greatly delays the development of simplified management plans. To improve economic and financial condition of small forest holdings it is necessary to:

1. maintain state supervision of private forests by special forest services of the State Forests or state administration;
2. increase staffing of the state administration and self-government authorities dealing with forest economy;
3. adjust the amounts of financial support from the state budget to the needs resulting from the supervision exercised by the State with special consideration of simplified management plans to be developed;
4. provide appropriate financial support from the state budget for afforestation, restitution of forests destroyed by ecological disasters, stand transformation and other goals connected with ecological and social functions of private forests;
5. develop consulting and technical services to private owners and at the same time to formulate the scope, principles and forms of rendering these services;
6. create conditions for private forest owners to form associations through adequate legal and economic instruments;
7. organize training courses for private forest owners by creating own model of a training system or starting co-operation with agricultural consulting centres;
8. consider the specificity of work connected with supervision of private forests in the education system of foresters by teaching them negotiating and advising skills, marketing, etc.

These conclusions are based on the general premise that legal, organizational and technical rules of supervising forestry management in private forests should result in balanced, sustainable and multi-functional forestry management at least at the same level as in the state-owned forests.

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# International Financing Possibilities for Small-Scale Forestry Development Schemes

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## Abstract

International financing for small-scale forestry development schemes can and should be tackled from different angles. First of all the planning of financing should cover the whole project concept and cycle; partial analyses or planning seldom bring about optimal results. Secondly the selection of financing sources should comprise several options and sources, as the scheme should never be fully dependent on a single source or option. The optimal selection is dependent to a large extent on the character/nature and objectives of the scheme and if the main content is institutionally oriented or if the main focus will be on investments. Most schemes contain training or extension components, and they can be financed from several sources as a rule. In every case the applications have to be modified according to the needs of various financing options, and thus the basic concept has to be described in such a way that it can be modified rather easily towards the requirements of these funding sources.

It is evident that the identification of the development scheme or project will occur on the planners' own financing. It is rare that ideas are supported by financing organizations without any previous analyses. The identification can also take place during and as a result of normal bilateral international cooperation like various institutes and organizations have had in Europe for decades between western and eastern European entities. When the scheme moves to a pre-feasibility phase the most probable and suitable sources can usually be found among bilateral donor agencies or in the Nordic Council of Ministers. These funds are very limited and small and usually their use should be restricted within pre-feasibility studies, international seminars for dissemination of information or for extension events.

Feasibility studies could be financed through the bilateral trust funds in international financing institutes (IFIs) such as: the World Bank and its subsidiary the International Financing Corporation; the Nordic Investment Bank and its subsidiary NEFCO; the European Bank for Reconstruction and Development; or through the EU system ending in the European Investment Bank or the coming SAPPARD program. In the case of non-EU sources and international financing organizations, it is essential to have the development scheme among the prioritized sectors in the country program of the IFIs. For instance, the World Bank has in every country in

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transition a Country Assistance Strategy (CAS), and every scheme to be financed has to be mentioned and prioritized there. One can also use the NGO financing channel, which is increasingly the case with privatized forestry in countries in transition (CITs). For instance in Romania, private forestry has received support from the bilateral trust fund in the World Bank and the WWF. This is based on the World Bank/WWF Alliance that operates worldwide. It is likely that the alliances between NGOs and IFIs are going to increase in the future. Implementation of the scheme can then continue to be financed from the same source or by combining two or more sources together. Research or educational components can be financed from the same sources, or from the EU ones, which seem to be among the most appropriate ones.

Nowadays there are more and more examples of how to combine practical oriented and research and educational projects also at the financing level together which, no doubt, brings about synenergetic effects to the development scheme.

*Keywords: funding, development, International Financing Institutes, small-scale forestry*

## 1. Introduction

International financing for small-scale forestry development schemes can and should be tackled from different angles. First of all the planning of financing should cover the whole project concept and cycle; partial analyses or planning seldom bring about optimal results. Secondly the selection of financing sources should comprise several options and sources, as the scheme should never be fully dependent on a single source or option. The optimal selection is dependent to a large extent on the character/nature and objectives of the scheme and if the main content is institutionally oriented or if the main focus will be on investments. Most schemes contain training or extension components, and as a rule they can be financed from several sources. In all cases the applications have to modified according to the needs of various financing options, and thus the basic concept has to be described in such a way that it can be modified rather easily towards the requirements of these funding sources.

## 2. Project cycle based management and financing

It is evident that the identification of the development scheme or project should occur using the planners' own financing. It is very rare that ideas are supported by financing organizations without any previous analyses. The identification can also take place during, and as a result of, normal bilateral international co-operation, such as various institutes and organizations have had in Europe for decades between Western and Eastern European entities. Very often identification arises from the results of applied research or practical forestry, and from the need to change the situation and solve the problems. The problem may vary to a large extent from very specific and functional orientation, to forest policy and legislation orientation. From the financing point of view it is usually recommended that the stakeholders clarify and define the problem area explicitly, but also integrate it to a larger or more prominent, policy oriented problem concept.

Most western European countries have active sectoral ministries that carry out financing of forestry development in their adjacent countries and regions. Most commonly the active ministries financing forest sector development are: the ministry for foreign affairs and of finance if the EU-programs or international financing institutions will be involved; the

ministry of agriculture and forestry mostly concentrating within its sectors purely or within rural development concepts; the ministry of trade and industry when donor originated exports are directly or indirectly promoted; the ministry of environment or energy if problems are tackled from the environmental or energy sectors or viewpoints as increasingly they are in Europe; or the ministry for interior affairs as they have traditionally been responsible for internal rural development schemes and also partners in certain EU financed, usually regionally or rurally oriented development schemes. Therefore, often the most efficient way to start planning the problem solving is to present the problem to a sectoral ministry who will commit to it, and will seek collaboration and assistance from its sectoral partners in other (most commonly western European) countries. Usually this concept also leads to a path where domestic and foreign experts start to learn how to co-operate and solve problems in a mutually satisfactory manner. These foreign, western European ministries also have experience in involving EU technical programs for financing of various types of projects.

Evidently it is crucial to design the project concept in such a detailed and comprehensive manner that research and educationally oriented elements will also be included from the very beginning into the process. This is crucial from the viewpoint of guaranteeing the long-term sustainability of the project, and also from the viewpoints of human resources development, and the permanent impacts and results. Additionally, if the project concept also includes research and education, it will also broaden the number of options and alternatives in financing the project in various parts of the cycle.

When the scheme moves to pre-feasibility phase the most probable and suitable sources can usually be found among the same bilateral donor agencies or in the Nordic Council of Ministers. These funds are typically small and very limited and usually their use should be restricted within pre-feasibility studies, international seminars for dissemination of information or for extension events. The Nordic Council of Ministers (NCM) has two operational programs for the countries neighbouring the Nordic countries. The projects financed multilaterally from the Nordic sources concentrate on the Baltic States and Northwest Russia. The general program consists of more general and socially or environmentally oriented development projects, which are also related to the forest sector, but the main origin for forestry projects can be found from the sectoral development program of the NCM. The latter program has included private forestry projects often in recent years. For this source it is a necessity that there are at least two Nordic countries involved and at least one target country of region in countries in transition. NCM also has funds to promote the implementation of international initiatives such as the Northern Dimension of the EU or the Agenda 21 and its application to the Baltic Region. Private forestry development is among the prioritized sub-sectors in the Baltic States and Poland and it could be developed also in reference with these international initiatives.

Feasibility studies could be financed through the bilateral trust funds in international financing institutes (IFIs) such as: the World Bank (WB); the International Bank for Reconstruction and Development (IBRD, one of the five institutions making up the World Bank Group); the International Financing Corporation (IFC, one of the five institutions making up the World Bank Group); the Nordic Investment Bank (NIB); the Nordic Environment Finance Corporation (NEFCO), which is the fund for environmental projects in Nordic countries; the European Bank for Reconstruction and Development (EBRD); through the EU system ending into European Investment Bank (EIB) or the coming SAPPARD program. In the case of non-EU sources and international financing organizations, it is essential to have the development scheme among the prioritized sectors in the country program of the IFIs. For instance, in every country-in-transition the World Bank has a Country Assistance Strategy (CAS), and every scheme to be financed has to be mentioned and prioritized there by the recipient government. So forestry in general, and private forestry in particular has to be among the prioritized sectors, the development of which the country would like to borrow money. If the forest sector is not among the prioritized sectors,

the development may occur through other sectoral development programs that have linkages with or contain forest related elements. The most common linkages with forest and wood occur through energy and environmental programs, but increasingly through very specialized segments like in the case of Latvia, solid waste management development, in a development project financed by the WB.

One can also use the NGO financing channel, which is increasingly the case with privatized forestry in CITs. For instance in Romania, private forestry has received support from the bilateral trust fund in the WB and the WWF. This is based on the WB/WWF Alliance that operates worldwide. It is likely that the alliances between NGOs and IFIs are going to become more common in the future. Very often the linkages are designed in such a manner that most of the forestry development occurs through traditional loan concept (e.g. with the WB), and the biodiversity conservation and other protective measures of the ecosystems are financed and carried out on a grant basis, through the Global Environment Facility (GEF) or by NGOs, most commonly in the case of bilaterally financed projects such as USAID.

After the planning/feasibility phase, implementation of the scheme can then continue to be financed from the same source or by combining two or more sources. Research or educational components can be either financed from the same sources, or from EU sources. EU funds in research and educational programs seem to be among the most appropriate ones. If the trust fund concept is being used within IFIs, the feasibility study should lead to an investment project, through the same apparatus. So if the trust funds are used within IFC, for instance, the implementation should also involve IFC. However, in the concept of developing small-scale or private forestry, these IFIs rarely have special expertise required for the planning and implementation of this type of project. They may also lack sufficient financial instruments for developing this type of concept. This is why it is essential to study the instruments of various IFIs beforehand.

## 3. Appropriate financial instruments

Lending is the most common instrument IFIs use in their projects. In the case of private forestry development, only structural changes having major parts of the project as investments, are suitable for lending programs. However, very seldom these development activities are included in the forest development projects financed by loans, as most projects in CITs concentrate on renovating the state forestry enterprises and administration. The institutional development type of activities of private forestry can be also financed through certain minor instruments, on a grant basis. But these instruments are usually only possible, if the sector or related sectors are financed through loans. But for instance, the development of regional environmental and forestry centers having a core role in private forestry extension and training services, can be among such topics that can be developed through grants of IFIs. If lending is being used, the lending should only concentrate on the establishment of the centers, and on safeguarding the basic functions of it, not on creating permanently subsidized, or externally financed mechanisms or structures.

Program investment risk guarantees can act as a powerful market-based mechanism for both encouraging private investment and encouraging governments to create a regulatory environment favorable for private investment. These guarantees have seldom been used in the forest sector development, but (for instance in Moldova) there are positive experiences with this instrument. In the future guarantees will be used in the Russian Federation as attached to the Pilot Forestry Project of the WB. In most Eastern European countries guarantees are not needed anymore as the investment climate is developing so rapidly and is increasingly encouraging private investment.

Grants are the most popular instruments in forest sector development. In the multilateral agencies, the Global Environment Facility (GEF) is the most commonly used mechanism in this respect. The GEF also finances private forestry related activities, mostly biodiversity-related elements attached or integrated to forestry development. In principle the institutional development of private forestry (especially in relation to environmental dimensions of forests) can be financed through this mechanism. There are certain instruments such as grant based small- and medium-scale enterprise and project development concepts that can be financed through the GEF. If private forestry is assessed in the context of valuation of various sustainable uses and values of forests – i.e. comparing traditional forest industrial products with the value of environmental services, of forest services or of non-wood forest products, or by developing integrated forest management planning systems such as ecological landscape ecological planning – these instruments can evidently be used if introduced to the financing organizations in an appropriate way.

## 4. The role of the United Nations system

The UN operates through its various organs by grants. Private forestry can be developed at policy level efforts, as very often is the case with Food and Agriculture Organization (FAO) projects in CITs, or by developing institutions and research and educational and extension services related to it. Also permanent, voluntary structures such as forest owners' associations can be developed through the UN system. FAO is by far the most professional organization in these respects, but also the United Nations Development Programme (UNDP) and United Nations Environmental Programme (UNEP) may have elements in their projects that support small-scale and private forestry. The International Labour Organization (ILO) is no doubt an organization that has paid remarkably attention to private forestry development especially in the field of harvesting techniques, and small-scale processing emphasizing mostly the safety and ergonomic aspects of work. The United Nations Industrial Development Organization (UNIDO) is the UN organization that is responsible for developing processing, also with respect to farms or small-scale forestry. FAO has also had projects in this field, mainly through its rural development projects. The grant is mainly allocated into private forestry in the form of advice, and support to institutional development rather than as support to investments. However, investments are also possible if the development is tackled through pilot enterprises or educational units. Nevertheless, these supportive investments are usually financed by donor agencies attached to the UN projects.

## 5. EU technical programs

The EU has so far mainly acted through grants in the field of forestry in general, and private forestry in particular. Usually the major changes, if any, have been developed within the PHARE Programme, which has been the main technical program of the EU in Central and Eastern European Countries (CEECs). The TACIS programme has been the corresponding program in the CITs of the former Soviet Union (but excluding the Baltic States), but so far TACIS has not included private forestry projects. PHARE has been the major program in private forestry development, for instance in Latvia in the 1990s, and private forestry related educational activities have been developed through PHARE, for instance in Estonia. Now the rate of EU technical programs allocated to investments is going to increase which will mean

that the EU funds as grants will become more popular and competitive than before. On the other hand, if grants are used increasingly instead of loans, the change is likely to give a more biased basis for forestry investments.

## 6. Other instruments of IFIs

Economic and sector work is also considered as an important instrument that IFIs can use in forest sector development. The latest evaluations of, for instance, the WB financed forestry projects conclude that economic and sector work should be strengthened in the future. Partly it will occur by using increasingly the local expertise in project preparation, but also through partnerships that bring about deepened analyses into the process. FAO is evidently going to increase its importance also in the case of private forestry development, and so are the international and national research institutes (including the European Forest Institute). This also means that private forestry development will depend increasingly on the resource allocation to research and development activities in this field. This cannot be fully dependent on external sourcing; the local and national governments must also commit to this development and must allocate resources to it.

Partnerships and alliances will become more important in the future in many ways. More and more planning of the activities will occur in a participatory manner involving various stakeholders. This is also the case in CEECs where the participatory planning is a relatively new planning process. It will also bring about a reliable and more solid basis for establishment of voluntary organizations, such as associations, which should have a role to play in private forestry development. It will also broaden the concept of development objectives and means that the small-scale schemes should also include various elements of sustainability. It will not occur automatically, as the experiences in CEECs over the last decade has shown. Very often, short-term economic goals overcome all the other objectives in the beginning of land tenure; the increased participation of stakeholders means that this danger will probably diminish.

International organizations and governments also need partnerships and active participation of various stakeholders as democratic development processes do not always automatically support the democratic development. The state organizations are not usually among the most advanced and active in adopting new principles, reducing their political or professional power, and supporting the structural changes needed in the privatization process. If private forestry is analysed in this context, many of its functions and activities can be developed by using the various EU programs and funds to accelerate the democracy processes, through the twinning (institutes and institutes), public/private sector (institutes and enterprises), NGO related programs (associations and associations), etc. This third sector financing is increasing most rapidly, and unfortunately the forest sector is lagging behind in realizing its opportunities.

## 7. The role of SMEs

IFIs have also emphasized in recent years the importance to support Small- and Medium-size Enterprises (SMEs). This has been particularly the case in supporting the privatization processes in different fields. However, besides the strong commitment in programs and theoretical levels, SMEs have in practice very seldom received enough emphasis. There are many reasons for this gap, but often the specialists and tailor-made instruments are lacking

from the IFIs. It is rare that the specialists in IFIs have specialized knowledge of the problems of SMEs, or in institutional development needed for the existence and survival of SMEs. It is usually the entrepreneurs of SMEs that know best the problems and can understand the difference in promoting SME like businesses in comparison with larger enterprises. Therefore, this process has often been left to NGOs, and IFIs have not paid enough attention to this problem. In fact this is one reason why the democracy process has been progressing so slowly in some CEECs and CITs as SMEs are essential elements in creating entrepreneurship and supporting the construction of a middle-class in every society.

In comparison with instruments developed so far for SMEs EBRD is by far the most advanced IFI in this respect. It has created special instruments for SME development and is acting through local carefully selected banking systems to support these enterprises at local level in CITs (countries in transition). At the same time it has focused the importance of creating and supporting special financing mechanisms needed for SMEs in rural businesses as this has been one of the main gaps during the last decade in all countries in transition. In most cases farmers or private forest owners should be increasingly analyzed and developed in the context of SME aiming at optimization of various production and service lines instead of maximizing only some activities at the cost of neglecting other activities.

It is essential when designing development projects for private forestry to build links with the general SME institutional development in the client country. Too seldom have western donor agencies or institutions realized that much lighter institutional structures can be created in countries in transition than in the state supported western industrialized countries. In addition organizations or donor agencies in western industrialized countries try to develop similar brother or sister organizations in the client countries. However, the conditions and especially the public support for these structures is much, much smaller, and more short-term oriented as the societies in transition cannot afford continuous support to this sub-sector.

SMEs and private forestry can also be developed and financed through large forest industrial investments. All large-scale investments such as a pulp mill, need SMEs to support their functions. SMEs can act as contractors for the large investor in certain parts of the production chain, such as in the growing, harvesting or transportation of timber. Also forest services based on SMEs are needed in most advanced forest areas where forest industries operate in a comprehensive manner. The development of SMEs for these purposes can occur at least partly by financing it directly or indirectly from the large investment itself. Especially in those countries that are aiming at new large-scale investments while being still in the process of land tenure changes, might need political and other support from private forestry, and the owners of forest holdings. Very often public opinion is emotionally against large, and especially foreign, investors that will consume the wood supply to a large extent. Partnerships are needed in these cases, and it should be planned in advance, before the public opinion turns against the investments. Baltic States will act as an interesting window for this potential conflict in the very near future while simultaneously developing its private forestry and changes in land tenure, and pulp mill investment.

## 8. Function based development and financing

The development of private forestry is often planned using small and limited concepts and approaches. Usually small-scale forest owners will develop or solve a very specific problem or eliminate a particular barrier. Most often the gap is specified as a lack of extension and training services. In principle the solutions can be sought from, and found among, a few options, namely developing it by strengthening what is already there: (i) state forest service

by construction of a private forestry unit; (ii) existing agricultural training and extension services; (iii) forestry schools and institutes; (iv) establishing forestry associations or other voluntary organizations; (v) the use of NGOs in this respect; or (vi) developing a state subsidized separate organizational structure for private forestry.

The optimum solution is always dependent on the country and locally based organizations and other existing and functioning structures. It is always more sensible to renovate and redesign on the basis of existing structures than eliminate the old ones. This is simply because of the fact that the public financing can seldom allocate enough resources to funding the building of new institutional structures. The main issue also in this respect is that the solution should originate from the country itself, and not from the donor agencies, and should not blindly follow the solutions that have been found to be appropriate in very different conditions.

IFIs seldom finance function based development processes. It is usually sensible to try to integrate them both to policy and strategy development, and in launching it as a part of a broader concept for development.

## 9. Optimization of international financing

The optimum structure of international financing is dependent on many factors and it should be analysed from many different angles. The identification and pre-feasibility phases are very often financed through bilateral cooperation and donor funds. It is usually the fastest and least bureaucratic solution. If it is intended that the Nordic IFIs should be involved in investments, then it is sensible to try to launch the project to Nordic multilateral financing and to build a development path through it. If research or education are to be emphasized, the EU funds are often the most appropriate ones. The Tempus program has been very successful program in educational and extension development, and the EU research programs can be reached at least partly by the CEECs. These programs vary from scholarships to active research funding and can act as major elements in developing private forestry. Good results and efficient work can be reached also by networking (e.g. by using the European Forest Institute network actively and in a target oriented manner).

If the project is primarily using EU funds, it might be sensible to continue on the EU path and try to include the project into the priorities of the country's SAPPARD programs. If investments are needed, and SMEs will be supported in general, EBRD is a possible source in the feasibility and implementation phases. If it is intended to involve the WB Group, private forestry has to prioritized in the Country Assistance Strategy (CAS), or if planned properly it can be tackled through other sectoral development projects through lending. If the private forestry will be developed in the context of National Forest Programs (NFP), it is sensible to involve the appropriate UN organizations (particularly FAO) in the process, especially in its strategy and policy level issues.

In every case it is sensible to use experts who understand the variety of approaches and concepts of international financing organizations rather than to follow the path designed by experts that are used to only single or few financing paths; the optimum structure and combination can seldom be reached by using a single path from the very beginning to the end.

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# Policy Measures and Forestry Extension to Encourage Small-Scale Forestry

# Forest Management Association – a Major Tool to Promote Economic Sustainability of Family Forestry

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## Abstract

Private ownership forests in the immediate vicinity of farms and villages in Finland is of ancient origin. Since the beginning of 20th century, forestry in Finland has been based on family forestry. There are now over 900 000 family forest owners in Finland owning 62% of the total forest area. Almost every fifth Finnish family owns some forest. The average size of these family forest holdings is under 30 hectares. About 32% of the private forests owners are wage and salary earners, 20% farmers and 39% pensioners.

Forest management in Finland is practised with future generations in mind. Due to the large number of forest owners with varying goals the multiple-use of Finnish forests is well presented. However, according to recent surveys the timber production and other economic values are priority to more than 70% of the private forest owners. Income from forestry is of importance to both households and the economy of the countryside.

Voluntary silvicultural guidance and the co-operation between private forest owners in Finland also has a long history and tradition. The Forest Management Association (FMA) is a forest owners' own body, the purpose of which is to promote profitability of forestry practised by forest owners and the realisation of the other goals they have set for forestry, and to advance the economically, ecologically, and socially sustainable management and utilisation of forests.

Forest Management Associations are working in a close co-operation with the forest owners in all matters related to forests. FMAs offer training and advice and provide professional assistance in forestry issues thus protecting forest owners interests and helping to achieve the set objectives. Especially important is that forest owners themselves have taken the responsibility to establish the FMAs and maintain and develop the economic sustainability of the private forests. The FMAs have democratically chosen administration.

The consolidation and globalisation of the forest industry can lead to highly unbalanced roundwood markets. This requires also that the private forest owners are provided the

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sufficient knowledge of sustainable forestry and timber markets. The Associations provide a significant help in actual wood sales transactions.

*Keywords: economic sustainability, co-operation, family forestry, forest management association, round wood markets*

## 1. What is MTK?

The Forestry Council of the Central Union of Agricultural Producers and Forest Owners (MTK) is a national central organisation of private forest owners in Finland. It looks after the interests of private forest owners in roundwood markets, and influences forest policy on national and international levels. Recently the defence of property rights has grown in importance. The Forestry Council of MTK also guides the activities of the Regional Unions of Forest Management Associations, protects the interests of the Forest Management Associations, and develops co-operation between forest owners.

## 2. Forestry plays a vital role in Finnish society

Finland is the most densely forested country in the European Union. As much as 74% of the land area is covered with forest. Finnish forest industries play a major role in EU paper and board production, with a share of 16% of the total production of 80 million tonnes. The share of EU wood pulp production is one-third and of EU sawn wood production 17% (more than 60 million $m^3$). Finnish forest industry companies account for 25% of the global printing and writing paper exports.

Even today the forest sector is more important to Finland than to any other western European country. The forest industry still accounts for almost 30% of total net exports. On average over 80% of our wood products are exported.

If the so-called forest cluster is taken into consideration, the role of forestry and the forest industry is even more crucial to our country. This forest cluster is a pool of know-how, research institutes and businesses related to forestry, ranging from forest management to consulting services and highly sophisticated computer-controlled paper machinery. The forest cluster employs 8% of the working population in Finland, i.e. some 150 000 people and accounts for almost 10% of the total GNP.

Forests are an essential part of the rural economy. The extensive private ownership and forestry incomes have also had a considerable trickle-down effect on the countryside by boosting rural livelihood. The nation-wide possibility to benefit from forest also economically (by their million owners) means that the whole country is populated. The infrastructure built-up over the years enables forest management and wood procurement almost all year round.

Finland's prosperity can be argued to be based on her forests. More than 80% of the domestic wood bought by the industry comes from family forests. In practice the forest owners make about 100 000–150 000 wood deals every year, the average size being 400 $m^3$.

In the 1990s the gross stumpage revenues obtained annually from the sales of roundwood in family forests were between EUR 0.8 and 1.4 billion, depending on economic trends. In family forests, the per hectare net earnings in 1970–2000 before direct taxes and external capital costs were on average EUR 80/ha (at 1999 prices); the range was from EUR 40/ha in 1993 to EUR 130/ha in 1974.

## 3. Sustainable Finnish family forestry has long roots

Historically Finns have utilised forest for the felling of trees to provide household timber and firewood, in shifting cultivation, and tar distillation. Wood was needed for building houses, for keeping their houses warm and for cooking food. In shifting cultivation, cleared and burned patches yielded crops of cerials and vegetables for a few years until the supply nutrients diminished; then the farmer moved on to a fresh patch of forest. Tar was a valuable export ahead of sawn timber and paper. At the turn of 20th century the need to secure the raw material base for the new wood manufacturing industry led to the enactment of forest policy and new forest legislation. Throughout the past one hundred years people have affected forests in almost all parts of Finland in one way or other.

Private ownership of forests in the immediate vicinity of farms and villages in Finland is of ancient origin. In the 17th century the farmers became crown crofters and tenants and with the improvement of the economic situation in the 18th century, tenant farmers were given the right to buy back their farms as hereditary holdings. New pressure on the forest ownership began at the end of the 19th century and the situation of the landless population was settled in 1918 when the so-called Crofter Law was passed. This led to the creation of about 150 000 new independent small farms and forest holdings by the end of the 1930s.

An active public forest policy can be said to have begun in Finland at the end of the 1920s when an extensive reform was made in forest regulation. The Private Forest Act was passed in 1928. This law was the most decisive of the forest policy tools, as it prohibited the destruction of forests and stipulated that the regeneration of felled areas had to be ensured and that young stands with high-value growth should not be cut prematurely. The sustained yield principle was thereby officially adopted as one of the cornerstones of Finnish forestry.

Since the beginning of 20th century, forestry in Finland has been mainly based on family forestry. Forest management in Finland is practised with future generations in mind. Due to the large number of forest owners with varying goals, the multiple-use of Finnish forests is well presented. According to surveys the timber production and other economic values are a priority to 71%, recreational and leisure values to 19%, conservation to 5%, and emotional values to 5% of the private forest owners. Naturally, these values are exclusive, but most forest owners appreciate all of them.

The socio-economic environment of the private forest owners has also changed radically. Since the end of the 1960s, private forestry has been in a state of transition. The main changes occurring in the structure of forest ownership have been: a decline in the number of farmers; forest owners moving to live somewhere outside the forest holding; migration to urban areas; an ageing of the forest owner population; and a growing proportion of female forest owners.

There are now over 900 000 private forest owners in Finland owning 62% of the total forest area, 69% of the growing stock and 72% of the annual increment. The average size of these family forest holdings is 26 ha. Despite the general move to towns and cities seen in Finland as a whole, 61% of forest owners still live in sparsely populated rural areas, and almost one-fifth live in villages or small towns. Only 21% of forest owners live in urban areas of more than 20 000 inhabitants.

A large proportion of the owners are already now urbanised, and their dependency on forestry income is not as high as before, as more of their income comes from other sources. However, so far, the cutting behaviour of private forest owners has not changed much.

Indeed, it is important to family forest owners that their precious assets are managed properly. However, too little attention is paid to the profitability of forest management and its basis – the income from the forest. Family forest owners at least cannot afford to take care of sustainable development unless forestry is financially profitable. Sufficient stumpages as well as cost-effective forest management practises guarantee the profitability of forestry.

Sustainable forest management is also very demanding. It requires know-how, professional advice and high motivation from forest owners and forestry professionals. Information on forest resources and certain organisational structures are also necessary elements. These pre-requisites are not easily achieved without financial incentives.

## 4. Great challenge to forest professionals

Voluntary silvicultural guidance and the co-operation between private forest owners have a long history and tradition in Finland. As early as at the end of the Russian rule in 1907, the first forest management associations (FMAs) were founded. FMAs are an independent voluntary forum of self-organisation and self-support of forest owners. Especially in the 1930s several associations were established and at the beginning of the 1940s there were already about 300 FMAs. At the end of 1940s this activity was fixed by law and the Forest Management Association Act was passed in 1950. The Act provided a solution to the key question in operation of FMAs, namely financing. Finnish society wanted to guarantee that training and advisory services were available for every single forest owner. This principle was also fixed in a law passed in 1999.

In 1999, an up-to-date Act on forest management associations was published. In this Act the task of forest management associations (FMAs) is set out as follows:

> *The forest Management Association is a forest owners' body, the purpose of which is to promote profitability of forestry practised by forest owners and the realisation of the other goals they have set for forestry, and to advance the economically, ecologically, and socially sustainable management and utilisation of forests (Section 1, Forest Management Association Act).*

## 5. Services of the Forest Management Association

FMAs work in close co-operation with the forest owners in all matters related to forests, from planting to harvesting. FMAs offer training and advice and provide professional assistance in forestry issues, thus protecting forest owners' interests and helping to achieve the set objectives. FMAs take care of most of the planning of the forestry measures and their realisation in private forests, wood sales planning, and also provide significant help in actual wood sales transactions.

About 80–90% of the activities in timber production in private forests are carried out by FMAs as well as approximately 70% of the preliminary planning of timber sales. Much emphasis is placed on the profitability of forestry due to its direct impact on the welfare of rural livelihoods.

Especially important is that forest owners themselves have taken the responsibility to establish the FMAs and maintain and develop the productivity of the private forests. This also requires that the private forest owners are provided with sufficient knowledge of sustainable forestry and timber markets. Advisory services were one of the basic tools that were already in place from the end of the 19$^{th}$ century. Actually, according to the studies made in Finland, advice and extension have proved to be the most effective means to promote sustainable forestry and motivate forest owners.

Forest owners also have a chance to grant FMAs the power of attorney in wood sales and deliveries. This provides a chance for those forest owners who themselves do not have enough time or opportunity to actively participate in the management of their forests or

timber sales. The radical changes in forest owners' socio-economic environment due to the urbanisation have increased the FMAs power of attorney in forest management and timber sales. At present approximately 40% of timber sales from private forests are based on attorney sales. The role of FMAs has gained further importance as the time available to use in forest management and the traditional knowledge on forestry work of the owners themselves are diminishing with increasing urbanisation. In addition, as mentioned already, a large proportion of the owners live far away from their forests.

An FMA is usually directly involved in many operations in their members' forests, from planning to implementation covering all activities related to sustainable forest management. The decision-making process under the FMA-involved operations typically involves four stages:

1. the forest owner always makes first the decision on a forest management operation;
2. the professional advice and services of FMA are used by the owner to define how the operation should be best carried out;
3. the operations in the field are based on the plans prepared by the FMA;
4. the FMA often assumes the executing role, or supervises on the owner's behalf, the work carried out by other operators.

FMAs provide work and income for people in rural areas and so they are also very important actors in a viable and settled countryside. FMAs employ approximately 1600 forestry professionals, including 600 forest workers. FMAs also promote the forest management activities and logging work done by the forest owners themselves.

## 6. Management of the FMAs

There were 206 FMAs at the beginning of 2001, each financed and administered by the forest owners themselves, with the number of members rising nearly to 330 000 estates altogether. This figure excludes the owners of forest holdings smaller than 5 ha since they are not required to be members of FMAs. However, the current trend is to decrease the number of FMAs to around 100 by the end of the 2005. Larger FMAs are better able to provide special services, and represent and look after the interests of their members.

FMAs are governed and financed totally by forest owners and the FMAs have democratically chosen administration. The Act on Forest Management Associations enables them to receive a forest management fee from forest owners. Every forest owner pays a forest management fee and thus is automatically a member of the FMA of the area where his/her forest is located.

Forest management fees account for approximately 20% of the associations' turnover; the rest is generated from services provided. The administration is based on democratic elections where every forest owner has a say. The shareholders of joint ownership forests are all members of the association as well, but they have only one, shared vote in council elections.

However, membership is free of charge. One can discontinue membership by notifying the association in writing. This will not exempt the forest owner from the forest management fee, but he will no longer have the opportunity to vote in elections.

Elected by absentee voting, and composed of 15–39 members, the Council is the highest authority in the association. All members of association have equal opportunities to participate in the nomination of candidates and in elections. In other words, the forest owners have ultimate power.

Regional unions of forest management associations are regional central organs for local forest management associations. They promote private forestry, protect the interests of private forest

owners, guide and develop the activities of the FMAs, and facilitate co-operation between forest owners. Regional unions also provide guidance and assistance in marketing of forest products. The unions are mainly financed by membership fees paid by the FMAs.

## 7. Forest owners' interest in timber trade

Although the concept of sustainable forest management is now understood in a much broader sense than before, something fundamental is missing from the discussion or is defined very poorly. When wood has an economic value and forestry is profitable, forest owners are able to assume the responsibility for silvicultural operations and biodiversity management, which leads to sustainable forest use.

The consolidation and globalisation of the forest industry can lead to highly unbalanced roundwood markets. The three leading forestry companies in Finland (UPM-Kymmene, Enso and Metsäliitto) buy more than 80% of their wood from private forests, but in pulpwood the share is as high as 98%. In the sawlog market there is more competition, because there are also other wood purchasers, such as 70 independent medium-sized sawmills and hundreds of small sawmills. Through integration, however, the three big companies control 70% of the sawmilling capacity.

This requires that the private forest owners are provided with the sufficient knowledge of timber markets. Private forest owners have to have a right to use expert services in timber trade. The FMAs provide a significant help in actual wood sales transactions. And above all, they also look after the interests of private forest owners in timber trade between the global forest industry and private forest owners. New roundwood pricing methods and information systems as well e-commerce solutions will also be modern timber sales services of FMAs.

## 8. The role of FMAs in the Finnish Forest Certification System (FFCS)

Forest certification is a voluntary tool for promoting sustainable forestry and for verifying sound forest management. For forest owners, certification provides a chance to influence sustainable forestry, while at the same time it helps to assure access to markets for wood based products.

Family forest owners and FMAs are also key groups for the Finnish Forest Certification Scheme. The participation of forest owners and their organisations in the development of the certification scheme as well as its operationalisation is crucial if the goals of forest certification are to be achieved. What is more, almost all FMAs have also started to establish quality and environmental management systems to better control their operations.

There are 21.9 million ha of forest now under the FFCS umbrella in Finland. That represents 95% of forests in Finland. Owners of 311 500 forest estates are now committed to FFCS certification. The FFCS forest certification system has been shown to be suitable for Finland's conditions. It was endorsed by the Pan European Forest Certification Council (PEFCC) in May 2000. Forest certification is becoming firmly established in this country as a practical tool for forest management and forestry integrating the sustainable development of wood production with forest biodiversity.

MTK is in favour of Pan European Forest Certification because it is developed for small-scale forestry and respects democratic procedures and requires high professional quality and credibility.

In Finland, because the average size of forest holdings and number of forest owners, certification of individual forest holdings does not necessarily lead to ecologically, economically or socially sustainable forest management. Thus, the Finnish certification system is based on regional group certification.

The Union of FMAs is the applicant to certification for the area of the Forest Management Association. The certification group consists of forest owners, relevant organisations and other actors operating within FMA's boundaries.

Participation to certification is voluntary for every party or private forest owner. In official meetings forest owners decide whether to apply for regional group certification or not.

## 9. Changes in the structure of family forestry – threat or challenge?

Because of the essential role of private owners in Finnish forestry, it has been very important for the government to influence the forest management decisions of these owners to serve national goals. Therefore, also the activity of the FMA was fixed by law. Training and advising of forest owners held a key position of Finnish forest management. With the support of FMAs, the training and advisory services were accessible to all forest owners. This has been a cornerstone of the favourable development of the whole Forest Cluster.

Changes in the structure of family forestry ownership have raised the risk of lower wood supply and reduced inputs in sustainable forest management. The traditional structure and activities of Associations are not enough any more. Many of the tools formerly available for FMAs, such as a stumpage price bargaining, have lost their relative importance during the 1990s. The new situation requires the FMAs to adopt a more market oriented approach in their operations. To accept the challenge of this structural change the FMAs have to go through a wave of transition and liberalisation. However, there is a need to merge into much larger and more effective units.

We have already started a reform process of forest owners interest organisations. During the past few years, the number of FMAs have already decreased from 300 to around 200, and the current aim is to decrease the number of FMAs to around 100 by the end of 2005. Also the number of Regional Unions of Associations has to decrease from 14 today, to about 5.

MTK as a central organisation and the FMAs need to offer new and better services for the changing and diverse forest owners. A new approach has been developed for the non-farmer forest owners and they will be integrated more to the operation and decision-making of the forest-owner organisation at all levels.

Another major task of the organisation is to enhance implementation of the information system. The goal is that all persons in the FMA's organisation take the computer network into daily and standard use and that elected officials use the network on a regular basis in the acquisition and exchange of information.

## 10. Conclusions

The economic perspective is the basis for family forestry. Without financial profit from the forest, the private forest owners would hardly be interested in forest operations. Forest owners cannot be obliged to finance the 'common good' derived from the forests by an unreasonable loss of income. Only economically profitable forestry also conserves forest biodiversity and the social and cultural values that arise from it.

Finnish forestry and forest industry, as well as the whole national economy have been undergoing a transition and liberalisation since 1995. Everything has started to globalise: financial markets, forest industry investments, information exchange. Also, the socio-economic environment of the private forest owners has changed radically as well.

However, the FMA is still the most significant body to promote profitability of family forestry. The services of FMAs are available for every single forest owner. With increasing urbanisation and globalisation the role of FMAs might even increase.

# Policy Measures and Forestry Extension, Education and Training to Encourage Small-Scale Forestry

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## Abstract

Policy influencing management of small-scale forestry (woodlots) must incorporate not only biological capabilities of the land, but also the owner's level of education and available social and economic resources. Society can influence sustainable management of small-scale forestry in three different ways:

- Work with the landowner: education, information, technical advice, etc.
- Work with the land: economic incentives, subsidies for planting, thinning, roads, etc.
- Work with the operational/regulatory environment: laws, regulations, research and development.

Successful influence requires a long-term approach, working with the owner and with the operational/regulatory environment. Working with the land can kick-start desirable activities, but it can also create dependency and, over time, distort goals.

*Keywords: small-scale forestry, extension, education, training, policy*

## 1. Help the landowner to help themself or show the landowner what can be done and encourage the owner to do it

This statement was the trademark for the New Brunswick Forest Extension Service from 1975 to 2000. A sharp-eyed reader immediately notices that there is no specific reference to the woodlot or to sustainable forest management. It purposely focused on the owner's situation and challenged the Forest Extension Service Staff to choose a holistic approach. It is in this context that the concept of Rural Business Enterprise was introduced (see detailed description in section 3).

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If public policies and educational efforts were to aim at encouraging sustainable woodlot management using a holistic approach, then the demand on extension staff (professionals and technicians) must, in addition to their traditional skills in forest management and communications, also incorporate business management skills. Assessments made and advice given must incorporate all resources available, not only the woodlot.

This situation is a challenge to the research community to include socio-economic research as an integral part of traditional woodlot management research. Knowledge of what makes the owner tick (Gasser 1999; Schwichtenberg 1999) becomes a crucial component in the development of efficient policies and educational programs. The Rural Business Enterprise (see section 3) becomes the focus in which sustainable woodlot management may be only a part.

## 2. The owner and his world

The owner perceives himself as the centre of the world. How he combines and uses available resources hopefully produces the returns he needs. However, these activities take place in a physical and regulatory environment over which he, as an individual, has very limited influence. There are four major factors influencing this dual environment of the woodlot owner and his resources on the one hand, and the regulatory and physical environments on the other:

- First, there is the historical development behind today's realities. We cannot change history, but we can learn from it.
- Second, society as a whole influences the woodlot owner's extended environment. Attitudes and regulatory instruments are the tools of society to do this work. The time frame for this type of influence is often long.
- Third, the market place has a major influence, since products from the woodlots have to be sold to create a cash flow. Market conditions can change very quickly, and market fluctuations are often cyclical.
- The fourth factor is technology. This is an area of constant change due to research and development, but the impact is felt more in the medium time frame. The owner cannot throw out 'old' equipment because a new 'magic' technology has come on the market.

Policies and educational efforts must take into account the above factors, all of which influence the viability of the Rural Business Enterprise.

## 3. The rural business enterprise

Traditionally, we look at the small-scale forestry (the woodlot) as a certain amount of land on which we can grow trees. The products from this woodlot are almost always part of the raw material base for one or several wood-processing industries. When society says it wants to promote sustainable production from this woodlot, it generally means a desire to secure a steady wood supply for the wood-processing industry. Rational, efficient management utilizes the biological growing capabilities, wood gets produced, industry converts the wood into products which are sold, jobs are created and everybody is happy. Or is there more to the woodlot than producing trees? Are we looking at trees or humans?

Let us look at the woodlot in a slightly different way. Every woodlot has an owner. This owner most likely does something more than own and manage a woodlot. Let us look, then, at a woodlot as part of a 'Rural Business Enterprise'.

This enterprise has several resources at its disposal:

1. Human resources: Owner, eventual family member and people employed by the owner.
2. Business and stewardship resources: Owner's interest, education, skills, economic assets (other business or sources of income), etc.
3. Natural resources (including farmland): The woodlot and what is on it (flora, fauna, soil, water, etc.).

The owner tries to manage this mix to satisfy his needs and goals. However, it is not automatically true that intensive forest management is the most desirable outcome for the woodlot portion of this particular Rural Business Enterprise.

Maybe some version of 'poor-man's management' or 'low investment management' is more advantageous from the business point of view.

In conclusion, policy makers and developers of public woodlot support programs must take into account the socio-economic realities of the Rural Business Enterprise. With this comes the challenge to the research community to recognize the diversity of the subject, to not focus only on the production of fiber, but also include the socio-economic aspects of owning and operating a woodlot and its associated activities. Also, what makes the woodlot owner tick may have a major impact on how the woodlot part of the rural enterprise is managed.

## 4. No federal policy, but at least basic principles

In 1990, the Canadian Forest Service consulted private woodlot stakeholders across Canada in an effort to find a common base for a federal woodlot policy. The policy initiative failed but the six-month long effort provided an interesting list of basic principles that came out of the extensive stakeholder consultations.

The overriding concept was that any policy should first aim at helping the owner help himself. The additional comments are readily summarized in these nine principles:

1. Respect private ownership;
2. Incorporate environmental concerns;
3. Accommodate regional diversity (Canada is a huge country!);
4. Provide recognition;
5. Utilize partnership approach;
6. Involve industry;
7. Apply economic criteria;
8. Activate forestry educational and research communities;
9. Develop support systems.

The nine principles showed up in most discussions, not always all of them and not always clearly stated, but they were there in all jurisdictions consulted.

## 5. Public measures to influence sustainable management

Public intervention in, or interaction with, the small-scale forest sector (woodlot sector) can, for the purpose of this presentation, be divided into three broad categories.

1. Working with the owner(s) (owner-oriented activities)
Through information, education and technical advice, enhance the owner's ability to make rational management and business decisions (comprising the total rural business enterprise) including traditional forest products, specialty or value-added products and other benefits.

Examples: Periodic publications, modular woodlot, or other, management courses, 'kitchen table' courses, field days, displays, demonstrations, workshops, seminars, handbooks, manuals, pamphlets, videos, films, etc.

2. Working with land (property-oriented activities)
Through economic incentives (subsidies), promote targeted desirable forestry activities or infrastructure on individual woodlots.

Examples: Management planning, boundary lines development or maintenance, construction of trails and roads. Also different silviculture activities such as site preparation, planting, pre-commercial thinning, semi-commercial thinning, conversion of trash stands, etc.

3. Working with the operational/regulatory environment
Through a variety of direct or indirect regulatory administrative and supporting activities, enhance the operational and management environment for the rural business enterprise (the woodlot sector).

Examples: Laws and regulations, which directly or indirectly affect the operation (forest/environmental legislation, taxation, land use planning, marketing etc.).

Also, activities such as RD, public services like provincial inventories, forest woodlot resources studies, etc.

**Table 1.** Province of New Brunswick.

| | |
|---|---|
| Total land area | 7.2 million ha |
| Forest | 6.1 million ha |
| Provincial Parks | 29 000 ha |
| Provincial Public Forest Land | 48% |
| Federal Public Forest Land | 1% |
| Private Forest Land | 51% |
| – Industry 20% | |
| – Private Woodlot 31% | |
| Annual Harvest | approximately 11 million $m^3$ |
| Species composition | 1/3 hardwood |
| | 2/3 softwood |
| Approximately 30 000 woodlot owners | |
| Average size woodlot | approximately 40 ha |

**Table 2.** Woodlot sector activities from 1930 to 2000. The province has offered the Forest Extension Service to the private sector. Discussions and negotiations are underway with a couple of stakeholders (Federation of Woodlot Owners, Maritime Forest Ranger School).

| Time Period | Activities | Jurisdiction/ source of external financing |
|---|---|---|
| 1930–1941 | Farm demonstration woodlots (owner activities) | Dominion Forest Service (Federal agency) |
| 1941–1952 | Extension Forester (owner activities) | University of New Brunswick |
| 1952–1975 | Independent Forest Extension Service (Owner and property activities) | Multi-agency (Board of Directors) Agriculture Regional Development Agreement Funds |
| 1975–1995 | Forest Extension Service (Branch) of Dept. of Natural Resources (Owner, property and sector activities) | Natural Resources and Energy (Provincial), Natural Resources Canada Federation of Woodlot Owners (Provincial), Joint provincial/federal development agreements. |
| 1995–2000 | Forest Extension Service (Unit) of Dept. of Natural Resources (owner, property and sector activities) | Natural Resources and Energy (Provincial), Federation of Woodlot Owners (Provincial), Provincial funding |
| 2000 | Forest Extension Service disbanded. Some property activities continued | Provincial funding |

## 6. A Canadian provincial perspective

The following section is an overview of what took place in the province of New Brunswick from 1930 to 2000. Analysing Table 2 reveals some interesting observations:

1. Woodlot sector development activities have been present since the 1930s but under different jurisdictions (federal, provincial, university as well as a multi-agency effort (1952–1975).
2. Development activities have always included 'owner activities', i.e. education, information, technical advice such as traditional extension work in one form or another.
3. The 1970s saw the introduction of management subsidies (property activities) in the form of a fixed amount per completed hectare (example – pre-commercial thinning) to promote forest management. Funds from federal/provincial development agreements were also used to assist organizational efforts among woodlot owners resulting in forest products marketing boards and Christmas trees and maple organizations. Once organizational efforts were completed, funding stopped and the groups were on their own. The efforts were successful and the organizations are flourishing today and are self-financed, economically independent entities.
4. It is interesting to notice that most funding has come from outside sources (federal) or joint federal/provincial development agreements.

5. New Brunswick has never had a specific woodlot/private forest legislation. We have the Crown Lands and Forest Act covering provincial public forestland. Private industrial forestland is expected to be managed at the same level, or better, as Crown land. The province did a Private Woodlot Resources Study in the early 1980s, but it never resulted in any legislative framework. Later efforts to introduce legislation, mainly to prevent over-cutting, have been unsuccessful.
6. Another somewhat unexpected result was that management incentives (property activities) were widely looked upon as social or make-work projects.

## 7. Conclusion

Successful policy and educational efforts to enhance sustainable small-scale forestry requires a long-term multi-disciplinary approach. An informed, educated woodlot owner/rural business enterprise owner is the most likely person to make national decisions.

The operational/regulatory environment must be stable enough to instill confidence in the system for long-term investments. It must also be flexible enough to accommodate changes in markets and products.

Economic incentives should only be used selectively to, for example, kick-start desired development/behaviour.

The educational and research community must apply a multi-disciplinary approach to sustainable woodlot management and incorporate socio-economic aspects of owning and operating a private woodlot.

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# The Challenges of Small-Scale Forestry in Finland: Policy and Planning Perspectives

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## 1. Introduction

The major task of Finnish forest policy today (as has been the case in the past) is to respond to the challenges of small-scale private forestry, which comprises the economic and social backbone of forestry in Finland. While it is easy to recognise the private and social benefits that the reasonably democratic structure of forest ownership provides, it is also evident that it is not an easy task to achieve a compromise between the legitimate interests of private owners and the national economic needs of the country, where the large-scale is dominant, especially in pulp and paper industries. This paper reviews some of current issues related to private small-scale forestry from the points of view of forest policy and forest planning.

## 2. Non-industrial private forestry in the economy and the society

As in many European countries, non-industrial private forestry in Finland is characteristically small-scale, where 86% of forest lots are smaller than 50 ha (Finnish Statistical... 2000). The number of forest holdings (> 1 ha) is 440 000 and they are owned by 380 000 families (17% of 2.3 million Finnish families). When family members and joint ownership are accounted for, the number of people having some ownership relation to the forests is estimated to be almost 900 000 (Ripatti 1999).

A bit outside the agenda of the paper, one may add that through state ownership (24% of forest land, but only 9% of annual cut) every Finn owns some forest, and if the shareholders of the two largest forest industry corporations (Stora Enso and UPM-Kymmene) owning together about 1.5 million ha of forest in Finland (7%), are included, the number of 'forest owners' is even greater and may comprise families in other countries as well. There is no doubt that the idea of shareholder 'forest ownership' is a bit distant, not only geographically, but also conceptually. As the profitability of small-scale (similarly to any other form of) forestry is a matter of the utmost importance, a specific feature related to profitability

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calculation in the corporate forestry can be recognised, as it is seldom used in non-industrial private forestry in Finland. According to the profitability calculations of Stora Enso, their forest, although producing 6% of the corporate profit, was calculated to perform unprofitably in terms of creating added shareholder value (profit minus 10% capital cost), reducing by almost 3% the total value creation (Stora Enso 2001). Apparently, from the corporate point of view, the capital bound to forestry was less productive financially than that of most manufacturing sectors. This probably was a reason that some time ago the CEO of Stora Enso raised a question whether the company should sell its forests. If that very unlikely vision were to happen, it hardly would increase the number, in particular, of the small-scale forest owners in Finland or in any other country.

In 2000 Finnish forestry accounted for 2.1% of GDP, and forestry and forest industries together accounted for 6.5% of GDP. The share of wood and paper industry was 19.5% of the value added of the industry (Statistics Finland 2001). Employment in forestry has decreased and consists nowadays only 23 000 permanent employees (1% of total employment). Forest industries provide 72 000 jobs and the total employment of the forest cluster (pulp, paper and wood industries, forestry, related metal engineering and metal workshops, chemicals production, energy transport, service enterprises including research and development) is about 140 000 persons (6% of all employment).

In 2000 pulp, paper and wood products made up 26% of total exports. It has been estimated that the entire forest cluster makes up about 10% of GDP and 30–35% of gross export earnings (Lammi 1999; Maa- ja metsätalousministeriö 2000).

The role of private forest owners in Finnish forestry can hardly be overestimated. In 1999 about 90% of the domestic wood used by the forest industries was from private forests and probably at the same level are also its contribution to the employment due to the use of domestic wood (about 17% of roundwood used by industry is imported). The role of private forest owners is steadily growing, the firewood and wood energy business is similarly central, and its share of total domestic wood use might nowadays be close to 10%. Annual stumpage income of private forests (including municipalities, parishes and joint forests) in 1999 was FIM 9.2 billion and according to preliminary data from 2000 as much as FIM 10 billion. About 67% of gross value added and as much as 84% of operating surplus of forestry is due to net stumpage earnings (Finnish Statistical... 2000).

The familiar role of private forests to contribute to the welfare of farms still exists, but concerns now many fewer farms than before. For non-farmer rural families and urban families who own forest, the additional forest income is similarly welcome, especially in the case of larger investment needs. The regional and rural impacts of forestry are still significant, although there is increasing leakage of stumpage income from rural areas to towns and cities. However, Järveläinen (1999) has estimated that about 80% of the stumpage revenues in non-industrial private forestry still go to forest owners resident in rural areas.

Forestry has maintained its supporting role in rural communities and although logging labour has dramatically decreased, silviculture, forest energy and some new forest uses (tourism, non-wood forest products) still provide employment and entrepreneurial opportunities. These opportunities are especially emphasised in the Finnish National Forest Programme 2010, where the major hopes for better employment is laid on the increased use of wood energy and the development of small- and medium-scale value added wood processing, and also entrepreneurship based on multiple uses of forests and nature (Ministry of Agriculture and Forestry 1999).

## 3. Small size due to land reforms and partitioning

The small size of the majority of forest holdings, is largely a result of the land reforms before, and just after, the independence of Finland (in 1917), and a resettlement programme after World War II. As farms created were very small, there was a need to complement agricultural income of the new farms with household wood supply and stumpage income (Järveläinen 1999). The resettlement programme mainly concerned people evacuated from the territories ceded to Soviet Union, but it promised a piece of land also to those repatriated soldiers having family, disabled servicemen, war widows, and also displaced farm workers and tenant farmers (Tykkyläinen 1996). Although the major rationale for small forest plots was to support agriculture on one hand and to compensate for the war losses and struggles on the other, there was also a connection related to the forest industry. The small size of the holdings had a purpose to provide a seasonal labour force for logging. However, the need for this labour force was more short-lived than had been anticipated. Increased mechanisation of logging meant that the seasonal work force was gradually replaced by professional forest workers; more recently these workers have been largely replaced by modern harvesters. The crisis of small-scale agriculture emerging since the 1960s was not mitigated by, but rather deepened by the developments occurring in logging.

Industrialisation and urbanisation and more recently, decreased farm subsidies, have essentially reduced the number of active farms, changing the structure of forest owners to be composed largely of non-farming rural and urban households.

Urbanisation has caused further partitioning and fragmentation of forest ownership. However, fragmentation may not have been be the only result as some partitioned parts are also transferred to people who already own forest. In fact, until 1997 there was legislation which favoured the farmers when the sale of agricultural or forest land was concerned. The legislation has contributed to a slight uneven development found in forest ownership during recent decades. The number of medium-sized forest holdings (20–50 ha) is decreasing, and the number of small- and large-sized holdings is increasing (Ripatti 1999).

## 4. Small-scale forestry and global forest industry

The persistent dilemma that Finland has been facing is to facilitate the success of large-scale forest industries under the conditions of small-scale non-industrial private forestry. Responding to this problem has always been in the main focus of the Finnish forest policy. The four major policy 'packages' can only be listed here: (i) legal and other support to the forest management associations operating at local level; (ii) well-developed regional control, extension, training and planning services for private forest owners; (iii) a sufficient financial aid for forest owners to attract forest improvement investments justified by national goals; and (iv) national forest (forest sector) programmes attempting, among other things, to keep a reasonable balance between forest resources and the demand prospects of the forest industries.

The dilemma between small-scale forestry and the large-scale industries may become even more problematic, not only due to increasing numbers of forest owners, but also because the structural change of forest ownership have brought the most owners less and less dependent on their forest based income. This does not concern only the non-farmer urban owners, but in the long term it may also concern those remaining farmers, who will be successful in their efforts to increase the scale and productivity of their agriculture under the framework of the Common Agricultural Policies of EU. However, just in these times the profitability crisis in agriculture due to decreased national subsidies and other measures required in a transition to CAP is the major issue and probably fully compels the use of the possibilities of forestry income.

In the forest industries the development into bigger units has been the prevailing tendency in Finland (as elsewhere) almost through the history of the industry. Already in the early 1980s in Finland the four biggest companies accounted for 40% of the forest industry turnover. After the restructuring of the industry during the past 10–15 years the same figure has risen to 90%. Just now there are three bigger companies left, of which two can be regarded as truly international players in the world forest industries. While acquisitions and mergers have been a part of the strategies of the pulp and paper industries in particular, the consolidation processes are nowadays characteristically international, and also global in the sense, that the larger companies carry productive activities in the major production and market areas of the world (e.g. Diesen 1998, Saastamoinen 2001).

Globalising forest industries have global strategies in their wood and other fibre supply, indicating that the mills of global companies located in Finland have, at least in principle, more alternatives to acquire raw material. This can be seen in the increasing role of wood imports (from Russia and the Baltic states in particular); although the imports from Russia are also explained by historical factors and the geographical location of the forest industries close to the border. Private forest owners, especially in the eastern Finland, have seen wood import as a factor of increased competition impeding wood demand and lowering prices.

## 5. Roundwood and contracting markets and competition authorities

The state and functioning of roundwood markets has been one the major topical issues in Finnish private forestry during recent years. A problem related to wood markets from the point of view of private forestry has been the closing up of the period of bilateral price agreements between the national association of the forest owners and the forest industry association. The emergence and stringent application of EU and national competition laws in timber trade has created a situation, which from the formal and legal point of view has been regarded as to be appropriate, but which in fact, to some extent at least, seems to favour the big companies at the expense of the small players, the private forest owners, small and effective logging enterprises and timber truckers, as well as small- and medium-size saw-mills. In practice, however, the position of the owners of small forests might not be the most endangered as the forest industry is more dependent on a stable wood supply than most forest owners are on stumpage income, as mentioned above. Therefore, it is more likely that the other three groups of small- and medium-size operators in the forest sector named, have in practice been more affected to the new competition rules and their 'unreserved' (as is sometimes claimed) application by the competition authorities. Hopefully, development will turn more towards partnership-type relationships (Högnäs 2000).

From the point of view of the competition theory, the scene of the forest sector in Finland may sometimes resemble the battle between David and Goliath, although the larger companies are nevertheless negotiating with, rather than fighting against, the smaller players (small-scale forest owners, logging and trucking contractors, independent saw-mills). However, one should not forget that at least David (the forest owners) had stones to fight with. Therefore, seen from another auditorium, the scene might look like that of Gulliver (the forest industry as a whole) tied down by the tiny Lilliputians (the small-scale forest owners). Alternative scenes could be described, and the issue from the point of view of the forest policy is whether, and to what extent, the scenes need a director?

## 6. Planning in private forestry

The task of forest planning is to help decision-making in forestry. This is achieved through providing information about decision alternatives, and making systematic comparisons and rankings between management options. Foresters and forest researchers should continuously ask themselves whether the methods they use are appropriate for this task.

Forest planning in the private forests in Finland is largely based on silvicultural stand-level management instructions, issued by regional forestry authorities. The problem with these instructions is that in essence they have been based on fixed goals, which usually maximise timber production. Another problem is that they do not take into account the inter-dependencies between different stands. These problems have been alleviated by adopting optimisation techniques such as linear programming in forest planning. This is a useful, but still insufficient step towards improved planning in private forestry.

There are several reasons why new planning approaches are needed, some of which have already been mentioned. The values of the society and individual landowners have changed a lot in the recent past. The society aims at ecological sustainability and nowadays even obliges individual landowners to conserve biodiversity. The majority of present forest landowners are non-farmers whose livelihood is not dependent on timber sales. They may have forest management goals other than maximising income or profitability, such as amenity values, berry yields, and nature conservation. The typical situation in present planning in private forestry is that the goals may be quite different in different planning situations, and there are several simultaneous and sometimes conflicting goals. Some of the goals may be qualitative. Many present-day private forest owners are not familiar with forestry terminology.

These changes have resulted in the need to develop forest planning in private forestry in two main directions. One direction is from rule-based planning towards customer-oriented multi-criteria decision analysis, in which the analysis of forest owner's goals and subjective comparisons between management alternatives are important. The other direction is from holding-level planning to planning that integrates regional considerations into the analyses (Pukkala 1997).

## 7. From rule-based planning to multi-criteria decision analysis

The present-day forest owner typically has several simultaneous goals, part of which are non-economic such as recreation and nature conservation. Nowadays, the major challenge of forest planning is to produce owner- and forest-specific management instructions, rather than deriving the plan from external instructions. This requires several changes in planning practices. First, methods for analysing the preferences of the owner need to be used. Second, techniques for multi-objective planning need to be prepared and adopted. Third, measures, metrics and evaluation tools for the non-economic goals must be developed and integrated in the planning systems.

Planning should show the optimal way to use forest resources in the future. However, the result of optimisation is only seldom, if ever, truly optimal. This is because the high degree of uncertainty related to the future and the vague and qualitative nature of some management goals. Uncertainty with multiple and subjective decision criteria are leading from hard optimisation to softer planning approaches. Optimisation procedures and planning software are more and more used in a heuristic and interactive way, which allow the planner to flexibly interact with the process, by changing the decision criteria and the problem formulation. The calculation and optimisation procedures of the present planning systems are complemented with tools that ease and systemise subjective evaluations.

Forest visualisation is one of the new tools to evaluate the consequences of alternative decisions (Nousiainen et al. 1999). Forest owners and others are more and more interested in the scenic value of forests, diversity of the landscape, and other non-numerical things. At the same time, people are less and less familiar with the forestry concepts like volume per hectare or stocking. What helps in this situation is visual planning, from which everyone can understand what is happening to the forest (Pukkala 1997). Several projects with this target are going on in Finland, and in the near future the results of this work will be applicable to routine planning. With some additional work, static illustrations change into animations and interactive landscape simulation; they will allow the forest owner to 'walk in' or 'fly over' a virtual forest.

Visual planning agrees with the thinking that planning usually finds only approximate solutions, and many solutions may be equally good. Visualisation greatly helps participatory planning, and is practically necessary in customer-oriented interactive planning. Visualisation does not mean replacing numbers by illustrations, but converting the results of numerical calculations into graphical visualisations.

## 8. From holding-level to landscape level planning

A very clear current trend in forestry is the shift in concern from timber production to conservation and enhancement of biodiversity. A new emphasis in the new Forest Act of Finland is in biodiversity conservation instead of the sole focus on sustainable timber production of the previous legislation. Biodiversity is conserved if the populations of all species are kept viable. Forest planning should take care that the forest continuously contains suitable habitat patches for all species, with sufficient connectivity between patches.

During the past decades, forest planning has been mainly based on stand-level evaluations and decisions: such a prescription has been selected for every tree stand, which maximizes timber production. Along with goal-based planning there has been a shift towards simultaneous stand- and forest-holding-level planning. This is because some of the management objectives cannot be evaluated at the stand-level or computed as the sum of individual stands. A common example of these objectives is the even-flow requirement, which states that harvests should be about the same during successive decades. The even-flow target makes the management of different stands dependent on each other.

There are many methods now available that simultaneously produce stand-level and forest-holding-level optima. This means that these two planning scales have been successfully integrated. However, this integration seems to be insufficient. The main reason for this is that ecological planning requires consideration of areas much larger than the forest holding (Kurttila 2001). The forest holding is a very arbitrary and rather small planning unit from ecological standpoint. The new scale, the landscape, is required because habitat quality of many species cannot be evaluated at the stand- and forest-holding-levels. However, ecological reasons are not the only ones that call for planning at the landscape scale; several other functions of the forest such as recreation, scenic values, hunting possibilities, and even timber production could benefit from landscape planning.

Landscape planning in the privately owned forests is not just about forgetting the forest holdings and replacing them by planning for larger areas. This is because the owners of the forest holdings are still the decision-makers who accept or reject the prescriptions of the plan within their own forest. Without this acceptance the plan will not be implemented, and it does not have the desired effect on habitat quality. Instead of landscape planning, a completely new method is needed which integrates the landscape-level with the present planning. This planning method should result in plans, which synchronize the treatments of neighbouring

forests so that they form a good combination at the landscape level, but are also fair and acceptable to the forest owners.

## 9. Biodiversity conservation in the forests of Southern Finland

As yet far biodiversity vs. wood production conflicts in private forestry have been modest compared with those related to state forests. State forests are largely located in the northern half of Finland, characterised by high unemployment rates and a higher than average role of forestry and forest industries as a source of livelihood. Therefore, the establishment of new national parks and other nature conservation areas on a large scale in the north during the past decades have often met with strong local opposition and required measures to mitigate the employment impacts.

The focus on biodiversity conservation has recently moved to the southern parts of the Finland, where only 1.1% of forest land is legally or otherwise strictly protected, compared with 16.9% in the northern boreal zone (Ympäristöministeriö 2000). The major reason for the relatively low level of forest conservation in the south is the dominance of private forests and consequently less availability of larger 'natural' areas to be protected. On the other hand, the fertility of southern forests means higher potential biodiversity values. Due to better profitability of forestry and the need to buy private forest land for conservation (or pay full compensation for the new restrictions going beyond those required by the Forest Act) the opportunity costs of biodiversity protection will be far higher than those in the less productive and more distant state forest lands of the north.

The debate on the protection of southern forests was already started during the preparation phase of the Finland's new National Forest Programme 2010. The programme did not make any final decisions on that major issue, but as a compromise suggested that an *ad hoc* work group will be established to estimate the needs and means for forest protection in Southern Finland (Ministry of Agriculture and Forestry 1999). The first *ad hoc* work group investigated the biological and conservation needs for forest protection in Southern Finland and Ostrobothnia (Ympäristöministeriö 2000). The second committee, established at the end of 2000 and representing a wide range of expertise and interests, is now involved in the more political and policy oriented task of compilation of a target, financing and action programme for the conservation of forests in southern Finland, including the western parts of the province of Oulu and the southwestern regions of Lapland. The dead-line for the committee is June 2002. New methods for realising and financing the conservation schemes are also under investigation.

## 10. Forest certification in small-scale forestry

Although there is a close connection between the criteria and indicators of sustainable forest management and forest certification, the main difference is that the former are included into the resolutions of the intergovernmental processes, while the latter is voluntary action of the market actors. In autumn 2000 there were more than 30 different national, regional or global certification systems covering more than 60 million ha of forest (Maa- ja metsätalousministeriö 2000).

The focus of Pan European Forest Certification (PEFC) has been the development of group certification for small private forest owners although the model can be applied for other forms of forest ownerships well. The Finnish Forest Certification System (FFCS) developed during 1996–1999 has been accepted by PEFC and certification started in 1999. By autumn 2000 over 90% of forest areas of Finland is certified. FFCS is also based on group certification of private forests.

Although FFSC has been almost unanimously supported by the Finnish forest owners, forestry authorities and the industry, it has received criticism from the major environmental NGOs, which departed from the process of developing jointly FFSC. The environmental groups declared in 1998 that only Forest Stewardship Council (FSC) offers the framework to meet the basic requirements of a good certification system. The focus of criticism was the conservation of biodiversity in managed forests. In their press release in 1998 they stated points of particular importance for forest certification, including, among other things, that old-growth forests and other key habitats remain unlogged also in managed forest areas (see Appendix 12 in Greenpeace Nordic and the Finnish Nature League 2001).

The recent report of two environmental NGOs claim that FFCS is a system dominated by forestry, that regional group certification probably leads to the low level of commitment to the certificate by forest owners and that ecological criteria of FFSC are poor (Greenpeace Nordic and the Finnish Nature Leaque 2001). However, only 10 of 55 'case studies' presented in the report to disqualify PEFC/FFSC were from private forests. Nevertheless, as PEFC/FFSC were developed in mind to be applied in private forestry, the criticism against this scheme is a matter of concern for small-scale forestry as well.

The report largely indicates the continuity of the battle on old-growth forests on state lands. In its unwillingness to give any worth to the past compromises made between the environmental and forestry authorities, the report reflects more on the ecological fundamentalism than the balanced approach between economic, ecological and social dimensions of sustainability, that certification processes should aim to provide.The other major issue raised by the report is the ongoing conflict between forestry and Sámi reindeer herding in northern Lapland. Let us elaborate some points behind this question.

The Northern Lapland Nature Management District, where the issue on reindeer-forestry relationship was raised is generally known as the state forest district where the multiple use forestry, nature-oriented forestry practices and stakeholder involvement in forest land management has been implemented longest, and where the share of protected and restricted forests of forest land is as high as 59%. Altogether the area of commercial forestry is only 9% of the total land area. The district has just completed the most detailed and advanced natural resource management plan ever made in state forestry (Sandström et al. 2000). The underlying reason why this model state forest district has been brought into the debate lays in the claim of Sámi people for state forest land. This is a major issue, which has nothing to do with the PEFC or FFCS, but explains the tension between forestry and Sámi reindeer husbandry. The fact that Sámi Parliament has been flagging for FSC may also appear behind the scene and create a demand for environmental NGOs to show that PEFC/FFSC cannot manage reindeer-forestry relationship in the area. The one part of the problem is a well-known part-whole bias: if one single separate area is discussed at a time without taking the full account of the whole land and forest uses of the area, and people related to them, then it is easy to question any single decision.

Certification is said to be a process led by markets. Competition is an essential characteristic of the markets. It is easy to find that there is a competition for market shares between the two certification schemes. Certification is a part of policies for improving sustainability of forestry and the forest sector at large, but it is also a tool for maintaining or improving the environmental image. It is evident, that in the sensitive area of image building the environmental organisations do have a considerable market power, which they exercise effectively through the mass media. But use of any power is a sensitive issue and the danger of misuse is always a possibility. If that occurs it certainly will undermine the long term credibility of the organisations involved.

## 11. The smallest scale: utilisation of berries and mushrooms

In Finland, as in many northern countries, picking berries and mushrooms is part of the traditional common rights, usually referred to as 'everyman's rights', to utilise forests. Although these rights are not written in law, berries, mushrooms and some other products have been purposefully excluded from the property rights of the forest owner. The ordinary citizen and the forest owner, therefore have the same rights and basic opportunities to practise this traditional 'micro-scale' forestry (until very recently berries and mushrooms were included into forestry in National Accounts). The arguments for common rights were initially social. During tough times in the past, non-wood forest products have had particular subsistence value, especially for the poor and landless. Although currently the use of everyman's rights is mainly related to recreational leisure time activities, there are economic interests involved as well.

Most widely these are related to picking wild berries and mushrooms, a tradition which continues to be rather strong in Finland. In 1997, 60% of Finnish households picked 56.5 million kg of wild berries and in 1998 a total of 49.7 million kg was picked. In 1997, 27% of berries were picked to get sale income by 5% of the households (Saastamoinen et al. 2000).

Somewhat surprising is the possibility that the quantity of berries picked in 1997 was probably higher than in any previous year. Until now, the highest officially documented figure was 47 million kg recorded for the wartime year of 1943. According to the officially documented figures, which were mainly drawn from household surveys done every fifth year, the quantities collected decreased significantly during the 1950s and 1960s. Presumably, berry-picking has been increasing since the 1970s, but there are no reliable annual statistics or studies concerning direct household use – which comprise at least 75% of picking – to prove this. Fortunately, there are annual statistics concerning commercial picking of berries and mushrooms based on the purchase of these products by industry and organised trade. In the 1990s the income from collecting berries and mushrooms has varied between FIM 30 million and FIM 141 million (Food and Farm Facts 2000).

One can claim that the sale income from picking berries is 'small potatoes' compared with stumpage earnings (during 1995–1999 it was only 0.6% of gross stumpage earnings). If the value of household use is included (which is a fairer comparison), then in 1997–1998 the value of picking berries was 3.7% when compared with the output value of roundwood harvested. The picture becomes significantly different if the remote areas of active income oriented picking are considered. For example, in Suomussalmi commune 31% of households participated in commercial picking earning on average FIM 3280 per household in 1997 (Kangas 2000).

## 12. Final conclusions

The sustainable challenge of Finnish forest policy has been to cope with the dilemma between the small-scale private forestry and large-scale forest industries. Private non-industrial forestry comprises the economic and social backbone of forestry in Finland, and plays a key role also from the point of view of domestic industrial wood supply. While the existing democratic structure of forest ownership provides numerous economic and social benefits to society, it is also evident that there are difficulties when compromising between the legitimate interests of private owners and the national economic needs of the country, even nowadays when much depends on the success of wood, pulp and paper industries. New dimensions of sustainability have brought new challenges for small-scale forestry, including the needs to further biodiversity conservation and develop new models for landscape ecological planning to be applicable in the institutional settings of small private forest ownership. Also forest

certification belongs to the actual challenges of small-scale forestry and seems to be the area, where the debate and argumentation goes far beyond the borders of ownership categories.

The system of forest planning in Finland has recently evolved into the structure of multi-level planning, where political, non-legally supported national forest programmes and regional forestry target programmes required by the new Forest Act provide the general national and regional frameworks and set the general targets. In private forestry the voluntary forest holding level planning results in more operational plans, serving the diversifying targets of the individual private forest owners. In state forestry, the strategic natural resource planning and landscape ecological planning play a key role and can utilise the professional knowledge, wide participation and sophisticated procedures more efficiently. New approaches for landscape level forest planning in private forestry are also being developed to contribute to the needs to adopt forest management practises, which take consideration the ecological impacts and interaction between the individual forest holdings.

The purpose of forestry planning is still the same as decades ago: it should provide relevant information for decision making in forest management. What is new is that the number of stakeholders and decision makers in forestry has been largely increased and forest planning should be able to serve the new information needs derived from the new uses and users of forests.

The forest manager 'needs to have the earthy and intimate forest understanding of the silviculturist, the long range viewpoint of the planner, the skills of the administrator, and the alertness, flexibility, and all-around resourcefulness of a successful businessman' summarises Davis (1978). In addition to these well defined qualifications, certain new roles are presently required: 'Today foresters and their forest ecosystem manager colleagues are adapting to a more humble, facilitator and negotiator role in assisting citizens of a democracy in developing long-term public forest goals and broad parameters on management options...' as Kennedy et al. (1998) have put it.

Despite the new challenges both private and public forests and their managers are facing, the basic question for forest policy during the new millennium may still have remained the same, which Davis (1978) formulated when discussing past – not always very successful – experiences of forest planning: '... the real problem is to meet the present and still care for the future'.

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# Forest Tenant Farming as Tested in Canada by the Bas-Saint-Laurent Model Forest: Is it Socio-Economically Viable?

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## Abstract

This paper analyses the socio-economic viability of forest tenant farming, a land leasing system that Canada's Bas-Saint-Laurent Model Forest has been testing since 1994. Forest tenant farming is first described, as well as the approach used to evaluate this system. The evaluation approach is based on four criteria: viability of tenant farms, cost of supervision and technical support, socio-economic benefits, and potential for extending the model. The results of five studies are then summarized from the perspective of the evaluation criteria, and the principal issues raised by the testing and extension of forest tenant farming are identified. The paper closes with conclusions on the socio-economic viability of this management model.

*Keywords: forest tenure; forest tenant farming; community forestry; sustainable rural development*

## 1. Forest tenant farming in brief

Located in the eastern part of the Province of Quebec, the Bas-Saint-Laurent Model Forest (BSLMF) is part of a network of 11 model forests established in the early 1990s by the Government of Canada to develop new approaches and find practical solutions to concerns related to sustainable forest management. The main program of the BSLMF is the development and testing of forest tenant farming, a land leasing system that can be defined as follows:

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*Allocation of a unit of land to an individual, called a forest tenant farmer, who agrees to manage it in a sustainable manner and to share the ensuing revenues with the landowner.*

This approach provides a way to circumvent the fact that it is impossible for most people interested in becoming forest farmers to acquire enough forest land to generate, through their management of the land, sufficient earnings to eliminate their dependence on social programs.

The main objectives of the forest tenant farming system are to:

- create wealth in rural communities;
- foster entrepreneurship;
- place greater value on forestry work; and
- develop an exportable model.

Forest tenant farming is being tested on two sections of land (seigneuries) owned by Abitibi-Consolidated, a large forest company (Figure 1). The Seigneurie du Lac-Métis is located about 75 km southeast of Rimouski, the regional urban centre. Covering an area of 33 900 ha, it can be reached through the municipalities of Saint-Zénon-du-Lac-Humqui and Saint-Charles-Garnier. It is divided into 16 farms or holdings allocated to tenant farmers. The Seigneurie Nicolas-Riou is 40 km southwest of Rimouski, within the municipality of Saint-Eugène-de-Ladrière. Covering 13 700 ha, it is divided into 9 tenant farms.

The 25 tenant farms average about 1000 ha each. Their average annual allowable cut is in the range of 1600 solid $m^3$ per year, with fir, spruce, maple and birch representing the main commercial species.

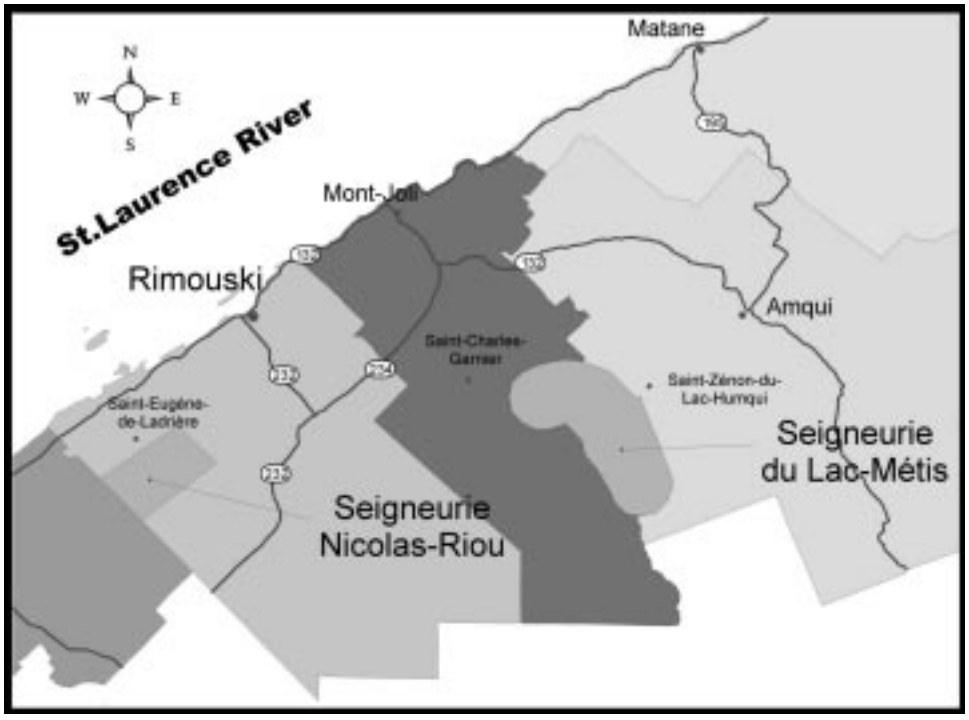


**Figure 1.** Location of tenant farming test areas.

The operational framework of the tenant farm system is characterized by:

- management delegation by the landowner of all forest resources to the Model Forest;
- 10-year contracts between the Model Forest and the tenant farmers;
- an agreement between the Model Forest and the landowner regarding the destination of timber cut on the seigneuries. Under this agreement, the landowner may determine the destination of saw logs, for example that all softwood saw logs be sent to a specific sawmill. In these cases, a committee of tenant farmers negotiates prices with the sawmill, based on market prices;
- individual management of the timber on a farm-by-farm basis;
- stumpage fees serving as rent;
- a collective management of hunting, fishing, and recreational and tourism activities through a tenant farmer outfitting business in each seigneurie; and
- the general supervision and technical support provided by the Model Forest.

The planning of forestry activities is based on a multi-resource management plan arising out of a consensus reached with the Model Forest's partners. This plan includes a code of ethics that governs interventions. For example, both the use of phytocides to maintain stands and clear-cutting over more than 4 ha are banned.

Stumpage fee rates vary according to the commercial value of the species. Each year, the Model Forest collects approximately CAN$8000 of stumpage fees per tenant farm. These amounts are used as follows:

- 20% is used to pay land taxes and territorial protection fees against forest fires, insects and diseases;
- 50% is reinvested in the land, mainly in silvicultural and road work; and
- 30% is placed in a compensation fund. This fund is for the tenant farmers, to compensate them for improving the territory.

So far, the landowner has agreed to reinvest all of the stumpage fees in the tenant farming project. In the medium term, however, the Model Forest intends to return to the landowner part of the stumpage fees it collects from the tenant farmers.

The net profits before taxes of the tenant farms in 1998–1999 varied between CAN$10 000 and CAN$60 000, with the average being around CAN$31 000. Approximately 80% of the tenant farms' earnings come from the sale of timber. Other sources of earnings include government subsidies for forest management work (13% of total earnings), net benefits from hunting, fishing and recreational activities (3%) and the compensation fund (3%). The main expenditure items are contract activities (33%), employee wages (30%) and stumpage fees (13%).

## 2. The evaluation approach

In 1998, the Canadian Forest Service (CFS) agreed to evaluate the socio-economic viability of forest tenant farming as tested by the Model Forest. The author was in charge of this project.

First, four evaluation criteria were established:

- viability of tenant farms;
- cost of supervision and technical support;
- socio-economic benefits; and
- potential for extending the model.

Five studies were then produced:

- a survey of tenant farmers;
- a survey of former tenant farmers, i.e., people who had been, but were no longer forest tenant farmers;
- a survey of tenant farm employees;
- an estimate of socio-economic benefits; and
- a study of the cost of supervision and technical support.

On this basis, a detailed evaluation report was produced (Masse 2001).

## 3. Results

This section summarizes the results of the individual studies in terms of the four basic evaluation criteria. The principal issues arising out of the testing and extension of forest tenant farming are also discussed.

### 3.1 Viability of forest tenant farms

According to our indicators, forest tenant farms are viable enterprises. The surveyed tenant farmers stated that they were generally satisfied with the net profits they earned from their farms. The vast majority even anticipated that profits would increase over the next few years, and the reasons given for this were plausible. Their tenant farmer status also provides them with a number of non-monetary benefits. For instance, several use Model Forest lands for personal and family recreation activities, such as hunting, fishing and hiking.

The tenant farmers noted that they had achieved the two most frequently cited initial expectations with regard to forest tenant farming, namely making a decent living from the forest by working year-round, and becoming their own boss. All wanted to continue forest tenant farming in the medium term (5 years), and most hoped to stay on for the long term (15 years); this in itself is an overall indicator of viability. All of the former tenant farmers interviewed, moreover, felt that most forest tenant farms would be viable enterprises in the medium term.

The profitability of forest tenant farms, however, raises a number of issues:

1. *Demarcation of forest tenant farms.* The former tenant farmers named lack of profitability as their main reason for quitting forest tenant farming. They stated that this poor profitability was primarily due to initially overestimated available wood supply (quantity and quality) in some forest tenant farms. The division of land into forest tenant farms should therefore be based on a sound knowledge of available wood supply and of parameters such as operating costs and resource markets.
2. *Poor working conditions.* Several tenant farmers stated that some forestry operations required too much physical effort or involved poor working conditions for both them and their employees. Some would like to address this problem by mechanizing their cutting operations. In this context, the Model Forest and three tenant farmers in the spring of 2000 undertook the initial phase of a trial project focusing on the mechanization of harvesting operations. The purpose of this trial is to measure the impact of small-scale mechanization on the profitability of cutting operations and on their environmental and social acceptability.

3. *Management of non-timber activities.* None of the forest tenant farmers who initially hoped to engage in recreation and tourism activities has achieved this objective to date. Also, the medium-term expectations of tenant farmers regarding non-timber revenue are lower than they were at the start of the project. Current and former tenant farmers identified several causes for this phenomenon, including inadequate structures for the collective management of hunting, fishing, and recreation and tourism activities, limited demand due to remoteness from major urban areas, and the large investments required to develop reception and accommodation facilities. Conclusions cannot be drawn on the economic potential of these non-timber activities at this time because this is a complex issue that must be examined separately.
4. *Sensitivity of profits to wood market conditions.* In the medium term, wood production will remain the main source of profits for forest tenant farms, notwithstanding the farmers' efforts to diversify their income sources. Consequently, the profit levels of tenant farms will remain vulnerable to wood market fluctuations. Similarly, a majority of present and former tenant farmers felt that the agreement on the destination of wood harvested in the Model Forest had a negative effect on their revenue from the sale of wood. Our data indicate that the impact on total revenue from the sale of wood is on the order of 3% to 6%. Thus, for the average forest tenant farm, a 5% decline in revenue from the sale of wood leads to a reduction of about 10% or CAN$4000 in the net profits generated by that farm. Consequently, it would be preferable to have no specific limitations on wood marketing when forest tenant farming is extended beyond the Model Forest.
5. *Compensation fund.* We do not see the relevance of reinvesting a portion of the stumpage fees into a fund to compensate forest tenant farmers for improvements they make to the land. Note that about 30% of stumpage fees are placed in such a fund. In our view, a balance already exists between the rights accorded to the forest tenant farmers and their contractual responsibilities. Moreover, this opinion is also shared by a number of tenant farmers.
6. *Supervision versus freedom of action.* Several current and former tenant farmers stated that they were not comfortable with the supervision of their operations by the Model Forest. According to them, too much emphasis on supervision resulted in a lack of freedom of action. Several former tenant farmers stated that this was the reason they had ended their participation in the project. We agree with most tenant farmers that some form of administrative and technical supervision is required to ensure sound forestry practices. Since the same individuals are responsible for providing supervision and advice, it is normal for tensions to arise between members of the technical team and some tenant farmers. In this regard, it is important for tenant farmers to recognize the limits of the rights that they have been accorded over resources that do not belong to them. The resulting restrictions must be taken into account from the very beginning of the tenant farmer selection process. Conversely, administrative and technical supervision must be lightened as much as possible in order to foster a spirit of initiative among the tenant farmers.

### 3.2 Costs of general supervision and technical support

The study of costs associated with general supervision and technical support provided to forest tenant farms indicates that such costs are similar to those incurred by forestry group ventures operating in Quebec private forests.

Our results also indicate that the general supervision and technical support costs of tenant farming are higher overall than those of industrial forestry on public lands. This is primarily

because of the economies of scale inherent in the size of industrial wood harvesting operations and because of the operational and management support provided to tenant farmers. Extending tenant farming to public lands would therefore require supervision and technical support costs similar to those in private forests.

### 3.3 Socio-economic benefits

The spin-offs from the testing of forest tenant farming are primarily local and regional. These benefits have been estimated in terms of direct labour generated by the operation of tenant farms, tenant farm operating expenditures, consumer expenditures by tenant farmers and their employees, and processing of wood that is harvested.

Tenant farming also generates substantial savings in employment insurance payments. In the two years prior to becoming tenant farmers, 88% of the future tenant farmers were drawing employment insurance for an average of 23 weeks a year. These individuals are no longer dependent on this social assistance.

Most of the tenant farmers' employees stated that they were satisfied with their jobs. They especially appreciated the opportunity to work near their homes, their relations with their employer, the safety of their jobs and the training opportunities offered to them. As a general rule, they considered their jobs superior to other forest jobs that were available in their region.

Four main issues can influence the nature and extent of the benefits of tenant farming:

1. *Number of tenant farms in a given territory.* The extent of local and regional benefits from tenant farming depends in large part on the number of tenant farms that are established in a given territory. Consequently, it seems preferable to implement tenant farming in blocks of ten or more tenant farms, as was done in the Model Forest. This group-based approach also has the following advantages:

- it ensures that there is a sufficient critical mass of territory for the management of non-timber resources (e.g. an entire lake);
- it ensures that there is a sufficient critical mass of territory to justify the participation of local and regional stakeholders in the decision-making process;
- it creates conditions that are conducive to mutual assistance and co-operation; and
- it makes possible economies of scale with respect to supervision and technical support.

2. *Size of forest tenant farms and timber supply.* The forest tenant farming approach requires the available wood supply to be calculated for each tenant farm. However, recent simulations have found that the available wood supply of the seigneuries in the Model Forest would be higher if it was calculated at the seigneurie level rather than for each tenant farm. The territorial characteristics of individual tenant farms, therefore, can reduce the allowable cut over a given area, thereby reducing the stumpage fees as well as certain types of economic benefits by comparison with other management models. Conversely, tenant farming promotes integrated resource management of forests, thereby generating additional benefits and spin-offs by comparison with more sector-specific management approaches. Furthermore, as we have seen, the spin-off benefits of tenant farming are mostly local and regional, which is not necessarily true of other management methods.
3. *Mechanization of harvesting operations.* The strong trend toward mechanization of harvesting operations in Quebec should, over the medium term, exert an influence over the direct labour generated by forest tenant farming. This issue is being examined in the test of small-scale mechanization of harvesting operations, which has been undertaken by the Model Forest.

4. *Degree of internalization of benefits.* The internalization of the spin-off benefits of tenant farming at the local and regional levels is attributable to two main reasons: (i) the management method itself; and (ii) the characteristics of the economy in the Bas-Saint-Laurent region. Among the characteristics of the region is the presence of several medium-sized municipalities and one regional centre that offer most of the goods and services required by the population. The degree of internalization of spin-offs could therefore vary according to the characteristics of each region where tenant farming is implemented.

### 3.4 Potential for extending the model

All of the interviewed tenant farmers and former tenant farmers felt that the forest tenant farming model could be extended to areas other than the Bas-Saint-Laurent Model Forest. Nearly all of them foresee extending the model to public lands, particularly near municipalities. It should be noted that, in Quebec, most of the forest lands that are large enough to accommodate groups of forest tenant farms are in the public domain. Factors contributing to the stated preference for land near communities include the advantages of working near one's place of residence and the sense of belonging that local communities have in relation to their surrounding territories.

From this standpoint, the tenant farming model offers several advantages:

1. *Diversification of public land tenure.* Diversification of the land tenure system with respect to public land is desirable. Each type of tenure has its advantages and disadvantages, and only a broad range of tenures can accommodate the diversity of contexts that can arise in the management of forest resources. The parameters of such diversity include the specific characteristics of forest areas, regional economic contexts and local community aspirations. The establishment of tenant farms on public lands would not constitute a precedent because forest land leasing formulas already exist in Quebec and other provinces, notably with respect to the maple syrup and blueberry industries.
2. *Flexibility of application.* The tenant farming concept can take several forms, depending on the context to which it is being applied. Potential variants depend on such factors as:

- the type of tenure (public or private);
- the nature of the rights accorded to tenant farmers (wood resources, maple resources, wildlife resources, etc.);
- the legal designation of the tenant farms (companies, self-employed workers' enterprises);
- the structure of the tenant farmers' group (co-operative or other); and
- the proponents and partners involved, including the entity providing general supervision and technical support (forestry group venture, forestry co-operative, group of organizations, etc.).

For example, in the spring of 2000, Maibec Industries announced the creation of a forest tenant farm in blocks of lots that it owned in three counties in eastern Quebec. Drawing its inspiration from the Bas-Saint-Laurent Model Forest, this initiative combines wood harvesting with the operation of a sugar bush, an outfitting business and an inn. In addition, a study is currently under way in New Brunswick to assess the potential of extending different variants of tenant farming to the specific context of that province.

3. *Combination of entrepreneurial and community approaches.* Although it relies on the entrepreneurship of tenant farmers, forest tenant farming also fits into a community economic development framework. The concept of tenant farming in fact has three of the key characteristics of community economic development (Groupe Éconov Développement Inc. 1993):

- active community participation, particularly in setting objectives;
- integration of economic and social development based on a comprehensive and non-sectoral approach; and
- a territorial approach whereby a community defines itself on a geographical basis.

4. *Improved social atmosphere.* The tenant farming approach meets the growing need of local communities to control the development of their natural and human resources. Through its emphasis on participation, tenant farming makes local populations more accountable for the management of neighbouring forest resources and thus reduces the possibility of scapegoats being named when errors occur.

The prospect of extending tenant farming also brings out a number of issues:

1. *People interested in becoming tenant farmers.* To date, many individuals have expressed an interest in becoming tenant farmers. During the initial recruitment drive in 1994, the Model Forest received 346 applications from Quebec and other provinces for 27 available tenant farmer positions. In 1998, a request for applications restricted to the Bas-Saint-Laurent region yielded 105 candidates for 5 vacant positions. This level of interest was confirmed in a survey of 439 forest workers in the Bas-Saint-Laurent region (Stanek 1997). When asked to identify what they considered the ideal job, 9% of respondents stated that they would like to be tenant farmers and 21% named forest farmer as their ideal occupation. Note that tenant farming is viewed as a means of overcoming the impossibility, for most individuals interested in forest farming, of acquiring enough land to earn a sufficient living without having to rely on social assistance.
2. *Wood harvesting costs.* Like most approaches to community forestry, tenant farming entails higher harvesting costs than industrial forestry. This is primarily due to the differences in the scale of operations and levels of mechanization. However, the cost gap could be narrowed in the medium term by the probable implementation of mechanized cutting methods in forest tenant farming, and by increasing requirements imposed on public forest harvesters with regard to planning and the size of cutting areas.
3. *Government support.* The government of Quebec supports the testing of tenant farming through its forest resource development programs. However, the Quebec government would facilitate the extension of the tenant farming concept considerably by restructuring the rights that have been accorded on certain public lands located near local communities. Such an adjustment would make room for tenant farming projects and other community forestry initiatives. The government can also facilitate the start-up of tenant farming projects through training programs, tax incentives and stumpage fee rebates (adapted from Bouthillier 1992).
4. *Forest industry collaboration.* Forest industry involvement is also required, particularly in terms of technical support, the opening up of processing markets and collaboration in the restructuring of public forest tenures.

## 4. Conclusion

The socio-economic viability of the concept of forest tenant farming was examined on the basis of four evaluation criteria and a number of indicators stemming from those criteria. The results for each of the criteria may be summarized as follows:

- Tenant farms are viable enterprises that will continue to derive their profits primarily from wood production in the medium term.
- General supervision and technical support costs reflect the characteristics of the model and are similar to those incurred by forestry group ventures operating in Quebec private forests.
- The socio-economic benefits of tenant farming are tangible and are concentrated at the local and regional levels.
- The potential for extending the model is good, particularly to public forests located near municipalities.

However, the testing and extension of tenant farming do present a certain number of challenges that we have identified as issues. These include the collective management of non-timber activities, the balance to be achieved between supervision and freedom of action, the vulnerability of profits to wood market fluctuations, and government support.

Overall, these results indicate that forest tenant farming, as tested by the Bas-Saint-Laurent Model Forest, is indeed socio-economically viable. However, only the establishment of forest tenant farms in a variety of contexts will make it possible, in the long term, to determine the potential for extending forest tenant farming.

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# Forest Management Planning
# – Tool for Sustainable Small-Scale Forestry –

# Treading the Path to Sustainable Forestry: New Directions in Canada with Particular Reference to British Columbia

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## Abstract

In response to the change in social values, sustainable forest management (SFM) is emerging as a defining feature of modern society. Reflecting the value realignment, Canada has made significant progress in shifting towards an SFM paradigm. New national policies and initiatives have been positioned in recent years led by the development of a national forest sector strategy and the endorsement of a set of science-based criteria and indicators (C&I) with their roots in the Montreal Process on the conservation and sustainable management of temperate and boreal forests. British Columbia (BC), with much of the globe's remaining coastal temperate rainforests and one of Canada's largest forest provinces by any measure, has implemented a wide array of policy changes and programs in an effort to further promote SFM. The key components of the BC SFM package include multi-stakeholder land use planning, a commitment to double the protected areas, and the codified prescription of forest management. More recently, BC has re-calibrated the Forest Practices Code in pursuit of operational efficiency, established pilot community managed forest tenures, promoted incremental silviculture and tried to encourage employment in the sector. The emerging paradigm has resulted in new directions in forest practices. In particular, the question of forest renewal and the integration of non-timber values into forestland use have become key issues to policy-makers and sector stakeholders. Given the need to balance social expectations, sustain the forest ecology and work within economic realities, there is little reason to expect that the path to SFM will be prescriptive or without displacement. Transition dynamics can, however, be smoothed, albeit only to a degree, by the rigorous examination of SFM drivers, SFM characteristics, stakeholder perspectives, market signals, and the institutional setting. This paper will examine the SFM policy efforts of Canada and British Columbia.

*Keywords: sustainable forestry, criteria and indicators, silviculture, policy*

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## 1. Introduction

Canada accounts for approximately 10% of the Earth's forests. Of the nation's 417.6 million ha of forest (i.e. 45% of Canada's land area), 235 million ha are considered 'commercial forests' – capable of producing timber along with a variety of other benefits, including maple products and Christmas trees. Of these commercial forests, an estimated 119 million ha are currently managed primarily for timber production, while the remainder have not been accessed or allocated for timber supply. In other words, although 56% of Canada's forests are considered capable of producing forest products, only 28% are managed for timber purposes. Annually, Canada harvests less than half of 1% of its commercial forest area. In 1998, it is estimated that 400 863 ha were planted with 543 million seedlings and another 27 009 ha were seeded. Canada's non-commercial forestland is made up of open forests comprising natural areas of small trees, shrubs and muskeg. This array of forest ecosystems provides diverse habitats for an estimated 140 000 species of plants, animals and micro-organisms (Natural Resources Canada 2000a).

Forests are one of the strongest symbols of what is Canadian. For centuries, the inhabitants of this land have relied on the forest for basic needs. Forests are a dominant feature of the economy, culture, traditions and history. About 340 communities in Canada depend largely on forestry and in 1999 some 352 000 direct jobs were provided by the forest industry or related services (Natural Resources Canada 2000a).

Canada's forests are predominantly publicly owned (94%), with the federal government overseeing 23% and the provincial governments regulating 71%. The remaining 6% is held by an estimated 425 000 private landowners. The biggest challenge is to manage the forest resources in a sustainable fashion. This paper has three primary objectives: (1) the major initiatives that Canada has implemented in recent years in fostering sustainable development of the Canadian forestry sector are documented; (2) the initiatives in British Columbia, which is Canada's largest forest province, are summarised; and (3) the implications of the new initiatives for sustainable forestry and the major trends are discussed highlighting the new directions in the near future.

## 2. Emerging issues and trends surrounding sustainable forestry

Canada is one of the first countries in the world to be cognisant of the arrival of the environmental age. At the beginning of the 1980s, leaders in the Canadian forestry circle endorsed a document known as 'A Forest Sector Strategy for Canada'. In 1985, the Canadian Council of Forest Ministers (CCFM) was established for the purpose of setting the direction for stewardship and sustainable management of Canada's forests. Under the direction of the CCFM, A National Forest Sector Strategy came into being, which may be viewed as the first truly national, comprehensive statement on Canada's strategic concerns regarding forestry matters.

Since the late 1980s, the wind of change has swept across the country and, as a result, Canadian forest policies and legislation have responded in a very positive way through broadly based consultation and consensus building. Canadians have participated in a variety of consultative forums and have had the opportunities to express their views on how the nation's forests should be managed. Their views and values have found their way into the reorientation of government policies. Forest values have evolved to include economic, environmental, social and cultural considerations. Although the traditional forest industry remains a cornerstone of the Canadian economy, forest management in this country is increasingly viewed as encompassing much more than simply promoting timber.

In line with the global tide of sustainable development, the Government of Canada announced in 1990 a Green Plan as a national action plan for a healthy environment. It was a landmark document in that the Canadian government formally declared that clean air, water and land must be respected as life's three essentials. Stipulating that sustaining the forest constitutes one of the most important elements of the Green Plan, Canada pledged to become the world's best model of sustainable forestry through building partnerships with the industry and other stakeholders, conserving forest diversity and fulfilling Canada's international obligations (Government of Canada 1990).

If the Green Plan offered a vision for moves towards achieving the objectives of sustainable forestry, that vision was substantiated in 1992 through the CCFM's release of Sustainable Forests – Canadian Commitment. Some of the defining characteristics of that document include: (a) a clear recognition that forests constitute a key element of Canada's natural environment; and (b) a consensus among various forest stakeholders to become partners in embracing the concept of sustainable development. The commitment to sustainable forestry was encapsulated in the Canada Forest Accord, which was signed by representatives of the industry, communities, First Nations, and labour, as well as the federal and provincial governments. Individually and collectively, the signatories committed themselves to their respective action plans in response to the new forest strategy (see Canadian Council of Forest Ministers 1992).

Since the early 1990s, a number of fresh forest policy initiatives have been launched. As the ways by which forests are managed are of great concern, both domestically and internationally, efforts have been made to maintain Canada's unique forest landscapes through their designation as 'protected areas'. As of the end of 1999, some 10% of the land base in this country have been recognised by legislation as falling under some form of protected status. Many provinces have designated additional areas for protection. Meanwhile, because the 1992 National Forest Strategy expired in 1997, when the 8th National Forest Congress took place in Ottawa in the spring of 1998, some 350 members of Canada's forest community endorsed a new 5-year National Forest Strategy and confirmed their commitment to the Strategy by signing an amended Canada Forest Accord. There are nine strategic directions in the new National Forest Strategy, each with a set of commitments (Canadian Council of Forest Ministers 1998).

One of the most conspicuous achievements that Canada has made is the development of a set of criteria and indicators (C&I) that was made public in 2000 (Canadian Council of Forest Ministers 2000). C&I provides a science-based tool for measuring performance and progress towards sustainable forest management. Specifically, the six criteria are:

- conservation and enhancement of forest ecosystems;
- maintenance and enhancement of forest ecosystem condition and productivity;
- conservation of soil and water resources;
- forest ecosystem contributions to global ecological cycles;
- multiple benefits to society; and
- accepting society's responsibility for sustainable development.

The CCFM framework was designed for national level assessments and reporting, with the following primary benefits: (a) evaluation of the effectiveness of existing forest practices and regulations; (b) orientation of future policies supporting the sustainable development of forests; (c) improvement of information availability to facilitate knowledgeable domestic and international dialogue on forest issues; and (d) identification and prioritisation of research needs. Table 1 provides a list of the milestones that characterize Canada's policy moves towards sustainable forestry.

**Table 1.** Milestones of Canada's moves towards sustainable forestry.

| | |
|---|---|
| 1899 | Birth of Canadian Forest Service |
| 1906 | Convening of Canada's first National Forest Congress |
| 1977 | National Forest Regeneration Conference |
| 1981 | Release of A Forest Sector Strategy for Canada |
| 1985 | Establishment of the CCFM |
| 1987 | Release of A National Forest Sector Strategy<br>Announcement of the Green Plan |
| 1991 | Release of Canada's first report The State of Canada's Forests |
| 1992 | Release of Canada's first National Forest Strategy, Sustainable Forests: A Canadian Commitment |
| 1995 | Release of the CCFM framework that identifies forest values (6 criteria) that Canadians want to sustain and enhance, and describes the factors (83 indicators) that measure the condition of these values |
| 1998 | Release of Canada's second National Forest Strategy |
| 2000 | Public commitment to CCFM C&I framework |

While the new trends outlined above clearly indicate Canada's progress towards sustainable forestry, there are a number of challenges facing the nation. For instance, consumers of final forest products demand assurances that the wood and fibre products they purchase come from sustainable managed forests. Meanwhile, forest industries in Canada have recognised that increasing competition within global markets is challenging this nation's position as the world's largest exporter of forest products. This recognition is accompanied by the realisation that Canada's position as an abundant supply of low-cost, easily accessible, high-quality timber has also been eroded. As a result, the industries have had to grapple with a number of other challenges, such as trade tariffs (such as with a number of APEC [Asian-Pacific Economic Co-operation] countries), export quotas (such as the softwood lumber agreement with the USA), international building codes and standards (such as in the case of Japan), and the move towards certification of forest products originating from sustainably managed forests. These challenges will be further discussed in section 4 when the new directions of forest policy are delineated. However, in the succeeding section some new initiatives that British Columbia has adopted in recent years are described.

## 3. British Columbia's initiatives

In Canada, each province has its own legislation, regulations, standards and programs through which it allocates public forest harvesting rights and management responsibilities (Winget 1984). In this section, the British Columbia initiatives are focused on.

Forests are the mainstay of the Provincial economy. For instance, the contribution made by the forest industry accounts for 48% of the total manufactured shipments. The forest industry is a major source of livelihood for 292 500 British Columbians (COFI 1998).

In the early 1990s, conflicts broke out between the forest industry and environmental groups who threatened to launch international boycotts of BC forest products. Aimed at ending the 'war in the woods', the BC Government announced a package of significant policy changes. For the purpose of deflecting criticism from environmentalists, this package comprised three main components: (1) the Province adopted a strategy of reserving 12% of the Province for parks and other protected areas as a tool for defusing the threat from the

environmental movement; (2) a Crown corporation known as the Forest Renewal BC was created to finance projects that would foster forest renewal and employ displaced forest workers; and (3) a stratified set of legislative and administrative rules were adopted under the umbrella name of the Forest Practices Code. Consisting of legislation, regulations, standards and field guidelines that collectively govern forest practices, the Code establishes mandatory requirements for forest practices and sets compliance, enforcement and penalty provisions. The details of these major policy initiatives are analysed by Wilson and Wang (1999).

However, since the mid-1990s, deficiency has been found with some of the above initiatives. Specifically, the Forest Practices Code, which lays out in considerable detail how trees are to be harvested for minimal environmental impact, is essential, both to eliminate destructive practices and to forestall boycotts of the Province's forest products. However, there are downsides to the Code. First, although the Code succeeded in consolidating many existing bills and regulations into one single framework, this consolidated framework has been criticised as excessively cumbersome and, as a result, it has become difficult to implement and enforce. The sharp increase in required planning documentation to get approval for cutting permits resulted in delays in timber harvesting and regeneration. Second, the Code was criticised for its rigidity in allowing for site-specific solutions as it was likened to a 'cook book' among the forest industry. This creates problems for the Province because BC is a very diverse province and what works in one part of the province will not work in another part. Third, the Code has been identified as having had a negative impact on the costs of wood delivery. For one thing, implementing the Code resulted in a sharp reduction in the size of cut-blocks. When blocks become smaller forest companies have to build more roads, obviously at greater costs (McIntosh et al. 1997). These cost factors mean that some stands of timber are simply no longer economically viable to harvest, forcing companies to defer harvesting those stands of timber where costs outweigh potential revenues. It also means that camps must close, leading to decline in stumpage revenues for the Provincial coffer and job losses for local communities.

These problems, along with others, have prompted the BC Government to undertake changes. The most conspicuous one is the Province-wide forest policy review, which was commissioned in 1999 and the final report released at the beginning of 2000 (see Wouters 2000). The Commissioner made a large number of recommendations, which are being considered for adoption.

Parallel to the forest policy review, the Forest Practices Code has been streamlined to become somewhat flexible, enabling forest managers at the field level to use their judgement and location-specific knowledge in operational decisions. Since the beginning of 2000, the BC Ministry of Forests has taken a new initiative in experimenting with ways to reduce the administrative costs associated with the Code. Known as Forest Practices Code Pilot Project, the initiative seeks to test results-based forest management techniques on the ground to enhance efficiency and save costs for both the forest industry and the government (British Columbia Ministry of Forests 2001).

Given BC's predominant public ownership of the forestland, the forestry sector has been characterised by a tenurial relationship between the Forest Service and the industry (Wang et al. 1998). Nevertheless, small-scale forestry has managed to secure an important place in at least three areas. First, private owners possess some 2.2 million ha of forestland, 42% of which are classified as managed forest. Accounting for 8 million $m^3$ of timber harvest (i.e. 12% of BC's total timber harvest in 1998), this sector employs over 9000 people directly and generates another 18 000 jobs in spin-off activities (BC Ministry of Forests 1999b). Second, independent contractors play a significant role in forestry activities, as they account for over 80% of BC's timber harvest and the majority of the silvicultural operations around the

Province (PriceWaterhouseCoopers 1999; Wang et al. 1998). Third, opportunities have been available under the Small Business Forest Enterprise Program (SBFEP). Accounting for approximately 13% of the Provincial AAC (allowable annual cut), the SBFEP provides market loggers (those who harvest timber and do not undertake any processing), sawmill owners, value-added processors and remanufacturers with access to timber sales (BC Ministry of Forests 1999a). Normally, a 5-year Forest Development Plan identifies where the timber will be harvested and, increasingly, the Ministry of Forests encourages efforts that aim at linking access to timber with ventures in value-added activities and non-timber operations.

Recently, BC has introduced a pilot program aimed at promoting community forests as a new form of forest tenure. In order to promote the direct participation of communities and First Nations in forest management and to create sustainable jobs, the Forests Statutes Amendment Act (Bill 34) was adopted in 1998 to establish community forest agreements (CFA) as a new form of forest tenure. The main objectives of the community forest initiative are the following: (a) sustaining and strengthening existing community economics; (b) promoting partnership among stakeholders; (c) providing local communities with access to timber resources; (d) encouraging new ventures such as value added and non-timber products; (e) providing youth and the First Nations with employment opportunities; and (f) fostering sustainable forest management (British Columbia Ministry of Forests 2001). The term of the pilot agreements will be five years with provisions for extension or replacement with a long-term CFA of 25–99 years if the pilot program proves successful.

As of the end of 2000, 10 communities (out of several dozen proponents) had been offered pilot CFAs by the BC Ministry of Forests. Involving some 120 000 ha of forested area, these CFAs are characterised by partnerships between local communities, First Nations and other stakeholders and the recognition of the importance of sound resource stewardship (see Table 2). Detailed configuration of the forest tenures involved and selection of management approaches are yet to be specified. While the essence of the new forest tenure is to provide the forest-dependent communities with greater opportunities in accessing and managing the forest resource base, local residents will be able to make use of the pilot program to gather experience and information in the drive towards sustainable forest management. The community forests initiative represents a significant step forward in encouraging community involvement in forest management, as there is an apparent need to stimulate renewal of forest-dependent communities.

One cornerstone of BC's forest policy is to renew the land base. As sound silvicultural practices contribute to nature conservation as well as the renewal of the forest, a new initiative is under way to encourage incremental silviculture. Traditionally, intensive silviculture such as pruning and fertilising were funded out of special programs such as the Canada-British Columbia Forest Resource Development Programs (FRDA I and II) which were implemented during the 1980s and the 1990s. Recently, the Forest Renewal BC has allocated more funds for incremental silviculture through innovative practices.

However, it is a challenging task to search for an effective policy paradigm because the options available to the BC government are rather limited (Wilson 1999). Given the complexity of the various forestry institutions involved, any policy move may impact more than one sub-sector. For instance, it is difficult for the Provincial Forest Service to slash stumpage rates without risking retaliation from the USA and without reducing government revenues. Ultimately, the real challenge lies in the responsiveness of BC's forestry public administration system to evolving social demands and in the capacity of making informed decisions to safeguard efficient delivery of services for the well-being of society at large.

**Table 2.** British Columbia's Community Forest Pilot Project. Source: BC Ministry of Forests web site http://www.gov.bc.ca/for/

| Proponent | Region (Forest Region, FR) | Area involved (ha) | Highlights |
|---|---|---|---|
| Bamfield Huu-ay-aht First Nation | Coast (Vancouver FR) | 418 | Partnership among local community, First Nations and schools, pursuing non-timber products |
| District of Ft. St. James | Interior (Prince George FR) | 33 500 | Landscape management, resource stewardship, access to AAC, value added operations |
| Esketemc First Nation | Interior (Cariboo FR) | 19 604 | Including Indian reserve land, promoting traditional cultural activities such as trapping, hunting, fishing, natural goods and medicine, access to 11 000 $m^3$ AAC, generating 16 direct jobs in first year and 13 thereafter |
| Harrop-Proctor Watershed Protection Society | Interior (Nelson FR) | 10 600 | Practising ecosystem based forestry, access to 5000 $m^3$ AAC, pursuing non-timber products, value added operations |
| Islands Community Stability Initiative | Coast (Vancouver FR) | 23 932 | Community development, non-timber products, access to timber, economic diversification |
| Likely Community Forest Ltd. | Interior (Cariboo FR) | Not available | Promoting small business ventures, silviculture, tourism, recreation |
| North Island Woodlot Corporation | Coast (Vancouver FR) | 715 | Involving private land, practising small-scale harvesting, with access to 2090 $m^3$ AAC |
| Nuxalk First Nation | Coast (Vancouver FR) | 3088 | Integrated resource management, access to 14 250 $m^3$ AAC |
| Village of Burns Lake | Interior (Prince Rupert FR) | 19 862 | Practising small-scale harvesting, access to 23 677 $m^3$ AAC, resource stewardship, partnership with schools and training facilities |
| Village of McBride | Interior (Prince George FR) | Not available | Access to 50 000 $m^3$ AAC, multiple benefits, economic diversification |

## 4. New Directions

As described in previous sections, sustainable forest management has been recognised as a defining mark of a modern society. According to Hardy (1997, 1999), the Canadian Forest Service is determined to play a leadership role in fostering sustainable forestry that meets the various demands placed on Canada's forests while maintaining environmental, social and economic benefits. In regard to the forest management, the essence of this approach is three-

fold: (1) it recognises an inevitable reduction of the industry's dependence on natural forests; (2) it indicates a readiness in embracing an imminent intensification of managing second-growth forests; and (3) it points to the need for appropriately allocating resources towards managing relatively fast-growing plantations.

Specifically, regarding the natural forests this would mean: (a) less wood harvested; (b) alternative harvesting methods; (c) more forest areas protected; and (d) managing the forest for multiple values. Concerning the second-growth forests this would mean: (a) managing for values such as timber, fishing, hunting and trapping; (b) providing an income source for communities and Aboriginals; (c) using various harvesting methods; and (d) requiring more investment in silviculture to accelerate tree growth. In terms of plantation forests, it would mean: (a) planting fast-growing trees on available land – a 100% timber focus; (b) providing industry with a secure source of fibre; (c) getting buy-in from stakeholders; and (d) substantial investment (Natural Resources Canada 2000a; Hardy 1999).

Each of the above aspects involves reorientation in both theoretical and operational adjustments. For the reason of space limitation, we focus on the third aspect, namely, the issue of forest plantations. In the Canadian context, establishing forest plantations is concerned with the debate between two schools of thought over the advantages and disadvantages of basic silviculture and incremental silviculture. Commonly, basic silviculture is defined as including all the silvicultural practices required to achieve a free-growing regeneration of desired species at specified densities and stocking. Incremental silviculture refers to the silvicultural prescriptions and practices in stands that are past free-growing conditions for the purposes of enhancing stand value and yield. The two schools of thoughts are represented by Benson on one side (1988, 1990) who argues in favour of adopting basic silviculture, and by Reed (1983) and Reed and Baskerville (1990) on the other. Advocates of basic silviculture present their arguments based on Canada's low forest productivity measured by mean annual increment (MAI) relative to other major forest jurisdictions (Benson 1988). They insist that, given Canada's extensive forest resource base, low population density and northern location, it is to the country's advantage to practice basic silviculture. Measures include relying on natural regeneration and avoiding activities that involve a high requirement of physical labour.

Supporters of incremental silviculture defend their position largely from the potential employment opportunities that incremental silviculture may provide (Reed 1990), considerations of increasing timber supply in response to old-growth withdrawal (Thompson 1991), and a host of forest-level benefits (Reed and Baskerville 1990). Akoena and Gray (1994) present their support from the viewpoint of spatial benefits arising from incremental silviculture. They argue that even modest increases in unit area timber yields will allow timber production to be concentrated on a smaller area, closer to mill or market, reduce hauling distances and costs, hence minimising the required road network and construction costs. The view that smaller, more concentrated silvicultural operations diminish conflicts with other forestland uses is independently endorsed by Binkley (1997).

Forest management objectives in Canada, with BC in particular, are essentially concerned with maintaining the productivity of the forestland, growth rate, ecological health and increasing the volume and value of timber produced (Booth et al. 1993). These objectives may overlap or even conflict with one another when it comes to deciding on investing in incremental silviculture. Empirical research findings differ from one another concerning the profitability of incremental silviculture projects. For instance, at one extreme, Thompson et al. (1992) find that virtually no silvicultural activity pays in the Province; on the other extreme, intensive silviculture was found capable of adding significant value over and above basic silviculture, as much as 36% in total log value over basic silviculture (Reid Collins and Associates 1994). However, in a study regarding the extent and profitability of intensive forest management, BC is ranked at the bottom among the selected jurisdictions (Wilson et al.

1998). The discrepancy between the two camps lies in the assumptions about future prices of wood products and in the level of analysis.

In recent years, a middle-road proposal has emerged. Instead of debating the adoption of one strategy to the exclusion of another, there is an argument that 'from a forest-management point of view, what we really want is not more-intensive silviculture, but rather affordable, smart silviculture – the gentlest intrusions into forest ecosystems that get the required job done' (Duinker 1994, p.136). Binkley (1997) suggests that BC adopt the zonation route, based on the theory and practice of dominant use and multiple use. Binkley (1997) demonstrates that such an approach will yield several benefits for the Province: (1) maintaining a non-declining level of timber supply; (2) satisfying environmental groups by setting aside large areas of forestlands as parks and protected areas; and (3) helping sustain employment levels in forest dependent communities, and so forth. The essential premise of Binkley's argument is that investors should focus their investment on sites that are above average in biological productivity. This investment approach may be more expensive, but the growth and eventual dividend prospects will also probably be above average. One other important objective of incremental silviculture is its role in rectifying the undesirable age-class distribution of the forest. Weetman (1987) refers to this problem of holes in the age classes of forest structures by drawing attention to the problem of time operability. Some silvicultural activities such as spacing and thinning do not contribute to yield increase; instead, they help reallocate timber growth to a different point in time, hence improving the structure of the forest towards more even-flow harvest or the so-called 'normal forest'.

If the middle-road proposal sounds so promising, why is it the case that BC has difficulty marching beyond the stage of basic silviculture? Pearse (1985) pointed out the main obstacles to Canadian silviculture while Weetman (1987) identified seven important determinants of silvicultural programs. Duinker (1994) acknowledged that, in order to turn incremental silviculture into a viable investment, the following conditions are needed: more public education, acceptance of the allowable cut effect, increased roundwood demand or decreased land base and increased value of roundwood; furthermore, forest tenure holders must be made responsible for the cost of silviculture. Obviously, further inquiry into the need for incremental silviculture will lead one into the realm of institutional constraint and this issue is beyond the scope of this paper.

It may be argued that the basic silviculture school is a type of low-cost and low intensity mentality, whereas the intensive silviculture school is the commercial forestry thinking that emphasises concentrated input in well-zoned areas. This goes back to the old argument of dominant use. That is, concentrating efforts and resources on the low lands to grow commercially viable plantations so as to help maintain land use diversity in the uplands. Adopting an appropriate strategy is a matter of concern for a number of provinces in Canada. At the national level, a consensus seems to have been reached (Booth et al. 1993) and policies have been put in place (Hardy 1997, 1999). At the provincial level, policies are bound to be diverse because of the vast differences across socio-economic as well as natural landscapes. It is clear that intensive silvicultural investments may be justified for areas of superior site quality. Incremental silviculture is more likely to be acceptable when financial returns are considered together with socio-political reasons.

## 5. Conclusion

The year 1999 marked the centennial of the Canadian Forest Service with celebrations of 100 years of research and policy development devoted to the stewardship of Canada's forests. The Canadian Forest Service views its mission as 'to promote the sustainable development of Canada's forests and the competitiveness of the Canadian forest sector for the well-being of present and future generations of Canadians'. To implement this mission, the Canadian Forest Service is committed to advancing Canada's forest agenda through the establishment of strategic alliances and partnerships. In the meantime, Canada is striving to become an international model of sustainable forestry, one with progressive methods of forest management and a world-class forest industry (Natural Resources Canada 2000a, 2000b).

It has been recognised that society's expectations of the forest resource will continue to evolve and that the forest sector will be challenged to adapt, primarily through innovation. For Canada, sustainable forestry is best represented as a journey, not a destination. It is a constantly evolving process with complex and inter-woven goals concerning various sectors of the economy and society (Wilson and Wang 1999), and no one should expect the process to be a smooth drive. It may well be a thorny path full of twists and turns. In spite of the challenges and difficulties, Canada remains firmly committed to the process and, with the new policies and initiatives, the Canadians are on their way to success.

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# Sustainable Forest Management: with or without Privately Owned Forests? A Romanian Case Survey

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## Abstract

At the beginning of the year 2000, the land-base of private estates in Romania was 374 400 ha, (5% of national forest land), while the average of private woodlands reached about 0.56 ha. Through the Law on land ownership promoted on 10 January 2000, another 700 000 ha will be transferred to the former owners. In spite of legal provisions aiming to enhance sustainable management of private forests, 10 000 to 30 000 ha were deforested in private estates, while another 47 000 ha were seriously damaged by irregular tree extraction. Obviously, the main preoccupation of new private owners was to defend the woodland against timber robbery, rather than to comply with the forest management plan or the formal rules for forest management. Through a survey on private owners' attitudes, it was pointed out that the policy means for sustainable forest management have missed their goals because of two main reasons: (1) the regulation of private forests as a public one; and (2) the weak legal framework for the management of private forests. A greater understanding of private owner behaviour and a bottom-up approach of policy measures are needed, especially in the context of the new changes in forest ownership structure.

*Keywords: small-scale forestry, regulatory means, social practices, property rights, bottom-up approach*

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## 1. The private forest in romania: a small scale forestry

### 1.1 The structure of the private estate resulting from the restoration process

One year before the elections in 1992, the Romanian Parliament adopted a law concerning the restoration of land to the former owners. In the case of forest lands, the amount of land to transfer has been fixed at one hectare per person (which often has to be divided between heirs). In 1996, a new governmental coalition composed by centre-right parties won the elections with a programme in which the restoration of private land was a priority. Nevertheless, the parties of the coalition bargained for a long time on the method of the restoration, especially regarding the amount of area to transfer to the former owners.

Finally in 1997, a law was passed to authorise citizens to claim their former forests and agricultural land, but the restoration was implemented at this time. This is the reason why many conflicts raised between the claimants and the public forest administration, who have to stop the harvest operations (otherwise provided for in the management plans) in some claimed woodlands. In late 1999, an accord was made between the parties of the coalition, and the law on land restoration was promoted in January 2000. The restoration of forest property was fixed at not more than 10 hectares per owner (Table 1).

Ambiguous situations have occurred in the restoration process since the opposition (the socialist party of the president Iliescu) won the local elections in June 2000. The political parties still in power were interested in the complete transfer of forestland before the general election in November. On the other hand, the socialist party was interested in a slower advancement of the restoration process, in order to gain control of the process after November 2000.

At present, the restoration is progressing slowly. Of the 800 000 ha recognised by the local commissions as transferable to private owners, only 50 000 ha were effectively transferred to the former owners in the first nine months of 2000. Table 2 shows how much forested land has been claimed by different categories of owners. Only part of claimed land will be recognised as transferable by the local commissions. Nevertheless, Table 2 provides an estimation of the future structure of property in Romanian forests. If all the claimed lands are transferred, individual forest owners will reach about 1 103 783 ha forests (17.3% of national forested area). In this case, the average size of woodland plots will be less than 2 hectare.

**Table 1.** The evolution of forest ownership in Romania. Sources: Machedon et al. 1999; RNP 1996; RNP 1999; RNP 2000.

| | 1947 | 1990 | 1996 | 1998 | 2000 |
|---|---|---|---|---|---|
| Total forested area | 6 487 000 | 6 372 000 | 6 372 000 | 6 367 000 | 6 342 538 |
| Public forests | 1 878 723 | 6 372 000 | 6 033 322 | 6 028 000 | 5 998 784 |
| Private forests (forests of individuals) | 1 514 486 | – | 338 678 | 339 000 | 343 754 |
| Average area of private forests | 3.1 | – | 0.6 | 0.6 | 0.56 |
| Forests of different institutions | 567 399 | – | – | – | – |
| Forest of the communities and of the communes | 2 743 092 | – | – | – | – |

**Table 2.** Forest claims by former owners in 2000. Sources: RNP 2000.

| | |
|---|---|
| Forests in the administration of forest office | 5 998 784 ha |
| Total claimed area | 2 560 858 ha |
| | |
| Surface of forest lands claimed by: | |
| – Individuals | 757 548 ha |
| – Communities | 722 071 ha |
| – Churches, schools | 56 886 ha |
| – Communes | 1 015 572 ha |
| – Romanian citizens living abroad | 8 781 ha |

### 1.2 The management of private forests under the 'forest regime'

The issue of harvests in claimed woodlands and the ambiguous situation in the advancement of the restoration process contributed to misunderstandings between the forest administration and the forest owners. The National Association of Forest Owners from Romania (APPR), which originally agreed with the idea of a unique administration of forest estates by the public forest office (as in the case of Slovenia), called for the creation of a separate administrative body for private forests. Hence the law (Forest Code approved by the Law 26/1996, Governmental regulation 98/1998 modified by the Law n.141/1999, Governmental decision 997/1999), accepted three solutions:

1. the self-administration of forests, which is allowed for individuals. Therefore, the owner must respect the 'forest regime'. The owner is required to defend forests against illegal cuttings: if damage occurs, the owner is in contravention of the law;
2. the administration of private forests by 'private' foresters, employed and paid by the owner (commune, community, juridical association of private owners, church or other institution owning a forest). In this case, the forest owners must create an association. The forests are organised similarly to public estates in forest divisions and forest counties. The managers are under the control of the owners, but they must act in compliance with the rules of 'forest regimes';
3. the administration of private forests by the public administration, in accordance with an optional contract. The forest office could make contracts with the individuals owners, as well as with communities, communes or other organisations owning forests.

Among these three solutions, the first one prevailed. In 1997, only 15% of private owners were organised in associations to manage and to protect their forests against theft (Giurgiu and Popescu 1997). Agreements concluded between private owners and the forest service were without juridical consequences, because until 1998 there was no formal framework establishing the rights and the responsibilities of each party to the contracts.

Most private owners were informed about the requisite rules of forest management through an official paper received at the time of restoration. The paper explained the obligations of forest owners: maintain the forested state of the land, regenerate the forest, undertake silvicultural operations required by the stand, and harvest only after timber marking done by the forest service.

The results of forest management in private estates, taking into account the indicators 'forested area' and 'harvested volume', show that:

- depending on the source of information, the area of private forest estates decreased in the last decade by 3% to 8%. Various sources estimate differently the loss of forests in private estates: about 10 000 ha according to the National Association of Private Owners, 10 575 according to RNP-ICAS from 1999 (RNP-ICAS 1999b), 26 386 ha in another MAPPM-ICAS-RNP[1] study from 1999 (MAPPM-ICAS-RNP 1999). The latter study also mentions an increasing area of clear forests (canopy density less than 0.4), estimated at 47 268 ha (14% of total private forests);
- the average canopy density decreased from 0.82 in 1993 to 0.71 in 1999. This shows a tendency for a lower density of tree cover stands in private forests (see comments regarding Table 3);
- the total afforestation on private land for the period 1991–1999 did not exceed 90 ha!;
- the proportion of coppice stands increased from about 4% in 1990 to 62% in 1999.

The annual allowable harvest in the private forests is established at 562 000 $m^3$. Regarding the official statistics, the volume effectively approved by the forest authorities and marked in private stands in the last decade was about 4.9 million $m^3$. Therefore, it seems that the amount of timber harvested from private forests does not exceed the annual allowable harvest. However, if we add to the official statistic, the volume of timber resulting from the illegal clear cuttings, it appears that the private owners have harvested 11.6 million $m^3$ in the last 8 years (MAPPM-ICAS-RNP 1999). This means the allowable cut was exceeded by 64% in the decade 1990–2000.

Concerning the harvest, a high proportion of timber resulted from 'sanitary cuttings', which are felling imposed by natural events such as serious forest damage by storms, pests, diseases, etc. The harvest of such trees could be done through provisions of the forest management plan and a convenient way to exceed the allowable cut, without infringing upon the law. Discussions with representatives from forest offices, with respect to the practice of charging for marking trees in private forests, confirmed the frequent occurrence of this practice.

Note that, except the sanitation cuttings, the allowed cut was not realised. In the absence of additional information, it could be assumed that private owners do not have the means to extract mature trees themselves. On the other hand, the small size of most private woodland plots is a discouraging factor for the timber buyer.

**Table 3.** The partition of harvested volume in private forests (1990–1999). Source: MAPPM-ICAS-RNP 1999.

| Type of silvicultural intervention | Volume to extract ('000 $m^3$) | Allowable cut $m^3$/year/ha | Volume marked for extraction ('000 $m^3$) | Realisation of planned crop |
|---|---|---|---|---|
| Final cutting | 2648.5 | 0.79 | 873.0 | 34% |
| Conservation cuttings | 156.7 | 0.05 | 71.2 | 45% |
| Selection | 259.5 | 0.08 | 88.1 | 34% |
| Thinning | 1813.5 | 0.54 | 861.2 | 47% |
| Sanitation cuttings | 2175.1 | 0.65 | 3034.2 | 139% |
| Total | 7053.3 | 2.11 | 4927.8 | 70% |

[1] The acronyms designate the ministry (Ministry of Water, Forest and Environmental Protection - MAPPM), the forest service, manager of public forests (National Forest Service – RNP), and the national institute of research in forestry (National Institute for Forestry Research and Forest Planning – ICAS).

Surely, the deforestation of 10 000 to 30 000 ha of private forests could be seen as something of secondary importance if it is compared with the total forested area or with the social gains represented by the restoration of forest ownership. Nevertheless, it is still of interest to understand the nature of the phenomenon, which could be an isolated manifestation, or a tendency of concern in private forestry. This is the reason why an analysis of private owner behaviour is presented with respect to the policy direction implemented for a sustainable forest management.

## 2. About the methodology

The intervention of government in the field of small-scale forestry requires a great understanding of the private owners' motivation and attitudes. A social analyses and a bottom-up approach of public measures are necessary if policies are to be developed to prevent avoiding deforestation or encourage people to plant trees (Harrison et al. 2000).

A method is proposed based on the analysis of existing relationships between formal means that regulate private forestry and social practices that appear in implementing those means. Such an approach could give satisfactory results in cases where a 'gap' is identified between the initial goal of public policy and its outcome.

In order to implement a 'sustainable forest management', the public decision makers carry out a complex of actions which constitutes a basic 'referential' for all the concerned stakeholders. The stakeholders may or may not assimilate this 'referential', they may also have their own 'referential' which motivates their attitudes in forestry (a 'framework for explaining the world', Murell 2000) and their political actions. However, if the public action does not successfully change the social practices, at least initially, the implementation of public rules has the result of creating a 'local regulation' (in French, *ordre local*, Friedberg 1993). This supposes that the public executors and the interested stakeholders tend to 'bargain' with the application of the rules, in modifying the referential of public actions.

A similar methodological framework was applied in analysing the multi-functionality of forest management in Savoy, France (Bouriaud 2000). Four main steps are needed:

1. Analyses of the formal existing framework to identify the goals and the means of policy measures (the 'formal' referential: what is the meaning of 'sustainability' to the public decision-maker? How does the public decision-maker intend to make the case for a 'sustainable forest management'?);
2. Analyses of the social practices as outcomes of the policy. Did policy modify the actions of stakeholders? Did the stakeholders assume the proposed goals of the policy?
3. Identification of the 'why?' of observed reality (the causality relation between the implementation of formal rules and the motivation of stakeholders to change their behaviour);
4. Estimating the 'deviation' of local practices from the basic referential of public actions and suggesting possible directions of change.

Initially the rules that are applied for sustainable forest management in private forests were analysed. Secondly, through a questionnaire sent to the private owners of a Northern Romanian county (Suceava County), we tried to identify attitudes and expectations of private owners related to the sustainable management of forests and to the multiple use of the forest resource. The empirical results were analysed with respect to property rights theory, which attempts to provide the 'why' of the observed facts. Although the analysis of social practices refers to a relatively small area (the private forests of Suceava county represents only 6.2% of national private forests), the method can help to estimate accurately social impacts of government actions in forestry.

**Box 1.** Some rules concerning the forest management of private estates. (Forest Code and Governmental Regulations)

*The forest management has to respect three main categories of duties:*

- the conservation of forested areas, which consists of prohibiting irregular deforestation, harvesting less than the annual increment, and an obligation to regenerate the forest after clear felling or natural damage. As in the latest regulations of 1999, the private owner should be responsible for illegal cuttings occurring on his forests, because the owner is obliged to insure the protection of the forest against all types of damage;
- the preservation and the improvement of forest quality, which consists of undertaking measures to prevent and combat pests and diseases, restricting grazing activities, and undertaking silvicultural operations such as selection or thinning;
- to respect a plan of forest activities; until the governmental regulations of 1998 and 1999, the forest management plan was compulsory for all private forests. In the actual legislation, private owners must have a forest management plan only if their forest is bigger than 10 ha. For forests less than 10 ha, the private owner is obliged to have a simplified forest management plan (for comparison, in France the simplified management plan is compulsory up to 10 ha).

## 3. The formal referential: sustainable forest management as the reason for the 'forest regime'

### 3.1 Legal provisions for a sustainable forest management

The Forest code of 1996 promotes the automatic submission of all national forests to the 'forest regime'. The 'forest regime' refers to a system of technical, economic and juridical rules aiming to ensure a sustainable management of forest ecosystems (art. 9, Forest Code 1996), and which is to be applied in private forests as well as in public forests. It should be emphasised that the 'forest regime', introduced in Romania in 1881, initially respected the French meaning: a system of public rules aimed at ensuring the conservation and the valorisation of forests owned by the State or by the communities. The 'forest regime' was extended progressively to all existing forest estates, in Romanian legislation, as well in the legislation of other former socialist countries (Slovenia, Poland, Albania and Ukraine).

The rules of forest management were not differentiated: the same silvicultural and technical rules are required for both public and private estate. The law does not recognise distinctions between private and public management. The private owner is obliged, to the same extent as the public owner, to respect the forest regime and the forest plan, to provide environmental services, and to allow the public free access to the forest. Only now are some efforts being made to establish rules more adapted to private forestry (concerning especially rotation length, the coppice, and the investment).

Hence, among several means promoted by the law, few of them have been effectively put into practice to implement a 'sustainable forest management' in private estates:

- financial means: (1) a system of taxation is promoted by the law for compensating for losses in forested areas. The change of land from forest purposes to other purposes is possible only with the ministry’s authorisation and with a Pigouvian tax payment; (2) direct financial means (box 2); (3) indirect financial means such as technical assistance provided by RNP for replanting poor agricultural lands or forest lands which have been damaged by natural events;

**Box 2.** Direct financial means aiming to stimulate a sustainable forest management. (art. 31, Governmental regulation 86/1998 approved by the Law 141/1999).

*The State will allocate each year the necessary funds for:*
- eliminating negative effects on forest health caused natural disasters or forest fires;
- treatment of forests affected by pests and diseases;
- establishing forest management plans for forests held by individual owners;
- information and training of private owners;
- compensation of private individuals owning forests with protection roles. The compensation represents the value of assets, which the owner could not realize because of environmental or ecological restrictions.

- juridical means: (1) for replanting. The national forest service (RNP) has the juridical and technical authority to replant private lands, even without the agreement of the private owners. However, the initiation of reforestation operations is incumbent on the ministry, which has not reacted yet in this modality; (2) for buying forest land. The State, through the RNP, has a pre-emption right on the sale of private woodlands;
- education and training: no courses exist for the private owners. Nevertheless, the budget of the Ministry of Water, Forests and Environmental protection (MAPPM) allocated about US$2.5 million for the dispersal of information and training for private owners in the year 2000. However the money was returned to the state budget at the end of the year, because of the lack of required infrastructure or an unwillingness to spend it.

One other category of policy means permits monitoring of the implementation of rules. The forest management plan and the marking of trees by a forest service representative should be sufficient to presume that 'sustained oriented' practices are carried out on private estates.

Finally, among means of control, an institutional solution has been adopted, with the creation of a public body, the Directorate of forest regime. It is composed of forest inspectors, who are the territorial representatives of the Ministry, and who act in 30 territorial divisions. They will number, in the end, about 1000–1100 persons (for comparison, the national forest service employs about 4000 forest engineers). During the period 1993–1994 the introduction of a similar structure for the control of the forest regime was intended, but did not succeed, because of the strong interests of public managers. As in other eastern European countries (Slovenia, Poland, Albania or Latvia), public body for the control of forest management in public and private estates was recently created to balance the strong influence formerly wielded by the national forest services.

### 3.2 What kind of sustainability for the private forests?

In considering the definition of 'forest regime', which was introduced to ensure the 'sustainable management of forest ecosystems' (art. 9, Forest Code 1996), it seems that the legislator intended an ecological meaning of sustainability. A law from 1999 concerning the forest regime and the administration of forest estates has shifted this interpretation toward the definition of sustainability as formulated in the Brundtland Report: the purpose of forest regime is the valorization of ecological and socio-economic values of forests for the present and future generations (art. 2, Law n. 141/1999).

In fact, the principle of sustainable forest management in Romanian legislation is the principle of sustained yield. In the calculation of the volume to be harvested each year, two

main indicators are taken into consideration: (1) the structure of stands according to the age class; and (2) the annual increment of the stands. Sustainability is ensured if the harvested volume is less than the annual increment. For example, in national forest land, the annual growth increment is calculated to be 18.1 millions $m^3$. The annual allowable harvest is 14 million $m^3$, while the volume effectively harvested is less than 13 million $m^3$ per year.

Only 'exploitable' stands can be harvested. The optimal harvesting age is determined for forest stands according to the objective of forest management: obtaining a degree of timber quality (in commercial forests) or ensuring an optimal environmental effect (in forests with special protection functions). For example, Norway spruce for sawmills may be harvested at only 100–120 years in commercial forest, private or public. In forests designated for protection purposes, the minimum age at harvest is increased by 10–20 years.

The stumpage value or the returns for timber production are never taken in account in fixing the optimal harvesting age. In recent years, some parties have lobbied for the necessity of calculating the harvesting age for private forests using economic concepts and criteria, e.g. the Faustman formula (Dragoi and Borlea 1998; Dragoi 2000). However, establishing the harvesting age according to the stumpage value remains only a scientific or a didactic approach.

## 4. The social practices: the private owner behaviour

### 4.1 The technique

With the goal of identifying the social practices related to private forestry, a sociological analysis was undertaken consisting of:

- delimiting a study 'area' to superpose a relatively homogeneous population for analysis with a relatively homogeneous level of policy implementation. The area where the implementation of rules directly meets the social expectations represents a 'space of social compromise' (Bouriaud 2000). For the present study, the area of a county was used;
- recording the private owners' motivations and attitudes. A total of 175 questionnaires were completed by direct interviews, and 45 were completed by mail. The enquiry by mail had only a 10% response rate. In contrast, there were no refusals in the direct questionnaires.

The questionnaire had 40 main questions (25 multiple-choice and 15 fill-in-the-blanks) concerning the attitudes of private forest owners, the motivations behind their practices, their ideas about forestry, about sustainability and multiple use, and their expectations of public decision-makers and forest services. The initial treatment of the answers was a simple cluster analysis to determine the proportion of different preferences expressed. Then the answers to the 25 questions were translated into a matrix to apply the factorial analysis (in French, *analyse factorielle des correspondances*).

### 4.2 The results

#### 4.2.1 Who are the private owners and what do they know in forestry?

The people interviewed are inhabitants of 7 communes of Suceava County. They were contacted directly, in a 'door to door manner', or by mail. The communes were chosen to cover different socio-economic situations:

- the first three communes, denoted in the text with 'Z', 'F' and 'A' are situated in a region where forests represent less than 10% of the total area (an open-country landscape). The main need of inhabitants of this region from forests is fuelwood. The commune denoted by 'M' is situated also in a little-forested region, but here the private owners have created an association for managing their forests together;
- the answers to questionnaires sent by mail to the owners from the open-country region were denoted by 'C', and those from the mountainous region were denoted by 'MT';
- finally, the last three communes ('S', 'B', and 'U') are situated in a mountainous region where the forest resource is well represented.

Three groups may be composed: 1. the open-country region (Z, F, A and C); 2. the mountainous region (S, B, U and MT); and 3. the commune where owners are associated (M).

Originally, we tried to understand the owner's perceptions about the potential uses of forests. In Table 4, the preferences of owners are expressed as percentages of the total number of answers recorded for questions b1 and h1. The answers to question g1 were sorted according to the quotations obtained (which have been numbered from 1 to 10).

The important discrepancy between the answers to questions g1 and h1 highlight the transition from a general case ('what do you think about forests') to a particular one ('what do you think about *your* forest'). Some factors get in the way, such as the need for timber, the fear that the forest might be classified, or the missing evaluation of non-market forest benefits. The clear preference for timber production must nevertheless be interpreted through the answers to question h2 (a fill-in-the-blank question): 'if you had enough money for buying timber, what kind of management would you adopt?' A very high proportion of the owners mentioned that, in this case, they would prefer to let the forest grow (50%). One-quarter of them preferred to preserve the forest as a legacy for their children, while 8% effectively advocated for the preservation of forests. Only 9% of people interviewed declared their intention to harvest the forest.

The perception about forests and forest use are one of the most important factors in the formation of social needs in private forestry, in respect to a logical sequence: perceptions –

**Table 4**. The responses of forest owners about forest benefits.

| Questions aimed at recording the perception of private owners on forest benefits | Open region | Mountain region | M | Total |
|---|---|---|---|---|
| b1. In 1993, owning a forest represented for you (in %): | | | | |
| – more domestic wood | 53 | 63 | 61 | 59 |
| – the possibility to sell the land or the timber | 12 | 10 | 11 | 11 |
| – a legacy to leave to the children | 17 | 10 | 11 | 13 |
| – the accomplishment of a justice act (restitution of goods nationalised) | 18 | 10 | 17 | 14 |
| – other | – | 7 | – | 3 |
| g1. The most important forest products and services (quotations): | | | | |
| – the regulation of the weather and climate | | | | 9.14 |
| – the timber, for fire and for construction | | | | 8.76 |
| – the landscape | | | | 8.65 |
| – the protection against soil erosion | | | | 8.35 |
| h1. Does your forest provide one benefit more important than wood? (in % of total recorded answers) | | | | |
| – yes | 24 | 22 | 13 | 22 |
| – no | 76 | 78 | 88 | 78 |

**Table 5**. Forest owner's attitudes in the timber felling issue.

| Questions concerning the legality (lawfulness) of harvests in private forests (in % of total recorded answers) | Open region | Mountain region | M | Total |
|---|---|---|---|---|
| a1. Did you take measures to prevent theft? | | | | |
| – yes, with my family | 22 | 53 | – | 35 |
| – yes, in paying someone | 38 | 16 | 5 | 25 |
| – no, I did not | 38 | 13 | – | 23 |
| – no, it was not necessary | 2 | 18 | 95 | 17 |
| a2. Has your forest already been affected by theft? | | | | |
| – no | 7 | 53 | 86 | 37 |
| – yes | 93 | 45 | 14 | 60 |
| – I do not know | – | 2 | – | 3 |
| a4. Did you have the legal authorisation for timber harvest in your forest? | | | | |
| – each time | 65 | 83 | 100 | 74 |
| – nearly every time | 28 | 16 | – | 22 |
| – some of the time | 3 | 1 | – | 2 |
| – never | 4 | – | – | 2 |
| a5. If you felled timber without authorisation, the reason was: | | | | |
| – the need for money | – | 25 | – | 9 |
| – the need for timber | 42 | 67 | – | 50 |
| – you feared theft | 52 | 8 | – | 37 |
| – other | 6 | – | – | 4 |

needs and expectation – attitudes and behaviour – (political) actions. The social needs and expectations cannot appear in the political process, where the interests promoted by interest groups prevail (Bouriaud 1999), but they can give a good explanation of the private owner's behaviour. In order to identify some expectations of owners related to the policies for sustainable management, two categories of questions were formulated. The first category is intended to identify the attitudes of private owners on the harvest issue (Table 5), and the second describes the private owner expectation towards the State and the public forest administration (Table 6).

The number of people interviewed who responded that they felled timber occasionally without authorisation (a4, last four options) was 48, while the number of answers to question a5 was 74. This means that 26 answers should be relegated from the category 'each time cut with authorisation' to the remaining categories. It can be deduced then that the harvests in private forests were legal only in 60% of situations, and this is according to the owners' declarations!

Some 8% of private owners identified timber theft as the primary cause of the deforestation of their land. The official amount of deforested land in the study area, the Suceava forest county, is 2600 ha (MAPPM-ICAS-RNP 1999). With respect to the total area of private forests in the county (16 000 ha), the percentage of deforestation was calculated to be 15.6%, which is more than the national average (3–8%).

### 4.2.2 Which expectations exist towards the public policies?

The questionnaire recorded the expectations of private owners in forest policies through several questions, some of them multiple-choice (question i), others with fill-in-the-blank answers (questions l and m1).

**Table 6**. The private owner's expectation towards the State and the public forest administration.

| Questions seeking out expectations and intentions of owners in forest management (in % of total recorded answers to the question) | Open region | Mountain region | M | Total |
|---|---|---|---|---|
| i. What kind of help do you expect from the State? | | | | |
| – to finance the employment of a forest guard | 22 | 18 | 21 | 20 |
| – to oblige the forest service to survey private forests | 39 | 28 | 24 | 33 |
| – to authorise the timber harvest without restriction | 13 | 13 | – | 12 |
| – to organise training and courses in forest management | 10 | 33 | 10 | 19 |
| – to help us create associations for forest management | 16 | 8 | 45 | 16 |
| l. What are you expecting from the State and from the forest service? | | | | |
| – to secure the survey of forests and to punish timber thieves | 38 | 22 | 50 | 33 |
| – to respect the law and the private property | 15 | 35 | 7 | 22 |
| – to ensure the necessity of timber and fuelwood | 15 | 7 | – | 11 |
| – to help us in managing the forests and in creating associations | 10 | 16 | 43 | 15 |
| – to replant the land | 18 | 9 | – | 13 |
| – to facilitate the timber harvest, less bureaucratic system, lower taxes | – | 11 | – | 4 |
| – to protect forests | 4 | – | – | 2 |
| m1. What do you intend to do with your forest in the future? | | | | |
| – I do not know | 15 | 3 | 14 | 9 |
| – leave it to my children | 12 | 3 | – | 7 |
| – care for/let it grow | 20 | 39 | 29 | 30 |
| – harvest according to the forest regime | 12 | 27 | 29 | 20 |
| – replant | 26 | 3 | – | 13 |
| – harvest for the needs of the household | 3 | 23 | 21 | 14 |
| – other | 12 | 2 | 7 | 7 |

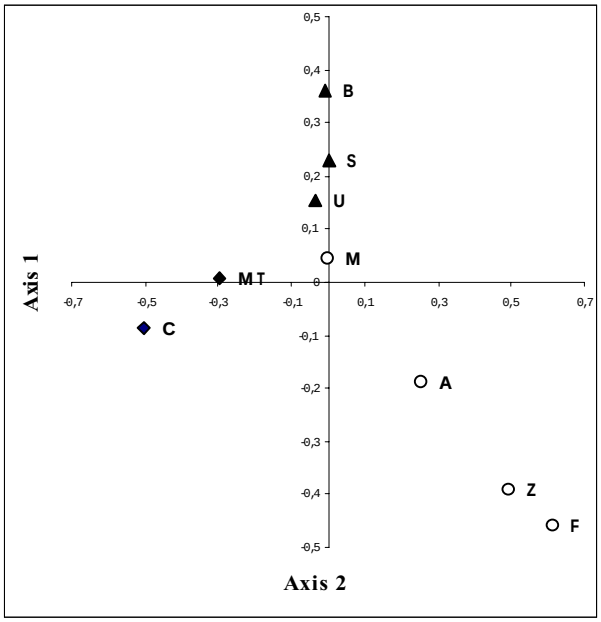
Table 6 shows the attachment of private owners to the idea of property and secure property rights. The main expectation of owners toward the State is for the provision of forest protection against illegal cutting, especially in the open-country region where forests have been more affected by timber theft (the number of people affected is twice that of the mountain region, Table 3). On the other hand, owners from the mountain region seem to be more suspicious about forest service actions (35% of them asked the forest service to operate in accordance with the law and to respect private property). The owners from the mountain region asked for the organisation of training courses.

Nevertheless, those most interested in having the help of the state and of the public forest administration are the private owners from the commune M. This proves that the association of private owners is beginning to act as an interest group. The owners became aware of the common interest they have in forest management, partly because of intensive work of forest service representatives, who organised meetings and discussions with private owners during the last four years. As a consequence, they are already used to discussing and to being counselled by forest authorities.

### 4.2.3 The ANOVA results

To arrive at conclusions on private owners' attitudes and expectations, a factorial analysis was undertaken aiming to group the interviewed people who provided the most similar

(a.)




(b.)

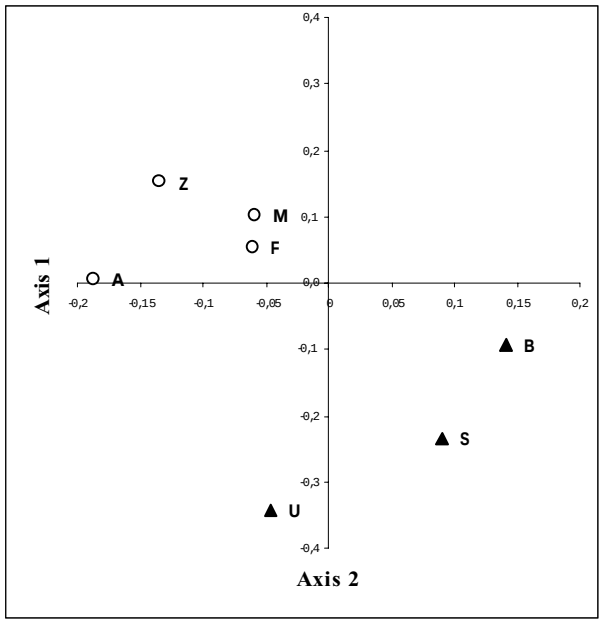



**Figure 1.** The localisation of communes on the factorial axis: (a) analysis including all answers (direct observation and mail); (b) analysis including only the answers by direct observation.

answers. The factorial analysis applied to the whole population provided two main factorial axes, which could help in understanding the variability of the sample.

According to the first factorial axes absorbing 3.8% of total inertia, the different communes appear to be well segregated: the commune situated in the mountain region fell on the negative side, and the communes in the open-region fell on the negative side (Figure 1-a). To confirm this result, an ANOVA (analysis of variance) was done to test the importance of the factor 'commune' on the co-ordinates of individual answers. This test was very highly significant [$F(8;218)=14.7$; $p<10^{-6}$], proving that the first axes were correlated with the location of the owners. Other ANOVA test did not reveal significant results with the first axis among the variables.

The first axis (Figure 1-a) pointed out two significant effects:

1. the effect of the techniques used for recording data (the fact that 'C' and 'MT', from the open-region and from the mountain region, both received questionnaires by mail and both are on the negative side of the axis); and
2. the effect of 'region'.

Referring to the previous tables, the communes from two regions provided different answers on several main questions. For example, different answers were obtained for questions a1, a2, and a5 that concerned the threat of timber theft and the possibility of surveying forests. Also, answers were different on questions i, l, and m1 which concerned the expectations of private owners towards public authority. It was concluded that the 'region' effect is induced first by the different perceptions of owners about the security of property rights and secondly, by the different needs for domestic wood.

On the second axis, the differences between the 9 groups (3 open region, 3 mountain region, and 2 by mail) are still significant, but a second factor intervenes: the year in which the owner received the forest. Significant years were: 1991 (beginning of the restoration process), 1993 (the year when most owners received their forests), 1992 and 1996 (election years), and 1997 (the year when the restoration process was re-launched).

In order to eliminate the effect of technique (direct interview or mail) the factorial analysis was applied only on the population interviewed directly (Figure 1-b). The co-ordinates of the first axis are determined by the factor ‘year of property rights transfer’ (the year when the owner received the forest). Several significant pairs oppose the years 1991, 1992 and 1993 to the years 1996 (the year of general elections) and 1997 (the year when the governmental coalition promoted a law which authorised former owners to claim their land).

The second factor with a significant influence is the age of the stand, which determined also the co-ordinates of the second axis. In both cases, the ANOVA shows a significant difference between the stands aged 40, 60 or 80 years and the stands aged 100–120 years. This could mean that the old stands are difficult to harvest, because of lower accessibility and specific equipment needed (which limits also the possibility of timber theft).

Additionally, the effect 'commune' appears only in two cases. Two communes from plain region (A and Z) are significantly opposed to two others communes from the mountain region (S and U).

## 5. Better understanding is better acting

### 5.1 On the lights of property rights theory

The security of property rights could be measured in different ways. Honore (1961) proposes a list of eleven 'standard incidents' that constitute private property, including: the right to

exclusive possession; the right to personal use and enjoyment; the right to capital value, including alienation, waste or destruction; the right to transmit by gift, devise, or descent; the right to the income from use by others; etc. In forests, the *ab usus* (in the Honore' formulation, the right to capital value) as part of the property right is commonly restricted (by limitations on deforestation, clear felling, sale, destruction). All of these restrictions were found in the regulation of 'forest regime'.

Considering the results of the sample, two other 'standard incidents' disappear or are seriously affected: the right to exclude; and the right to personal use and enjoyment (Table 7).

According to the classification of Schlager and Ostrom (1992), the owner has all four rights (access, management, exclusion, alienation). The bundle of rights identified in this study could be associated with the position of claimant (rights limited to access and management), attenuated by the possibility of transferring the forest in compliance with the Civil Law.

What are the consequences of strong limitations that affect the right to exclude? Because the private owners have no exclusive right to capture for themselves the benefits of their forest resources, they have no incentive to make long term investments in forests (Schlager and Ostrom 1992; Hanstad 1998). Even if most of them declared the intention to re-plant, such an investment would not be possible without the enforcement of exclusion rights. Due to the actual agricultural system, grazing will rapidly damage a forest plantation, if the owner does not have the right to exclude and to limit access. On the other hand, transforming forests into agricultural lands involves short-term investments, and provides better security of property rights. The agricultural crop from one hectare could be enough to purchase the landowners' timber needs, and to ensure a little additional income.

**Table 7.** Standard incidents affecting the security of property rights

| | Owners' rights | Legal limitations to the right<br>*De facto* limitations of the right |
|---|---|---|
| Access and withdrawal | | The forests are open to the public and for hunting activities; some forest externalities do not give the possibility to decide who can benefit from forest and who cannot (landscape, soil protection). |
| Management | Right to manage by self, by delegates (association) or through an agent (contract with RNP). | Compliance with an official forest plan required for being inline with the law.<br>The owner does not have the right to choose the trees to log (the right to benefit from forest products is established in an administrative compulsory way).<br>The payment for the services of the agent is too expensive in comparison with the income from the forest. |
| Exclusion | The right to benefit from the income of forest (timber logging or payment of forest services). | The users of forests could collect forest products.<br>The owners do not have 'veto' rights against hunting activities in their forests.<br>Grazing without agreement affects 25% of private forests (45% in open-region).<br>93% of owners from the open-region and 14% from the mountain region declared to be affected by timber theft. |
| Alienation | The right to transfer the forest by sale, gift, heritage. | The right to sale requires the procedure of pre-emption.<br>Prohibition of destruction of forests (deforestation, fire, clear felling without regeneration, grazing of young plant). |

From the viewpoint of forest conservation, property rights could be useful for the society, only if it could be easily policed (Alchian and Demsetz 1973). The enforcement of property rights could be made through private self-protection, by encouraging others to respect property rights or through payments to a third-party (outsider), who could be the State (North 1990). In our case self-protection as individuals or families might not be sufficient, especially in the open-region. Encouraging others to respect the private rights on forests would probably not be that successful, because of the open access nature of the forest resource, and also because of the general economic situation in the country.

The last solution, the payment of a third-party, was the solution adopted initially by the political decision-maker, who takes into account two possibilities. The first was the payment of the existing forest structures for ensuring the right to exclude (trees marking and survey of forests). The second was the action of the State as sovereign authority. If the property right is violated, the owner could open a juridical procedure to secure the right for himself.

But, in both cases, the enforcement of property rights is very costly, compared with the annual allowed harvest and with the average area of the forest property. Furthermore, the juridical process proved to be ineffective: half of forest owners who were interested in following up the punishment of timber theft declared that no measures had been undertaken.

### 5.2 The political system explains also

It would be easy to accept the official rhetoric explaining the state of private forests and to incriminate private owners as having irrational behaviour. The corollary of this explanation is that 'only the public owner is able to follow a sustainable forest management'. As a consequence, doing nothing to stop the destruction of private forests could be a profitable strategy for some interest groups (political parties, ministerial teams, as well as administrations) who do not agree with the restoration process, or who try to gain more influence in leading this process. The judicial and police system could also create conditions for rent seeking and for a slow advancement of property rights enforcement (Feder and Feeny 1993).

As long as the formation of forest policy involves only the central administration and the forest service, the interests of private owners may be neglected. National representatives of private owners were admitted only recently into discussions about forest strategy, and this occurred because of recommendations by international financial institutions. The political actions of representatives of forest owners were concentrated until now in defending the restoration process, which faced many obstructions. As a consequence, they neglected also the issue of property rights consolidation in forestry. In immediately requiring that the forests be transferred to the former owners, the politicians and representatives of forest owners rejected that which might have been a less costly solution. These meant private forests were administrated by the existing forest service, even temporarily. For an efficient and sustainable forest management, it could be better to modify forest regime in the direction of existing paths and existing self-reinforcing mechanisms, and take advantage of a specific organisational and institutional inertia (Kant 2000), than to modify completely the institutional background.

It is concluded that: (1) the policy process dealt separately with two issues otherwise closely related – the restoration of private property on forest estates, and the exercise of private property in forests; and (2) the policy process does not provide a framework for the representation of the interests of private owners.

## 6. Concluding remarks

The situation presented shows that the implementation of a policy toward 'a sustainable forest management' in private forests has missed its goals: to introduce a forest management plan, to avoid illegal harvesting, and to avoid deforestation. The forest legislation tried to impose a sustained yield concept in private forests according to the rules existing in public forests. Nevertheless, the lack of consideration of private property and private rights was not the only one reason for the policy failure. The main reason was, in our opinion, the weakness of the formal framework intended to organise the management of private forests.

The owners' preferences and the situation of forests in the commune M illustrate that the association of private owners could be the most appropriate means for securing property rights. Until now, political decision-makers have seen in the private owners' associations a method of forcing them to comply with the forest regime and to have more control of logging. If future regulations deal with the problem of forest management in the same way, the existing propensity of owners to log their forests will be accentuated.

For the moment, a sustainable forest management of private forests seems to depend on the capacity of policy makers to encourage private owners' associations. The example of co-operation between the forest owners from the commune M and the representatives of the forest service suggests that improvements in small-scale forestry could be realised only through a bottom-up approach. Here, the transaction costs related to the organisation of owners were reduced by the intensive communication work of forest officers. Of course, obtaining a social compromise in this way involves new problems, e.g. social acceptance or institutional credibility.

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# A Model Indicating Effects of Multi-purpose Use of Forestry at the Stand Level

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## Abstract

Environmental factors must be regarded to the same degree as timber production in the Swedish Forestry Act. To co-ordinate different interests in forestry, it is necessary to develop criteria, indicating the degree of consideration in varying aspects. Biodiversity indicators in a single stand are, for example, with differentiation on tree species, the amounts of wood, graded into dimension classes and the amounts of dead wood. The proportions of deciduous tree species as well as of large trees, passability by foot, the sight between stems and the average stem diameter are relevant factors as regards recreation values. Three expressions have been derived to illuminate effects on: (1) timber production; (2) biodiversity; and (3) recreation. Each expression gives estimates in the range from 0 (no value) to 1 (best beforehand estimated value). The value 1 represents the highest net present value from timber production. Other alternatives are related to the best one. The developed biodiversity model gives a high indication value for the first cubic metre of large dimension, of the first deciduous tree, etc. With increasing amount of, for example large trees, the next large tree will give a decreasing marginal effect on the actual biodiversity value, due to an exponential function to express the values of biodiversity. The recreation value is calculated with a linear regression model, illuminating the influence of difference on environmental consideration. The model has been applied on type studies giving the effects of transforming forests in southern Sweden, from trivial one-tree-species planted stands, into naturally regenerated, mixed stands managed to achieve sustainability. The qualifications of a single stand will, however, just give a part of the necessary prerequisites for biodiversity and recreation values in the perspective of a landscape or even a forest. Other models are required to regard these aspects.

*Keywords: multi-purpose forestry, nature indicator variables, recreation, biodiversity, environmental consideration, nature conservation, protection of natural resources*

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# 1. Introduction

## 1.1 Background

The present forests of south Sweden are dominated by managed conifer stands of low biodiversity, consisting mainly of Norway spruce (*Picea abies* (L.) Karst.) and Scots pine (*Pinus sylvestris* L.). Acid rain, nitrogen deposition and excessive ozone levels reduce biodiversity and change the biogeochemistry of the stands negatively from environmental points of view. During the last century, increasing populations, increasing leisure time and expanding tourism from the European continent have focused the recreational aspects of forestry in the southern part of Sweden (Lindhagen, 1996a). Simultaneously, the industrial use of roundwood and residual material from forestry is continuously increasing. Forestry must also be prepared for altered climatic conditions, most likely with an increasing average temperature favouring deciduous trees. The need of a multi-purpose planning system to co-ordinate different interests in the forests and the forestry is more evident than ever before. The multiple-goal perspective is also in accordance with the current Forestry Act in Sweden.

Within a research programme, 'Sustainable forestry in Southern Sweden', some hypotheses have been formulated in order to facilitate the transformation of forests poor in species, e.g. planted monocultures of Norway spruce, into a more sustainable status. The hypotheses state that:

- Increased natural regeneration and an increased proportion of deciduous trees in the forests, simultaneously avoiding large clear fellings and plantations, will increase the sustainability as regards soil fertility and biodiversity.
- Forest health will improve when nutritional balances are achieved, and that we will lower the leaching of acid elements and nitrogen by using the above principles for silviculture, but that the total economy of forestry (given some special efforts) will be just as good as before.
- Soil fertility must be retained by addition of missing macro and micro elements. This will guarantee sustainable productivity and better sustain biodiversity and forest health.
- Modelling the natural variation concerning forest productivity and forest damage effects, biogeochemical cycles and biodiversity, will considerably improve understanding of how to manage forests in a sustainable way in the future.

The consequences of transforming the forests may be analysed on varying geographic scales from stand level to the perspective of an entire landscape (see Fries et al. 1998). On the stand level it is possible to regard and analyse interactions between interests of single treatments of well described forest areas (see Eriksson and Eriksson 1993). On the level regarding a group of stands within a geographically limited area, aspects such as logging economy (Eriksson 2000), recreational effects of the concentration of logging or forest management system (Kardell 1990; Lindhagen 1996b) as well as some biodiversity factors (Angelstam 1992) can be studied. On the level of a forest estate, the treatment decisions are normally co-ordinated and the economic consequences may be followed up (Jonsson et al. 1993; Ekvall 1999; Eriksson et al. 1989). The possibility of consideration of different interests can be overviewed on this level by studying the effects for the forest owner. There is still a need of oversight in a larger perspective covering patterns of a landscape extending over thousands of hectares because of the movements of some species, as well as effects of the mix and the composition of forest stands on recreational consideration (Fries et al. 1998).

### 1.2 The purpose of the study

The aim of this sub-project, within the research programme mentioned, is in the perspective of multiple-use of forest resources to evaluate economic consequences of the transformation of forests, e.g. poor in species, into more sustainable forests in south Sweden. The aim of the study is to examine effects of different treatment regimes at the stand level. This is a necessary first step to be able to regard questions at higher, geographic or administrative levels. Estimations of treatment effects on timber production, biodiversity or recreational aspects found at the stand level will be related in other studies in the programme to perspectives at higher levels.

Another restriction of this study is that it only embraces areas for timber production with varying degrees of consideration to other interests. Areas, forested or not, left for free development or treated with the main purpose to support environmental questions are not involved.

## 2. Method and material

### 2.1 The planning model

Methods for analyses of multiple goal problems in forestry originated in the seventies from mathematical programming and resulted often in multiple objective linear programming problems. In other words, optimisation of well-structured problems where goals either are expressed in an objective function or as a constraint of the optimal solution (Dyer 1973; Wallenius and Zionts 1976). Since then, emphasis has shifted from serving final optimised solutions to problems of how to provide support to the decision-maker.

Focus has now changed to the question of how to present appealing suggestions by communication facilities to the decision-maker. The process of problem solving must be a part of the organisational context. The entire decision process from problem identification to decision implementation should be supported (Korhonen and Wallenius 1995). By means of multiple criteria decision support systems it should be possible to give answers to questions such as “how to achieve a specified status” rather than examining “what will happen if”. A method developed for the former ambition is back-casting. The process of analyses starts with a description of a desired status of future forestry, fulfilling defined goals for wood production as well as recreational and biodiversity values. The next step is to analyse how to achieve the goals from an actual situation. By the chosen method, it is easy to look beyond limitations of everyday problems (Ritchey 1991).

Essential information is often not at hand in the planning situation (what goals do the forest owners have for their forestry?), and important processes cannot be satisfactorily analysed (which is the optimal range of the trees to be cut and when during the rotation will each tree be cut?). The use of a forecasting model as a communication instrument in the planning process would then be preferable to decision-making by means of ‘optimised’ solutions.

### 2.2 Forecasting stand development

The model used for forecasting data for single trees and stands (Söderberg 1986; Jonsson 1974) is estimated on a large number of inventoried plots from the National Forest Survey (thinning response, however, is estimated from experimental plots). This means that the stand

prediction after treatment will give an average response to volume growth, diameter increment, etc. The simulation system is, as regards the main structure, developed and presented by Eriksson and Eriksson (1993) and Eriksson (1994).

The simulations are deterministic in the meaning that the result will become exactly the same if restarting on the same data input and also that the used costs and prices of roundwood are constant over time. The model used for analysing the treatment programmes for stands allows specification of the number of thinning treatments, their strength and form by choosing the cut of single trees at each possible time of thinning or at final cut. By implementing fixed logging costs for each treatment in the calculation, the number of cuts over the rotation age will be reduced for economic reasons.

Two regeneration methods may be simulated, natural regeneration and plantation, with or without scarifying. Plant density at plantation and the number of, and the time-points, of pre-commercial thinning, may be specified. For natural regeneration, time delay for plant establishment (–7 years) and reduced growth speed (–10%) is given (personal communication, G. Örlander 1999).

Three assortments, two for timber and one for pulpwood, have been selected for the cross-cut of both softwood and hardwood tree species. For the forestry activities, production efficiency, costs and revenues are derived as mean values from the market in south Sweden during four years at the end of the 1990s, embracing one economic cycle. The revenues vary due to the direction of the treatment program towards high- or low-grade timber. Net present values for activities during the rotation periods are calculated based on a real rate after taxes of 3%. The simulations are based on ground values calculated on the assumption of plantation of spruce or pine and a traditional stand treatment. The used ground values are given in Table 1.

### 2.3 Indicators of sustainable forestry

*Wood production*

The wood production indicators have successively been developed during the last century. They have been tested and established in the forestry of today (Lundström et al. 1992). The motive power for wood production is the market for roundwood, and as a consequence, the harvested volume of roundwood. Because of the influence on harvest economy, the volume cut should be distributed over average stem size at cut as well as over delivered saw logs and pulpwood. Variable costs and revenues of activities give the net value and the contribution to cover fixed costs and to support the liquidity of the forestry.

The state of the forestry as an input in a forecasting model generates consequences in the shape of the future cut, need of silviculture, economy and the change in forestry state. This can be viewed in different dimensions. Actual volume increment gives a good estimation of

**Table 1.** Ground values for pine (T) and spruce (G) in southern Sweden.

| Site index class, m (based on dominant height at 100 years) | Ground value, ’000 SEK/ha |
|---|---|
| T24 | 2.9 |
| T28 | 10.7 |
| G28 | 5.5 |
| G32 | 27.3 |
| G36 | 37.9 |

cut potential in the long term, but not for periods shorter than 2 to 3 decades (in Swedish forestry). Standing volume, on the other hand, gives the short-term potential. Stem density is an indicator of the need of silvicultural treatments such as regeneration, pre-commercial thinning and low thinning. The distribution of age classes in a forest ownership gives information about future changes in economy and is therefore the link between the short- and long-term perspectives. The mix of tree species and the average diameter in stands is important information for estimation of future profit of the forestry. Net present value of all future costs and revenues of forestry is a good indicator of the wood-producing economy. The variation in economy over time is not, however, described by means of this measurement. Analyses at the stand level deliver these variables for considerations at the level of the forest estate, etc.

*Biodiversity*

Compared with wood production, biodiversity is a new field of science, the numerous species to consider and the complexity in natural forest ecosystems making the problem area large and difficult. As the goal of this sub-project is reduced to analyse treatment alternatives to transform single stands, and the main purpose in the stands is to produce wood for sale, a number of aspects and indicator variables that are relevant in other situations may be excluded. Such variables are, for instance, the distribution of stands and treatments over the area, reserved areas, areas that are fertilized, ditched, burned or non-forested, as well as the area of agriculture. Some of these aspects may be involved in the discussion of this paper.

The main objective of biodiversity in forestry today, according to the Swedish standard of Forest Stewardship Council for forest certification, is the endangered species, in this case those occurring in forest ecosystems. The mix of tree species has a major influence on the number of endangered species in a wood-producing forest stand, see Almgren (1990). Which tree species are the most valuable with regard to the endangered species, can be studied in collations of endangered species associated to tree species (e.g. Ahlén et al. 1979). Especially large stem diameter and old age are important factors for survival of a large number of endangered species (Esseen 1996). Continuity, as regards the environment for survival of endangered species, is a prerequisite especially for those species adapted to a life in undisturbed (e.g. non-burned areas) (Fritz 1997; Nilsson 1997; Andersson 1997). This latter factor, which only can be relevant for areas known to be undisturbed during centuries, interacts with other factors such as the occurrence of large old trees, natural regeneration, etc.

A specific factor of importance for endangered species is dying and dead wood. A careful removal of trees damaged by wind, snow, drying, crowding, etc., has resulted in a lack of dead wood in Swedish managed forests (Ahlén et al. 1979). This is mainly the situation for large old stems (Bernes 1994). Therefore, it is necessary to re-establish this factor into a more natural state. It is logical that dead wood of rare tree species, such as large individuals of deciduous tree species, is the most valuable in this respect.

The conclusion is that the actual amount of dead wood is an important factor for biodiversity. The coarse woody debris (i.e. dead wood including snags, stumps, logs, large branches and pieces of roots), serve as cover, feeding, reproduction, etc. for mammals and amphibians and as habitat for other animals, plants and fungal species (Samuelsson et al. 1994). Different parts of the wood are used by different species. Some species are specialised to use the cellulose as basic food, others the lignin, while some use the stem as cover, etc.

The commonly practised method to measure and estimate the decomposition of dead wood is to study the loss of mass in, for example, boles of dead trees. Henningsson (1967) and Tamminen (1979) have studied the decay of stored pulpwood in different parts of Sweden, and Lambert et al. (1980) the decay of dead wood in a sub-alpine natural forest of balsam fir. Lambert found that high decay rates were attributed to small bole diameter, high moisture and

a nitrogen-rich environment. He also found that the content of cellulose, lignin, carbon and sodium followed the loss of mass, while the amount of calcium, magnesium, potassium and phosphorus decreased faster than the loss of mass. Lambert's results often show a decline of mass over time, which, after a short lag period, decreases slightly with increasing age of the bole. The lag period can be explained by the process of establishment of decaying organisms in the bole. Henningsson stresses that climatic factors, especially the length of the growing season, are very important for the decomposition of wood. After a short lag time period (about half a year) when the decaying organisms advanced from the ends of the logs, the loss of mass increased drastically with increasing time of storage. After two and a half years, including the lag time, the dry density was decreased to 75% on pulpwood of birch in a plot situated in Ryd in southern Sweden. The corresponding value for aspen was about four years. Tamminen (1979) found from his studies of the decay in pulpwood in south Sweden (Simlångsdalen) that Scots pine has a slower decay rate (12% of loss of dry mass during 3.5 years) than birch (19%), and Norway spruce was still slower with 3%. The figure from birch deviates from Henningsson´s, which may be explained by prevailing weather conditions. Tamminen concluded that the specific drying speed of wood of different tree species is an important factor behind the differences in wood decay rate. The conclusion as regards the task of this study is that these variations may exist even at ground level in the forest, but far less, and that litter fall in the form of leaves, branches, etc., will increase the process of decay of stems. The fact that the stems are not cross-cut (but may be broken by storm felling) will prolong the decay of wood. Existing bark on the stems will also protect the wood from fungus attacks, etc., for a while. Christensen (1977), analysing the turnover of dead wood in a Danish oak stand, found that the point of time for loss of half the dry mass of the wooden part of litter fall was as high as 17.7 years. He supposed that large fallen stems of oak would be lying without any particular decomposition for a decade or more.

Harmon et al. (1986) discuss models for losses from coarse woody debris. Most of the existing models use exponential functions as:

$$Y_t = Y_0 \cdot e^{-kt} \tag{1}$$

where: $Y_0$ = initial quantity of material
$Y_t$ = amount left at time t
k = decay rate constant.

The decay is proportional to the amount of remaining material according to this model. Multiple-exponent models may be used to differentiate for varying decay rates of bark, sapwood and heartwood. Also delay time may be included in this model type. Many other authors have shown attempts to adapt parameters in exponential models on decay materials, often with good results, see Lambert et al. (1980) and Christensen (1977).

Authors studying the decay of wood normally present their material in terms of half-time (the period when half of the dry material is lost). There is still a lack of relevant research material compared with the ambitions of this study. The figures roughly estimated and used in the analyses are, however, based on results from the above-mentioned authors.

The problem of mortality in managed forests is studied by Bengtsson (1978 and 1979). His material emanates from the Swedish national forest survey. Other Swedish attempts use more limited material groups and are not referred to here. Hägglund (1981) has split up the mortality into three groups:

1. Regular mortality caused by crowding.
2. Irregular mortality caused by storms, droughts, small forest fires, etc.
3. Catastrophic mortality caused by unpredictable hurricanes, insect population explosions, etc.

The third category is completely unpredictable and is not regarded in this study. The first category is estimated by means of an expression built on the basal area of the stand. The second has the age class of the actual stand as an independent variable. These mortality functions are applied to trees larger than 40 cm diameter at breast height, which may be questioned since tree size ought to have an influence on the probability of mortality. However, no alternatives are available.

The biodiversity indicator must be able to communicate treatment effects easily to decision-makers, and other interests in forestry. It would be preferable if the most important factors could be gathered in one expression comparable between objects. As with other products in demand the first unit often is the most valuable and thereafter the value of next unit get a bit smaller value, etc. The last addition of a unit gives almost no value at all. This kind of a relationship could be well described by an exponential expression such as:

$$K = 1 - e^{-(\alpha + \beta x_1 + \chi x_2 \ldots)} \quad (2)$$

where: K = total effect of a couple of products in the range 0–1
$x_1, x_2, \ldots$ = amounts of products
$\alpha, \beta, \chi$ = estimated parameters

One argument towards an application of an exponential function to describe biodiversity effects is that the first unit gives very little effect. It is not until the achievement of a minimum amount that the effects will arise (one swallow does not a summer make). This argument may have some relevance in a situation with very low biodiversity values in surrounding stands.

As protection of endangered species is the definition of biodiversity in this article, Ahlén's (Ahlén et al. 1979) placing of endangered species together as regards connections to tree species and dead wood originating from tree species is the starting-point for the application of the model above. Oak is the most valuable tree species in this list, with 10 endangered species associated with large living trees and 18 to large dead trees. The ambition is to let an old oak stand in this study represent the full biodiversity value 1. The practical solution of the problem is to give the standing volume above 40 cm diameter at breast height in a 100-year-old stand, (Carbonnier, 1975), and the accumulated amount of dead wood above 40 cm, a biodiversity value of 0.8 by means of two oak parameters, one for large living tree volume and one for large dead tree volume. Parameters for other tree species are related to the oak-values depending on the associated number of endangered species.

The adapted expression for biodiversity used in the analyses is now:

$$BIO = 1 - e^{-(PL_t \cdot VL_t + PD_t \cdot VD_t \ldots)} \quad (3)$$

where: BIO = total biodiversity effect in a stand (with the given constraints)
$PL_t$ = biodiversity parameter for living trees > 40 cm of tree species t
$VL_t$ = standing volume of living trees > 40 cm of tree species t
$PL_t$ = biodiversity parameter for dead trees > 40 cm of tree species t
$VL_t$ = accumulated volume of dead trees > 40 cm of tree species t

The model for description of the decay of large dead trees is based on the half-time exponential function. Let us start with the assumption that the half-time value is known for decay of a specific tree species, T. The remaining amount of wood V(t) after t years and with a starting amount of B is expressed by:

$$V_{(t)} = B \cdot 2^{-\frac{n}{T}} \tag{4}$$

The amount of fresh wood at the start of a period (e.g. of 10 years) is known, and during this period it is assumed that the contribution of fresh dead wood by mortality is constant and is given at the beginning of each year. The amount of fresh wood after n years is then:

$$V_f = B \cdot 2^{-\frac{n}{T}} + \sum_{k=0}^{n-1} N \cdot (2^{\frac{-k}{T}}) \tag{5}$$

where: N = annual contribution of fresh dead wood
k = current year
T = decay half-time

This is the sum of a geometrical array. The sum of this array, $V_f$, in year n during the period may be transformed into:

$$V_f = B \cdot 2^{-\frac{n}{T}} + N \cdot \frac{1-(2^{\frac{-1}{T}})^n}{1-2^{\frac{-1}{T}}} \tag{6}$$

This is the expression used to estimate the amount of remaining dead wood after a period when the input amount and the annual contribution of fresh dead wood is known as well as the half-time values for wood decay.

The used parameters in the simulations are estimated based on the literature cited. The parameters are shown in Table 2.

*Recreation*

The forest of southern Sweden is frequently used for outdoor recreation purposes . The average Swede visits a forest for recreational purposes about once a week during the summer and about once a fortnight in winter (Lindhagen and Hörnsten, In press). To understand how forestry can be adapted to better suit the preferences of outdoor recreationists research concerning public preferences of forest sites has been conducted since the 1970s in the southern Scandinavian region (Hultman 1983; Koch and Jensen 1988). These studies have been repeated during the late 1990s, which enables some conclusions regarding the stability of the preferences over time to be stated (Jensen and Koch 1997; Lindhagen and Hörnsten 2000). All studies mentioned are based on nation-wide postal inquiries sent to a representative selection of Swedish or Danish citizens. Black and white photographs are used

**Table 2.** Estimated biodiversity parameters.

| Tree species | No. of endangered on living trees | Parameter PL | No. of endangered species on dead wood | Parameter PD | Half-time for decay of wood years |
|---|---|---|---|---|---|
| Oak | 19 | 0.0080 | 28 | 0.0120 | 20 |
| Birch | 1 | 0.0004 | 13 | 0.0056 | 3 |
| Ash | No value | 0.0040 | No value | 0.0060 | 10 |
| Scots pine | 3 | 0.0013 | 15 | 0.0064 | 5 |
| Norway spruce | 1 | 0.0004 | 10 | 0.0043 | 4 |

to describe the forest stands. In several investigations, black and white photographs have proved to be suitable for assessment of forest views if they are carefully exposed and selected (Savolainen and Kellomäki 1981; Hultman 1983; Kellomäki and Savolainen 1984; Lindhagen 1996a, 1996b).

In other parts of the world, studies using tree vegetation variables to predict the recreational value or the amenity of a tree stand have been used. In a Finnish study, about 70% of the variation in the public's judgements of different forest stands could be explained by forest stand indicators such as number of stems/ha, average stem diameter and stem volume per hectare (Pukkala et al. 1988). A similar degree of explanation was found in a study, in the Appalachian region of the USA, of the effects of the Gypsy moth on near-view aesthetic preferences and recreational aspects (Hollenhorst et al. 1993); in this study, tree mortality was the outstanding predictor. In a field study in Sweden, it was found that the forest stand's possibility by foot was the most important predictor to explain forest suitability for outdoor recreation (Lindhagen, 1996b).

Recreational values can, as shown above, be predicted in forest stands using predictors describing the tree vegetation. In this study, the result of the latest Danish and Swedish studies (Jensen and Koch 1997; Lindhagen and Hörnsten 2000) have been used to develop linear regression models to predict the forest recreation value. In the investigations, the forest sites were given points corresponding to how they ranked related to other forest stands according to the respondent's outdoor recreation preferences. The mean values for these points have been used as the dependent variable when creating the regression models. The following three regression models were established and have been used to estimate the recreation value (REC):

1. Clear-cut areas and young forest with trees lower than 2 metres:

$$REC = 0.3 + 0.1 \cdot uneven - 0.01 \cdot deadtr - 0.02 \cdot lystem - 0.01 \cdot res \quad (7)$$

2. Young forest with trees higher than 2 metres and before the first commercial thinning:

$$REC = 0.568 - 0.0004 \cdot pinepr - 0.0202 \cdot sprupr + 0.169 \cdot uneven - 0.0009 \cdot stsm - 0.063 \cdot deadtr - 0.0965 \cdot lystem - 0.019\ res \quad (8)$$

3. Forest after first commercial thinning:

$$REC = 0.569 + 0.0106 \cdot broapr + 0.0491 \cdot uneven - 0{,}000076\ stsm + 0.000103\ stmed + 0.00176\ stla - 0.058 \cdot deadtr - 0.099 \cdot lystem - 0.0639\ res - 0.0549 \cdot grodam \quad (9)$$

where:

*pinepr, sprupr* and *broapr* are the proportion of Scots pine (*Pinus sylvestris*), spruces (*Picea* spp. and *Abies* spp.) and broadleaves (mostly *Betula* spp., *Fagus sylvatica* and *Fraxinus excelsior*), respectively.

*stsm, stmed* and *stla* are the number of stems per ha in the diameter classes 5-20 cm, 20-48 cm and above 48 cm, respectively.

*uneven* have the value 0 if the forest is even-aged and the value 1 if the forest is uneven-aged

*deadtr* is the amount of dead standing trees (snags) on a scale from 0 (none) to 3 (the stand is totally dominated by dead trees)

*lystem* is the amount clearly out of their perpendicular or lying on the ground on a scale from 0 (none) to 3 (the stand is totally dominated by lying trees)

*res* is the amount of logging residues on a scale from 0 (no logging residues) to 3 (the stand is totally dominated by logging residues)

*grodam* is the degree of damage on the ground on a scale from 0 (no ground damage) to 3 (very large damages on the ground)

## 3. Results

The analyses are performed to give answers to the hypothesis presented in the introduction of this paper. The first treatment alternative presented under one hypothesis is a reference giving the effects of continuing the forestry in accordance with traditions. The second alternative is the change in order to fulfil the ambitions of the hypothesis. If necessary, two forest generations for each alternative will be analysed. At any shift of stand generations, ten trees of a mix of spruce, pine, birch, aspen or oak is protected from cut as a general environmental consideration in accordance with Swedish negotiations between the forestry and different environmental movements.

### Stand 1. Transformation of a middle-aged stand of 90% of Norway spruce into a mix of birch and spruce. At the end of the second period, again spruce will dominate.

Starting stand: Type stand No G 502 (Bredberg 1972). The site index class is G28 (the Swedish index system based on dominant height at 100 years).

*Reference alternative*

The starting point of the analyses is at a total age of 33 years. The stand is dominated by 90% spruce. The rest is an overstorey of birch with 20 cm basal area weighted diameter. After three intermediate thinnings (thinning form 1.0), a clear-cut is performed at the age of 78 years followed by scarifying, plantation of spruce and a similar treatment with three intermediate thinnings in the new stand. The treatment program is supposed to give normal timber quality.

The reference programme gives a high annual volume production, 8.0 $m^3$/ha in the first generation (the first 33 years not regarded), and 6.4 $m^3$/ha in the second. The share of timber in the clear-cuts are 180 of a total cut of 289 $m^3$ in the first, and 225 of 331 $m^3$ in the second generation. A consequence of these figures is a high net present value of the programme from start including all future generations, 61 500 SEK/ha.

The biodiversity factor, BIO, is however, 0 during the entire first generation, since no dimensions achieve 40 cm diameter. During the second generation BIO reaches 0.1 because of the constantly growing ten trees left as a general consideration.

The recreation value, REC, increases from about 0.4 to about 0.62 during the first generation. After each thinning the value decreases with about 0.2. The clear-cut period and the young dense spruce forest in the beginning of the second generation achieves low recreation values (0.2–0.27). After the first commercial thinning the value increases fast, but due to the slowly increasing amount of dead or lying trees the recreation value of the mature second generation becomes slightly lower compared with the first generation.

*The multi-purpose alternative*

Hypothesis: Hardwood as a transit generation between two spruce stands will give at least the same total utility as spruce after spruce.

From the same starting point, the alternative treatment programme aims to successively reduce the stem number into a regenerating shelterwood system consisting of large birch in an overstorey (40% of standing volume) and spruce (60%) in an understorey. The next generation consists of a stand mixed of spruce and birch of about the same height and amount. Birch is cut more strongly after the half-way point of the rotation. A few stems of spruce and birch achieve 40 cm diameter at the end of the second generation.

A light cut from above in the thinnings result in higher logging nets than in the reference. Together with better timber quality and reduced costs at the natural regeneration the result is that the net present value (62 900 SEK/ha) exceeds the reference by 1400 SEK/ha.

The biodiversity factor reached the level of 0.15 at the end of the second generation.

The recreation value of the first generation increases faster than in the reference alternative and reaches 0.72 just before the clear-cut. The values during the regeneration period stays on a relatively high level (about 0.4). The recreation value at the end of the second tree generation is about 0.64, which is higher than the reference alternative, but lower than the first generation.

**Stand 2. After a clear cut of a stand of spruce on a good site, ash will be planted in the new generation.**

Starting stand: a clear-cut area on good site index class, G36 m.

*Reference alternative*

Similar to the second generation in the reference of alternative No 1., but with production of spruce on a better site. The result, including the costs of regeneration, is a high net present value, 13 700 SEK/ha. BIO increases up to 0.15 at the end of the simulated generation.

REC is low for the clear-cut area and young dense forest. After the first commercial thinning the value increases and reaches 0.61 in the end of the first generation. The second generation achieves a slightly lower recreation value due to higher amounts of dead and lying trees.

*The multi-purpose alternative*

Hypothesis: Plantation of ash to produce wood of high quality will give at least the same total utility as plantation of spruce on a better site.

The plantation of 2500 plants of ash is fenced and the ground is treated with herbicides. After one pre-commercial and seven commercial thinnings a clear-cut ends the rotation at 60 years. The average annual volume production is 6.8 $m^3$/ha (Carbonnier 1947). The net present value is 13 900 SEK/ha.

Since some trees will achieve 40 cm diameter at the end of the period, the biodiversity factor rises to the level 0.3.

The recreation value is much higher compared with the reference alternative especially for the period of young dense forest (REC=0.5). The mature stand achieves a value of about 0.7 before the clear-cut. The second generation has a slightly lower recreation value.

**Stand 3. A dense naturally regenerated young stand of Scots pine is treated to produce high-grade timber.**

Starting stand: a generated young stand mixed of Scots pine and birch based on pre-commercial thinning experiments (Pettersson 1992). Site index class, T24.

*Reference alternative*
In one strong pre-commercial thinning all birch is eliminated. After two strong commercial thinnings and a clear-cut, the area is scarified and planted with Scots pine. This programme gives a high annual volume production (5.2 $m^3$/ha in the first and 5.5 $m^3$/ha in the second generation), but worse timber quality. The net present value of future stand generations is 23 300 SEK/ha.

The biodiversity factor is 0 in the first generation of the reference alternative. In the second generation the generally protected trees give a BIO-value of 0.15 at the end of the period.

The recreation value is about 0.37 before the first commercial thinning when the value decreases to about 0.3 due to logging residues before it rapidly increases to about 0.6. The second generation has a slightly lower recreation value.

*The multi-purpose alternative*

Hypothesis: Production of high-grade timber by means of natural regeneration and an intensive treatment program gives at least the same total utility as clear-cut and plantation of pine.

An introductory pre-commercial thinning at 1.2 metres height to 4500 plants/ha is followed by another one to 2000 stems/ha at 6 metres height. One first intermediate thinning and two thinnings from above result in production of high-graded timber. The next naturally regenerated stand is treated in a similar way. Annual volume production is lower than in the reference (3.3 $m^3$/ha in the first and 4.2 cubic metres in the second generation). The net present value is 16 300 SEK/ha for all future stand generations.

The biodiversity factor, BIO, has achieved the value 0.15 at the end of the second generation.

The recreation value is during the whole period slightly higher compared with the reference alternative.

**Stand 4. An old grazing farm area abandoned for natural afforestation is used for selective forestry.**

Starting stand: an inventoried stand from a forest estate in Halland. (Eriksson 1990) The stand is mixed of an overstorey of birch, oak and pine and an understorey of spruce. The diameter distribution is wide. Site index class is G28.

*Reference alternative*
The stand is clear-cut followed by scarifying and plantation of spruce. A high standing volume (455 $m^3$/ha) gives a high net present value of 137 000 SEK/ha.

The biodiversity factor, BIO, has increased from 0 to 0.15 during a studied period of 115 years in this reference alternative.

The recreation value decreases after the introductory clear-cut (Figure 1). The dense young spruce forest achieves a value of about 0.2. After the first commercial thinning the value increases and it amounts to about 0.58 at the end of the first generation. The second generation shows a similar slightly lower development of the recreation value.

*The multi-purpose alternative*

Hypothesis: The creation of a multi-storied stand by successive thinnings will give at least the same total utility as clear-cut and plantation of spruce.

By thinnings from below and with priority for cut of spruce each tenth year an overstorey of large broadleaved trees is created as a shelterwood for natural regeneration of mainly broadleaves. The successive cuts endless repeated in the future gives a net present value of 77 400 SEK/ha.

The biodiversity factor varies during the period between 0.5 and 0.7, initially depending on a large amount of trees just above 40 cm diameter, and after some decades depending on a few very large trees.

The recreation value keeps on a high value (0.6–0.75) during the whole period (Figure 1).

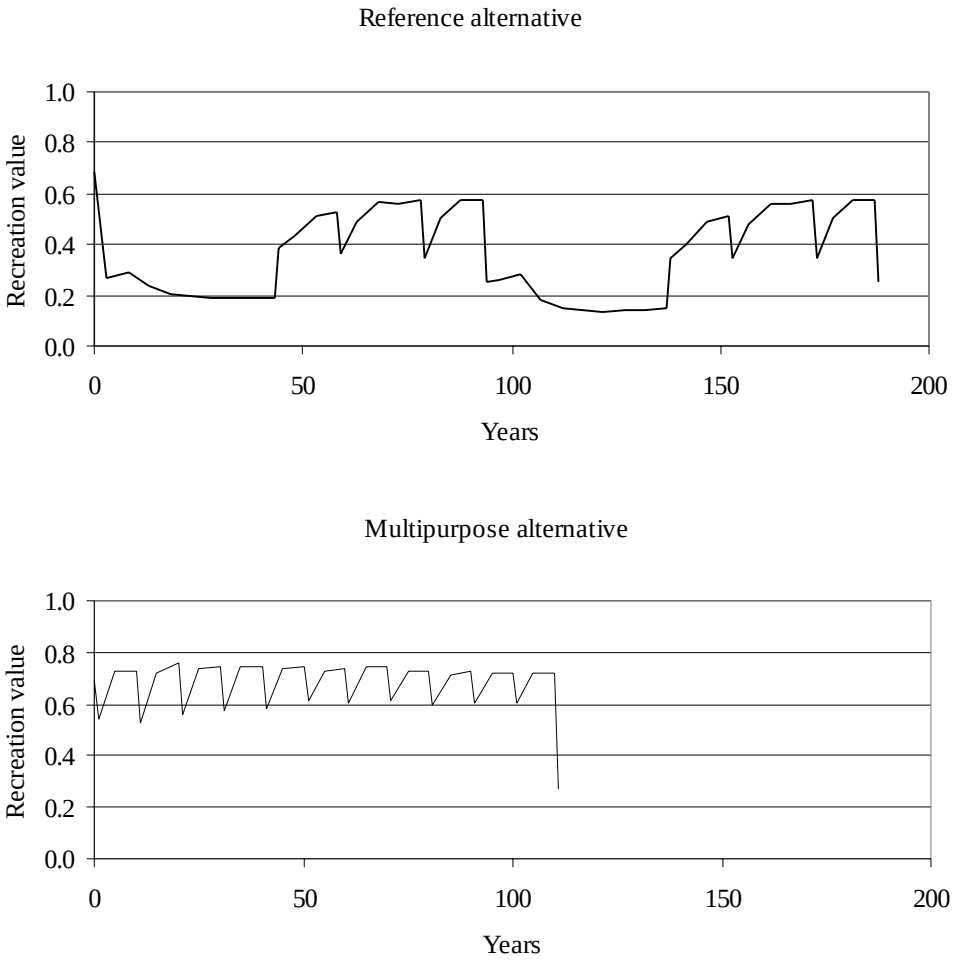


**Figure 1.** Stand 4. An old grazing farm area abandoned for natural afforestation is used for selective forestry. Comparison of the recreation values between the reference alternative (clear-cut followed by scarifying and plantation of spruce) and the multi-purpose alternative (creation of a multi-storied stand by successive thinnings).

## 4. Discussion

The analyses of the four stands illustrate well the difficulties to achieve high levels of the factors BIO and RNPV simultaneously. This is primarily a consequence of the specified requirement of a rate of interest of 3%, which leads to cut of trees and stands as soon as they achieve diameters above 30 or 35 cm diameter at breast height. In other words, there are no old, large trees in an economically well treated stand. The protection of ten trees towards future cut is in this situation a necessary part of multi-purpose forestry. A lower rate of interest (e.g. 2%) is probably a relevant level for many forest owners, and would make it easier to achieve the two factors BIO and RNPV simultaneously.

In this study, the public preferences of the late 1990s have been used to estimate the recreation value during the whole estimation period including two tree generations, (approximately 150–200 years depending on silvicultural method). Public preferences according to forest stands and different forest management strategies change over time. In the relatively few studies of trends in forest recreation, these changes have been shown to be small, at least when studied over a decade or two (Kardell and Lindhagen 1995; Lindhagen 1996a; Jensen and Koch 1997; Lindhagen and Hörnsten 2000). However, Lindhagen and Hörnsten (2000) found that a more natural forest with a few wind-throws was slightly more appreciated in their study in 1997 compared with results from a study in 1977. This kind of forest site was generally given a very low value compared with managed forests in 1977, but in 1997 the proportion of respondents preferring this kind of site had risen to about 10%. These changes were even greater among young people (aged between 16 and 25 years).

The multi-purpose alternatives show, as regards the economy of wood production, about as good results as the reference in stand 1 with natural regeneration of birch and spruce instead of planting spruce, and in stand 2 with plantation of ash instead of spruce. As an extra bonus, these two multi-purpose alternatives show better values when looking at the BIO and REC factors. The total utility is in other words higher by applying the multi-purpose alternatives in the first two stands. This conclusion must, however, be regarded just as an interesting option by the decision maker, and not as a management rule. It is also to be noticed that the amount of wood produced is highest in the references, but on the other hand also that the value per cubic metre of timber produced is higher in the multi-purpose alternatives, the latter fact an indication of more stable future revenues

In stand 3, strong thinnings and a short rotation as in the reference will give far better economy compared with the multi-purpose alternative. An important factor behind this result is the much higher volume production in the reference due to rapid growth after the early and strong pre-commercial thinning. This is a situation when pruning would probably be a realistic high-grade production alternative. Remarkable is the very modest effect on BIO and REC in the multi-purpose alternative.

In stand 4, there was a markedly lower logging economy by applying a successive cut in order to transform the stand into, as regards BIO and REC, a more valuable status. On the other hand, the level of these two factors is achieved so rapidly and is so pronounced that it would be worth the cost to choose the multi-purpose way in this stand. The administrative decision, if the stand should be regarded as a resource to fulfil biodiversity goals on the level of a forest estate or if the community should buy the rights to cut in the stand, must be considered above the stand level.

The overall relevant conclusion is that variety in tree species, regeneration methods and treatment programmes, will give better opportunities to meet future changes in public preferences as well as changes in timber or pulpwood prices.

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# Small-Scale Forestry Challenges in Austria

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## Abstract

Income from forestry is very important and in some cases it even ensures the basic existence for many agricultural and forestry landowners. Intensive forest management is of great economic interest: it provides raw material for local wood processing industries, ensures jobs in poor rural areas and guarantees the preservation of the protective functions of forests in the alpine region. Significant structural changes in agriculture leads to new challenges in forest management. The goal of this paper is to identify the challenges of small-scale forest management and to point out possible solutions. Available statistics were analysed and an empirical opinion poll using a non-standardised questionnaire was completed. Out of 224 mailed questionnaires, 70 replied (a response rate of 31%). The analyses clearly show that the most significant management problems result from small-scale management units and changes in ownership structure, followed by a low ranking of the forest itself within the whole company. The third ranked issue is a deficiency in the use of silvicultural methods. Insufficient road density, wood harvesting technology and working methods create low profitability. The solution requires more vertical and horizontal co-operation in managing the forest. The questionnaire showed that supply and utilisation of wood and the forest owner working as forest contractor are of very low significance.

*Keywords: small-scale forestry, structural problems, road density, timber harvesting, landowner co-operatives*

## 1. Introduction

Small-scale forests are of key importance in Austrian forestry. About half of the forest area belongs to forest owners with an area of less than 200 ha. In 1996 approximately 53% of the annual felling, which refers to a wood volume of 7.9 million $m^3$ under bark, was in this ownership category. The sustainable usable amount of wood is not exhausted in small-scale

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forests due to the fact that only 51% of the annual increment is actually harvested (Bundesministerium… 1998). Despite the high forest importance of small-scale forests, the economic conditions are comparatively poorly documented (Sekot 2000).

Income from forests for many agricultural and forestry companies is of growing importance and is a substantial contribution to their basic existence. Connected to intensive forest management is public interest. Forest management is a requirement for sustainable supply of raw material for the local, growth oriented, wood processing industry. It also promotes labour employment in poorly-structured rural areas, and also serves a protective function in mountainous regions. Beyond that, the culture scene supports the tourism industry.

General developments in agriculture partially impede efficient forest management. Small-structured management units prevent modern harvesting technology employment. Poor wood quality and the small amount of marketed wood underestimates the proceeds in comparison to the market value. An attempt to compensate for these disadvantages with contractor machinery and mutual wood marketing has showed partial success (e.g. Rieger 2001; Frank 2000; Bollin and Eklkofer 2000; Wuoti 1976).

To ensure competitiveness of small-scale forest enterprises in the future, new forms of co-operation and logistic improvements have to be developed. Based on a clear understanding of the private owner concerning his forest, ways have to be found to allow small-scale forest owners to participate in the market and help the wood industry to get this part of wood yield (Rieger 2001).

The objective of the following paper is to identify challenges of small-scale forest management and to show possible solution methods. Therefore, decisive changes in structural developments are outlined. By using a questionnaire problems are detected. Based on that information a co-operation model for small-scale forests is proposed.

## 2. Background

Austria is one of the most densely forested countries in Europe. Of the total federal territory, 47% or 3.92 million ha is covered with forest. As shown in Figure 1, the Austrian forest is primarily in private hands. Only 15.7% is state forest, owned by the Austrian Federal Forest (OEBF AG), and about 4% belongs to various public institutions. More than 204 000 forest owners (Table 1) manage enterprises of an area less than 200 ha, which is about half of the total forest area in Austria. Approximately 22% of the total forest area are forest enterprises of more than 200 ha. For more detailed informations on small-scale forestry see, for example, Moser and Stampfer (2000).

The development of small-scale forestry is strongly connected to structural changes in agriculture. In the decades between 1960 and 1990 the number of agricultural and forestry enterprises has decreased from 371 195 to 273 210, which corresponds to a rate of 26.4%. This trend has continued during the last decade (Table 1). At the same time the number of remote ownership has increased, which results in absent or insufficient forest tending.

The average forest area in the size class of enterprises up to 200 ha is 7.5 ha. Considerable management obstacles arise from the small size and partially scattered nature of forest ownership. Due to the small amount of marketed wood the timber sales are sub-standard in comparison to the market value.

The annual felling in the year 1996 was approximately 15 million $m^3$ under bark. Data from the forest inventory proves that a much larger volume of wood could be sustainable

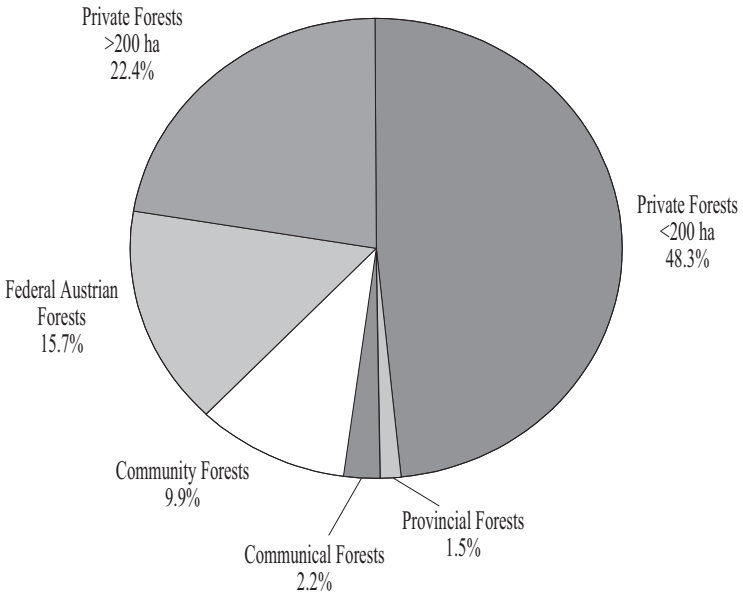


**Figure 1.** Forest ownership in percent of forest area in Austria (Bundesministerium… 1998).

used. Distributed over all Austria ownership categories only 71% of the annual increment is used (Bundesministerium … 1998). In small-scale forests this percentage is even lower and amounts to 53%. The results are thinning residues of 65 million $m^3$ standing volume in particular in small-scale forests. That indicates a hope for increasing wood yield in the future.

The often practised interrupted utilisation prevents continuous additional income from the forest. The savings bank function plays a rather more important role. Accordingly permanent time and working capacities are scarcely included for forest work which questions sustainable management at all. The possibility to earn additional income is not used enough.

**Table 1.** Size classes of Austrian forest enterprises (Österreichische... 1997).

| Size Class | Number of Owners | | Forest Area | |
|---|---|---|---|---|
| (ha) | (n) | (%) | (ha) | (%) |
| 1 to < 5 | 59 578 | 28.76 | 90 758 | 2.76 |
| 5 to < 20 | 79 987 | 38.61 | 340 282 | 10.34 |
| 20 to <50 | 51 581 | 24.90 | 544 635 | 16.55 |
| 50 to <200 | 13 546 | 6.54 | 559 414 | 17.00 |
| >200 | 2 458 | 1.19 | 1 755 461 | 53.35 |
| Total | 207 150 | 100.00 | 3 290 550 | 100.00 |

## 3. Methodology

The goal of a European union supported project (SMALLFORE – Small-scale wood harvesting technology in European Forestry and its contribution to rural development) is to demonstrate the *status quo* of wood harvesting technology in small-scale forests and to identify possible problems and challenges. Particular attention should be paid to the question 'what role can small-scale forestry play in rural development?' In total 13 European countries participate in this project.

To express secure statements on how small-scale forests should be managed in the future, an interview of key persons working in that area was carried out. A total of 224 non-standardised questionnaires were sent to experts of forest authorities at provincial and district level as well as to chambers and members of forest economic communities. Some 70 questionnaires were returned (a response rate of 31%). The task was to exclude a maximum of 5 problems each out of 11 prescribed categories according to their value (Figure 2). The answers for each category were divided into different subjects and given a weighting according to their priority.

## 4. Results

### 4.1 Challenges of small-scale forest management

The most significant management problems in small-scale forests result from small-scale forest units and changes in ownership structure (653 weighted answers). The small-scale management units as well as their shape and location make it difficult to manage the units efficiently. The distance between forest and domicile is increasing, which also impedes the possibility of effective forest management. Remote forest owners lose more and more their affinity to their forest, which goes partially to the point that ownership boundaries are not

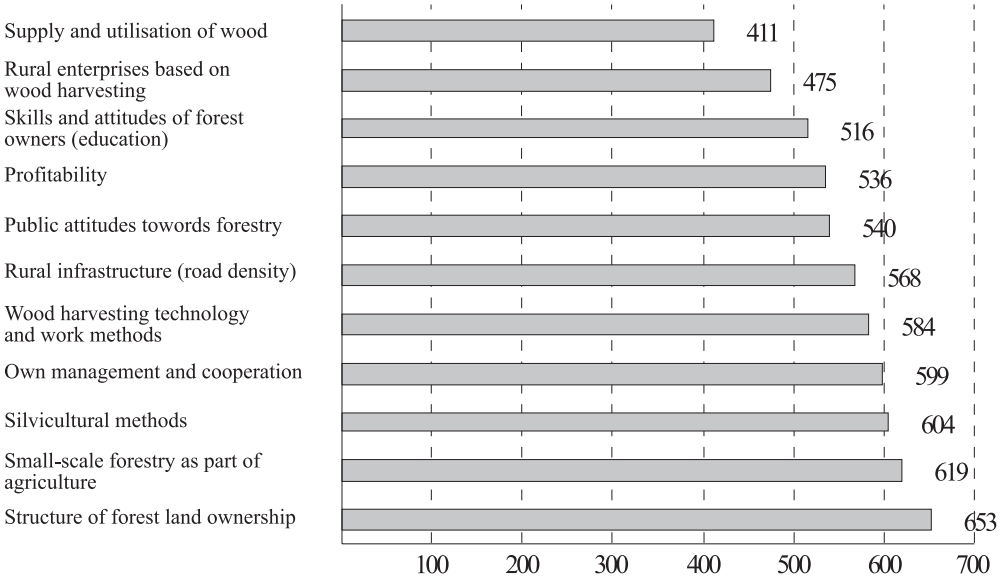


**Figure 2.** Challenges in small-scale forestry.

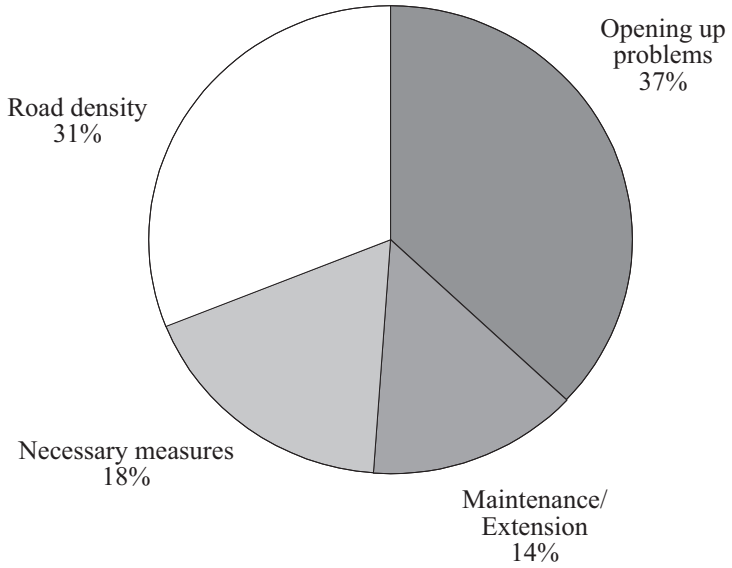


**Figure 3.** Problems with the road networks in small forest.

known any more. A major challenge in small-scale forestry is to overcome these structural disadvantages (Figure 2).

The second significant problem is the low importance of forests within the agricultural enterprise (Figure 2). The third ranked issue is deficiency of silvicultural methods. Absence of thinning and tending operations, minor consideration of habitat demands, poor tree selections as well as negative environmental impact play an important role. Insignificant in comparison to the already mentioned categories were education, the forest owner working as forest contractor and wood utilisation. The statement concerning education has to be reconsidered due to educational demands in other categories.

The question regarding infrastructure and road density showed it to be insufficient by 31% (Figure 3). From that 27% relate to opening up and another 4% relate to small skid road networks. This can be traced back to machinery equipment in farm enterprises. Obsolete tractors and cable cranes with limited range lead to this demand. The maintenance and extension of the existing road network is an urgent task for 14% of the people interviewed. General problems (37%) result from insufficient co-operation intentions, small-scaled management units and steep terrain. Profitability considerations and legal obstacles (nature protection conditions) are mentioned as another deficiency. A necessary measure in terms of stronger promotion and consulting as well as stronger co-operation intentions are demanded by 18% of the respondents.

The importance of wood harvesting as a contribution to increasing value was recognised by the respondents. Insufficient machinery employment (42%) followed by necessary improvement of harvesting systems (37%) was identified as very problematic (Figure 4). Structural problems result from small-scaled management units, insufficient road density and the lack of available capacity of work. Of little importance are negative impacts in connection with wood harvesting (8%). Apart from the general demand of more ecological adjusted technologies, the major problems are shown in the field of timber extraction especially in steep terrain.

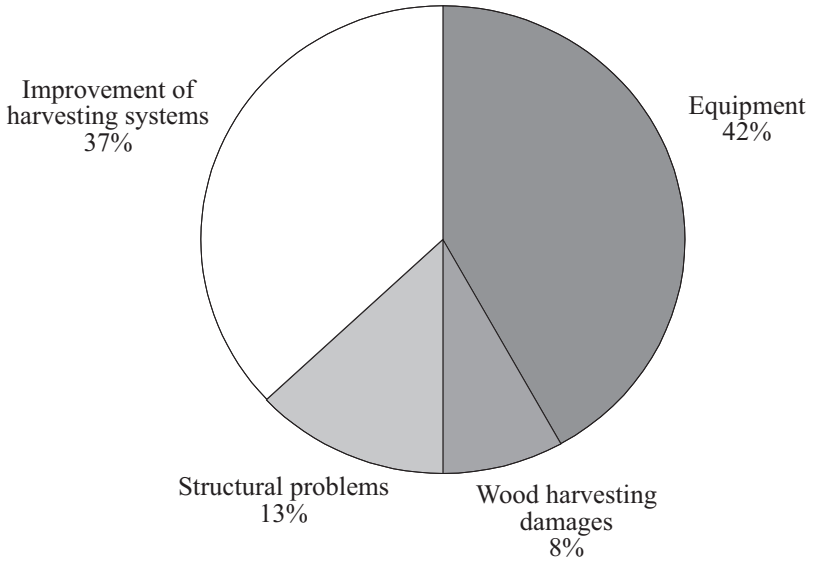


**Figure 4.** Problems with forest harvesting.

Several wood harvesting methods and machines need to be improved (Figure 5). In the opinion of the respondents, this could be achieved with more modern and more highly mechanised forest machines. To ensure machinery capacity, co-operations have to be formed. Modern logistic concepts should improve and control material and information flow along the value added chain. Support in this connection is expected from promotions of co-operations and appropriate consultation and information. Many also see a possibility in the employment of forest contractors to ensure forest tending. A reason for this is insufficient working capacity.

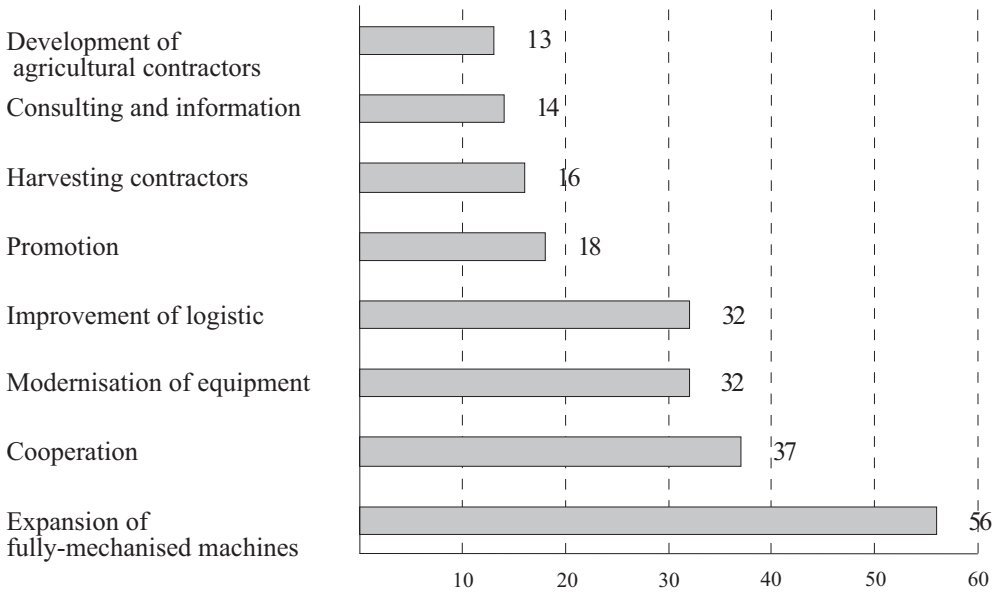


**Figure 5.** Possibilities for harvesting system improvements.

The most important equipment used in small-scale forests continues to be the chain saw and forestry adapted agricultural skidders (Lassnig 1997; Warkotsch and Bollin 2000). On steep terrain cable cranes are also used. Since there is much potential for rationalisation in mechanisation, the use of harvesters in small-scale forests is feasible. This statement relates to the fact that nobody wants to carry out hard forest work, and physical working capacities are missing. An opinion poll in Lower Bavaria showed that 20% of forest owners are willing to employ harvesters in forest management (Warkotsch and Bollin 2000). Such machinery can only be employed usefully across ownership borders, because the small-structured units do not allow other processes. Concerning the question, whether 'collected thinning' with harvesters are imaginable, 30% of the people replied negatively. This group also refuses general employment of large-scale machinery. Approximately 30% think that mutual harvester employment is a promising management method for the future. Harvester use with the restriction that the moment of thinning operations coincides with the individual planing is imaginable for 32% of the respondents.

### 4.2 Co-operation model small-scale forest

It is generally accepted that so far co-operations – in raw wood marketing or machinery employment – have been to the forest owners advantage, and have, at least partially, increased their competitiveness. The existing co-operations prove not only the need to react on changes, but they also have a structural say in the matter of processes. Therefore, it is necessary to constantly adjust to changing demands. This also confirms the opinion poll (Figure 5), which shows the importance of appropriate co-operation methods and improvements in the logistic field.

The models and approaches for co-operations are numerous. These models range between the mentioned examples of wood marketing and mutual machinery employment as well as the transfer of management through lease to a central disposition. This combines the interest of forest owners as well as their marketing partners to optimise the course of action. Modern forms of organisations, such as virtual enterprises or contracting out internal services (outsourcing) will also be accepted in the forestry sector (Warkotsch and Bollin 2000).

The question of what type of co-operation is preferred cannot be answered yet. However it is certain that connected to the demand of improved logistic a certain degree of integration, confined to mutual wood marketing, is not enough. Modern wood processing chains require intensive horizontal and vertical co-operation. Relating to the horizontal integration, existing co-operations such as forest economic communities offer excellent central management centres. Future promotion from public institution should concentrate on the essential start-up support to pave the way for those communities to modern management concepts. To develop suitable methods of vertical integration, the options of logistic concepts must be discussed. An important goal of this new approach is to give the small-scale forest owner the chance to incorporate and to exhaust the advantages of modern technologies.

Only a well-organised wood network is able to realise these concepts. This network organises and controls the whole information and material flow along the value added chain according to the demands on modern logistic. This requires a central information platform, where data from the forest owner as well as from the customer come together. Based on that data the manager decides continuously about the production course and wood provision, which is guaranteed through the integrated network entrepreneur pool or self-service with the forest owner. These advantages such as reduced delays, higher flexibility, stock reduction and increased product quality, all increase the overall network profit.

This mutual way requires compromises and the willingness to detach from old traditions. It also guarantees that public and business management concerns can furthermore taken into account.

## 5. Summary

The goal of this paper was the development of a co-operation model for small-scale forests. Information from the small-scale forest industry was analysed as well as an empirical opinion poll used to form people's opinion on problem identification.

The results supply evidence for the need for ongoing structural changes in small-scale forests. As the number of forestry and agricultural enterprises decreases, remote ownership of small forests increases. At the same time the average managed forest area is too small and is of unfavourable shape and location. Insufficient modern machinery equipment leads to the demand for improved harvesting systems. The need for greater road density in small-scale forests is the result of insufficient equipment and the desire to employ agricultural tractors in forest work. For many the maintenance of the existing road network is not considered an immediate task.

The suggested network enables small-scale forest owners to overcome structural weak points. Employment of modern wood harvesting technologies across different ownership units enables cost efficient forest management. At the same time wood yield could be improved in quality and quantity. Reduced pass times, greater flexibility, stock reduction and improved product quality should be profitable for all persons involved in the wood network.

The investigation clearly shows that problems exist in small-scale forest management in Austria. The situation in other parts of Europe is similar. To date the existence of some horizontal co-operation's indicate at least partial success. To ensure competitiveness in the future co-operation on a vertical level is necessary. This requires compromise intentions as well as detachment from old traditions from all persons involved. On a conceptual level competitive solutions are known, their integration into small-scale forestry, however, is missing.

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# Interactive Knowledge System for Family Enterprise Forestry

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## Abstract

Modern forestry places severe demands on the private forest-owner. The decisions that must be reached are complicated and must cover not only ecological, but also economic and technical considerations. One can hardly expect such a wide range of competence in private forest-owners. The need for qualified support adapted to the target group is, thus, greater than ever. One form of support is a knowledge system. Expert advice is presented to the user, mainly in order to function as support in decision-making. 'Knowledge Systems for Forest-owners' is a development and co-operative project between the Swedish forest-owner movement, the National Board of Forestry, the Forestry and Agricultural Research Council, and SkogForsk (Forest Research Institute of Sweden). The vision is to collect old, well-tried, knowledge and new research information in order to co-ordinate current facts and information concerning management and economy in the relevant sectors. The approach used is characterised by simple and easily understood advice, and the forest-owner can rapidly find answers to why and how the forest should be managed, and how the different inputs, or lack of inputs, will affect the development and economy of the stand. The interactive parts are an important component, where the user can transfer their knowledge into practical inputs, or enter data on their forest and thereby obtain management recommendations adapted to specific situations.

*Keywords: knowledge systems, private forest-owners, decision-making support, silviculture*

## 1. The importance of knowledge

Modern forestry places severe demands upon the private forest-owner. The decisions that must be reached are complicated and must include not only ecological considerations, but also economic and technical considerations.

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Forest management includes numerous complex decisions. Depending upon the natural conditions and the previous management the opportunities vary, and with them the various management alternatives. There is no universal solution.

During the establishment and juvenile phases of a stand, decisions are reached that will affect the forest for decades to come. The decisions made will therefore have major economic consequences. In addition, the forest-owner must be capable of reaching decisions compatible with legislation relating to consideration of nature.

Knowledge is important, but the lack of knowledge among forest-owners is sometimes considerable. Even if they have the knowledge required it is important that it is handled correctly. There is a major problem in making the collective knowledge available to all those who need it, when they need it.

During recent years the development of the Internet has taken off. The Internet has become a new public medium and a channel where a large number of people can be rapidly and easily reached. The web can now be used for effective dissemination of knowledge.

Valuable knowledge, of professional and specialist nature, can be released and spread. In this way, SkogForsk's vision of knowledge dissemination can be approached: that every decision-maker in each individual situation shall have access to decision-making support that helps the task at hand and improves its quality. The technology used for this has been called a knowledge system.

## 2. What is a knowledge system?

### 2.1 Decision-making support

A knowledge system provides assistance and support in decision-making – often in the shape of a computer program – that contains expert knowledge within a subject area. The knowledge is presented to the user, mainly in order to function as support in decision-making.

Knowledge systems can be used, for example, to:

- give advice or provide support in decision-making – what is the best option in this situation?
- accumulate knowledge – the system is always supplied with the latest research results;
- place diagnoses and make searches for errors;
- make prognoses.

Some systems can accumulate knowledge in the form of experiences and, with time, often become more knowledgeable than their creators as the system is supplied with data from several experts. Research has shown that an effect of building knowledge systems is that participating experts have often developed into better experts having completed a project. For the first time, they might have seen their knowledge in a structured presentation, and identified gaps in knowledge.

### 2.2 Perspectives – long experience in medicine

Within the field of medicine there are several knowledge system to assist doctors and laboratory staff to diagnose symptoms, pathological changes and illnesses.

In some systems the doctors can reject the conclusions of the system and 'criticise' the system by entering their own diagnosis and stating how their conclusions have been reached.

As a result, there are medical knowledge systems that reach their 'own' conclusions on the basis of fairly inadequate in-data since the system has built up a base of experience founded on problem descriptions and solutions.

It should be emphasised that considerable advances have been made in medicine in this sector, but nonetheless the systems are used mainly in research and education. The answers given by the system still only provide support for a diagnosis, mainly because responsibility for a patient cannot be transferred to the system.

### 2.3 Experiences from forestry

When are knowledge systems needed in forestry? They are needed when the benefits exceed the costs (i.e. when the correct decision is important for the completion of the process with regard to quality and/or time).

Today, there are only a few examples of knowledge systems in forestry. However, in some cases instruction manuals have been transferred onto CDs or placed on the Internet.

Systems that search for breakdowns in forest machines are being developed. From there, the step to being able to obtain concrete advice on repairing the breakdowns will probably take a few years more.

## 3. Forest-owners obtain immediate knowledge

### 3.1 Developmental project

Managing a forest generally requires qualified knowledge within widely different subjects. We cannot expect the individual private forest-owner to have such a wide competence. The need for qualified, target group adapted support is greater than ever.

A subject area that is suitable for knowledge systems is forest management, where questions concerning choice of method and the time to introduce different measures must be decided. One such knowledge system for forest-owners is being developed in a project between the Swedish forest-owner movement, the National Board of Forestry, the Research Council for Forestry and Agriculture, and Skogforsk. The system is similar to a manual where facts and information concerning different forest management inputs are compiled and supplemented with interactive extension and practical exercises. The intention has been to improve the efficiency of disseminating information and results produced by applied research to the individual forest-owners.

### 3.2 The Swedish forest-owner

Individual forest-owners are an important group in Swedish forestry. About 50% of the country’s forestland is privately owned and today there are almost 350 000 Swedish forest-owners. The average forest-owner is a 51-year-old man, but in step with urbanisation this group has changed from formerly mainly consisting of rural inhabitants to a situation today where it consists of a very heterogeneous group with representatives of varying professions, backgrounds, academic knowledge, age and gender. Consequently, it is difficult to use campaigns and other information inputs to reach this large and varied group with different opportunities, needs and interests.

### 3.3 Internet and the forest-owners

In December 2000 the number of Swedes surfing the Net was more than 4 million (i.e. 56.9% of the population). However, to get a more correct picture of the forest-owners in Sweden we should look at the activity in the 35–79 year age group. In this case, the share of Internet users was 49%. Many forest-owners report that they never use the Internet in their forestry activities. On the other hand, the Internet is used relatively often in searching for information.

During December 1999 the first module in the knowledge system was evaluated. The results of this evaluation show that most people considered that the Internet was a very good channel for spreading information on forest management. Those who were doubtful, or had no opinion, were mainly people who had little skill in using the Internet.

### 3.4 IT-based extension advice and support in decision-making

The intention is to create an IT-based channel for information and extension advice dealing with management and economy in privately owned forestry enterprises. Here, the forest-owners will be able to find answers to all the problems they may encounter during the different phases of the forest's development. The natural conditions of the forest stand, its history and status, as well as the long-term and short-term intentions of the owner should be weighed together in a diagnostic part of the system that requires good in-data and that will result in support in decision-making.

Today there are systems for management of broadleaf forests and for cleaning. The thinning module is being developed and there are plans for an additional module for final felling and reforestation.

The possibility for interactive operations distinguishes manual from on-site extension advice:

- calculations;
- diagnoses;
- prognoses;
- pedagogical support in decision-making and practical exercises; and
- local/regional adaptation.

However, forestry is not an exact science and it is important that the user does not experience the system's recommendations as being universally applicable; at the same time the user must feel confident that the system's recommendations are reliable. This is a fairly difficult problem to resolve.

The user is not only provided with support in decision-making, but also with knowledge. As a result of the design of the system the user can obtain an explanation of how the conclusion was reached at the end of a consultation. One example is the possibility to vary different in-data in the interactive parts of the knowledge system and observe the variations in results. The system thereby provides the user with the possibility to see and understand relationships between different factors and thus the user can form their own opinion of the relevance of the recommendations.

It is also important that there are several levels of knowledge in a knowledge system – the user must be able to get quick results but also be able to understand the theory behind the interface (e.g. research reports and other compilations).

### 3.5 Design of the knowledge system

The base of the system is found in static HTML pages that are supplemented with database functions. The technical level has been adapted to the user's conditions, which generally means poor links and weak computers.

The interactive parts are designed around imaginary situations where the system states how the forest should be managed in the different cases. Using the data supplied by the user the suitable alternative answers are collected from the database.

Editing and updating of the texts and illustrations in the static pages is done directly in the source code using Macromedia Dreamweaver.

The system's glossary, enquiry function and knowledge test are linked to an Access database. Maintenance of these functions is made easier through a simple web interface. This administration tool can then be used to arrange the different chapters and courses as required. For example, the chapters on the forest-owner's own activities in the different courses can be compiled into a new course.

### 3.6 Experiences emerging from the project

The results of evaluations show that users find the knowledge system is simple, informative, interesting and engaging. The design is well adapted to the user's needs and level of knowledge, and most people consider that they will return for similar services in the future.

Sweden is a country with considerable geographic variations as regards forest production. Thus, it would be desirable to adapt the information to the different parts of the country. Increased features of interactivity and problem-based learning should also be developed in subsequent modules.

The original ambition to reach all forest-owners is today regarded as unreasonable and no longer desirable. Instead, emphasis is concentrated on the younger forest-owners where the Internet functions as a natural channel of information, and also the other forest-owners with a certain amount of Internet awareness and interest (e.g. the increasing number of people who no longer live on their forest or farm properties). In addition, the target group has been widened to also include other people who influence management of the forests.

### 3.7 Complete knowledge system for forestry

This is only the start of the development of support for decision-making. In SkogForsk's vision everybody in every decision-making situation will be able to obtain advice on how to do their work in the best possible way. Regardless of whether you are going to build a road, plant a clear-cut or repair a machine you will not have to wonder how to do it, or even worse, make expensive mistakes.

For land-dependent industries such as forestry, where numerous different people with different levels of competence face similar problems, it should be profitable to co-operate around the creation of a knowledge system. Naturally, it will cost a lot of money to design a complete system for forestry, and it will take time too. Instead, there will probably be a number of pioneer projects growing together via the web into a functioning form of providing support for decision-making in all possible situations.

## 4. Development possibilities for knowledge systems on the Internet

Evaluations of earlier knowledge system projects for ‘Broadleaf Forest Management’ and 'Cleaning' show that the web is the obvious channel for spreading both theoretical and practical information on forest management.

This advisory service is found on SkogForsk’s homepage (http://www.skogforsk.se). It is open to everybody and is available without charge. The advantage of offering information via the Internet is that the information is available to everybody and at times that suit the user. In addition, the system is easily updated when new research results arrive or when the need arises.

Learning should become even more engaging, and thus also more effective, since the forest-owner can test the theory behind their own situations in practice through interactive exercises. Web-based knowledge systems also offer the opportunity to get information ‘on demand’ (i.e. when and if the user asks for it).

In comparison with distribution on, for example, CD or DVD, the web-based system offers better access and the system is easier to up-date. If necessary, web-based knowledge can be burnt onto a disc and distributed. On the other hand, the knowledge must be distributed by disc if large numbers of animations, film sequences, etc. are used. The slow transfer speeds of the web imply large limitations, but the problem can be reduced if the user downloads entire, or parts of, programs into an executive file.

Today, it is easy to integrate databases and web technology. This makes it simpler to build knowledge systems. In addition, the market is promoting development of decision-making support and interactive education using web technology. These systems are often classed as knowledge systems.

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# Supporting Selection between Individual and Joint Ownership in Private Forestry: a Planning Example in a Death Estate

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## Abstract

Members of a death estate must decide whether to continue forestry in the jointly owned forest estate or not. Alternatives to joint ownership are becoming the owner of a sub-area of the mother estate or selling the share of ownership. This paper introduces a forest planning approach for this problem. Selling the share of ownership is not considered in this paper.

A planning example including two forest owners, A and B, is presented. The forest estate includes two geographically separate areas, Blocks 1 and 2. Owner A has a 'financing strategy', and owner B a 'profit strategy' for forestry. The financing strategy means that the present value of net income is maximized so that expectation value of the forest at the end of the 30 years' planning period (year 2032) remains on the present level (year 2001). The profit strategy means that the sum of the present value of net income (years 2001–2031) and the present value of expectation value at the end of the planning period (year 2032) is maximized.

A compromise plan, based on the owners' individual strategies, is produced for the whole forest estate. From an individual forest owners point of view the alternative ownership arrangements are: (1) to own Block 1; (2) to own Block 2; and (3) to own 50% of the jointly owned forest estate.

*Keywords: economic sustainability, forest planning*

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## 1. Introduction

Members of a death estate must decide whether to continue forestry in the jointly owned forest estate or not. In this decision process the members of the estate may meet the fact that different members have different economic strategies and respective forest management goals (e.g. Pesonen 1997). Furthermore, attaining different goals is strongly dependent on the production possibilities of the forest.

The alternatives to joint ownership are becoming the owner of a sub-area of the mother estate or selling the share of ownership. In some cases, it may be more beneficial for an individual owner to leave the jointly owned estate instead of being a member of it and sharing decision authority with the other members. However, in some other cases compromising between different goals in a jointly owned forest estate may be the best alternative for all the owners involved. Before deciding whether to continue with a joint ownership, different forest owners' goals should be defined and possibilities to integrate these goals should be studied.

In general, it is not easy to say which kind of ownership arrangement best fulfills individual owners' goals in a specific situation. This paper introduces a forest planning approach for supporting decision making in this kind of a selection problem. The method is illustrated in a planning example.

## 2. Planning example

### 2.1 Planning area and simulation of treatment schedules

The forest estate of this planning example included two separate blocks. The forests of the estate were inventoried using visual stand-wise inventory. The inventory data were input to the Monsu planning system (Pukkala 2000), and the present status of the forest was calculated. The area of forest land (annual growth more than 1 $m^3$/ha) was 69 ha in Block 1 and 134 ha in Block 2. The blocks were covered by native tree species (Table 1).

The planning period was 30 years, consisting of three 10-years sub-periods. The planning period was quite long because the planning problem was clearly a strategic issue.

One or more treatment schedules were simulated, by utilizing growth models, for each forest compartment for the first (2001–2009), the second (2010–2019) and/or the third (2020–2029) sub-period(s). The Finnish silvicultural practices guided the simulation. The treatments (thinning, planting, fertilization, regeneration, clear felling, etc.) were simulated in the mid-points of the sub-periods.

### 2.2 Strategies, goals and alternatives

In Finnish forestry there are many forest owners who do not want to maximize their profit. Instead, they search for a compromise between income during a given time period and maintaining earning possibilities after that period (e.g. Kangas et al. 1996; Pykäläinen 2000).

Soil expectation value of a forest compartment is a widely used indicator for earning possibilities. It indicates what would be the present value of net income if forestry was continued forever. Expectation value can be estimated by using the 'sum value' method (Figure 1), or by maximizing the present value of net income over a long time period of, for example, 50–100 years (e.g. Oksanen-Peltola 1991). In this planning example expectation

**Table 1.** Characteristics of the growing stock in Blocks 1 and 2.

| Species | Volume ($m^3$) | Saw logs ($m^3$) | Pulp wood ($m^3$) | Felling value (FIM) |
|---|---|---|---|---|
| **Block 1** | | | | |
| *Pinus sylvestris* | 5 226 | 1 930 | 2 967 | 661 875 |
| *Picea abies* | 2 667 | 888 | 1 519 | 305 426 |
| *Betula pendula* | 352 | 24 | 294 | 26 138 |
| *Betula pubescens* | 1 024 | 147 | 697 | 81 153 |
| *Populus tremula* | 13 | 0 | 10 | 609 |
| *Alnus incana* | 52 | 0 | 40 | 2 021 |
| *Salix caprea* | 56 | 2 | 21 | 1 240 |
| Total | 9 390 | 2 991 | 5 548 | 1 078 462 |
| **Block 2** | | | | |
| *Pinus sylvestris* | 7 773 | 2 568 | 4 524 | 926 879 |
| *Picea abies* | 4 125 | 1 310 | 2 305 | 456 259 |
| *Betula pendula* | 488 | 0 | 396 | 27 710 |
| *Betula pubescens* | 2 529 | 149 | 1 752 | 155 457 |
| *Alnus incana* | 10 | 0 | 0 | 0 |
| *Sorbus aucuparia* | 25 | 0 | 0 | 0 |
| *Salix caprea* | 64 | 0 | 4 | 204 |
| Total | 15 014 | 4 027 | 8 980 | 1 566 508 |

values were calculated using the sum value method. Expectation values for the forest areas were calculated as sums of individual forest compartments.

The sum value method assumes that the forest stand is treated according to Finnish practices of silviculture and timber harvesting. Expectation values for seedling stands and bare land and expectation value coefficients (see Figure 1). are obtained from tables calculated beforehand. Current felling value of timber is calculated by multiplying the volumes of different timber assortments by unit prices. However, the felling value does not correspond to present cutting possibilities because clear felling is not allowed in young and middle-aged stands. The expectation value coefficient is high in young stands and low in old stands. In mature stands the coefficient is one.

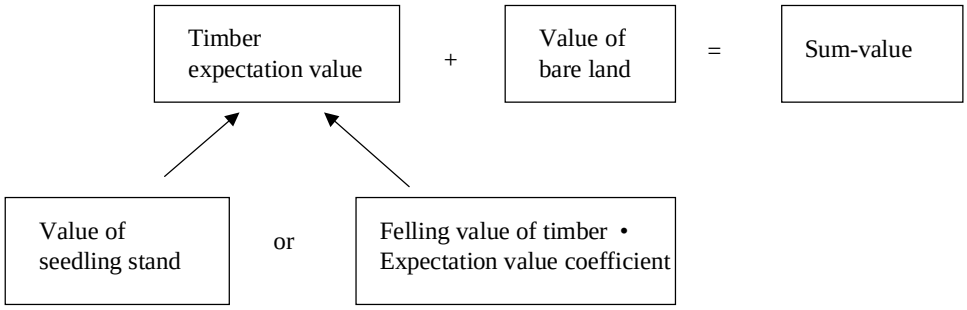


**Figure 1.** Calculating the sum value of a forest (Oksanen-Peltola 1991).

There were two members, A and B, in the death estate of this planning example. Forest owner A adopted a 'financing strategy' for forestry. Owner A compromised between earning money and maintaining earning possibilities after the planning period (30 years). The strategy was made operational in planning calculations by maximizing the present value of net income so that the soil expectation value at the end of the 30-year planning period (year 2032) remained at the present level (year 2001). The non-discounted expectation value in 2032 was a technical indicator of earning possibilities after the planning period. It allowed a direct comparison of the present state of the forest and the state in 2032. When comparing the alternative ownership arrangements, present value was also calculated for the expectation value in 2032. A discounting rate of 3% was used in all calculations of this paper.

Owner B adopted a 'profit strategy'. The total present value of forestry was maximized. The strategy was made operational in calculations by maximizing the sum of present value of net income (years 2001–2031) and the present value of the soil expectation value in 2032.

A compromise plan, based on the owners' individual strategies, is produced for the whole forest estate. From an individual forest owners point of view the alternative ownership arrangements were: (1) to own Block 1; (2) to own Block 2; and (3) to own 50% of the jointly owned forest estate.

### 2.3 Plans for different blocks

This planning example applied heuristics, more closely, a forest planning method called HERO (Pukkala and Kangas 1993). In the HERO method, the utility that the forest owner can expect from the implementation of a plan was computed from an additive utility function:

$$u = \sum_{i=1}^{m} a_i u_i \qquad (1)$$

where: $m$ is the number of goal variables, $a_i$ is the importance of goal variable $i$, and $u_i$ is the sub-utility obtained through the goal variable $i$. The sub-utility was defined through a sub-utility function (Figure 2A and 2B).

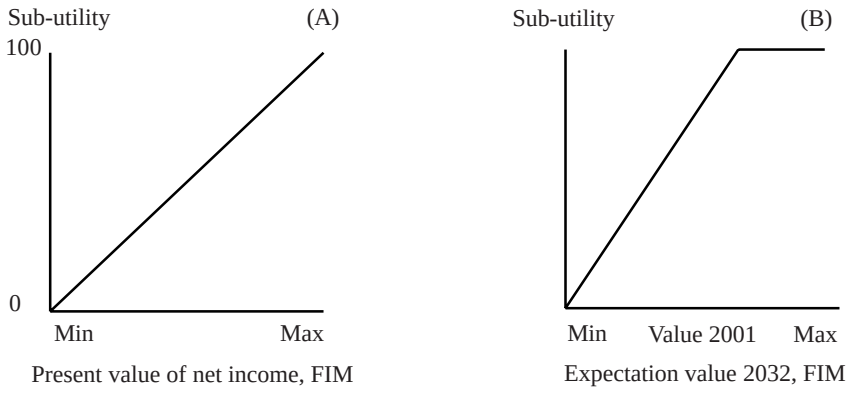


**Figure 2.** Forms of the sub-utility functions.

Owner A had a linear sub-utility function (Figure 2A) for net income (2001–2031), and an angled sub-utility function (Figure 2B) for expectation value in 2032. In the angled sub-utility function marginal utility of increasing expectation value over the present level was zero. Owner B had linear sub-utility functions for both goal variables.

The utility model (Equation 1) was maximized by heuristic optimization. Iterative search was needed to find out the maximum sum of present value of net income (years 2001–2031) and the present value of the soil expectation value in 2032 for the owner B. Iteration was done by gradually increasing the weight of income and decreasing the weight of expectation value. In general, financing and profit strategies gave remarkably different results (Table 2).

### 2.4 Compromise plan for the whole estate

The compromise plan was produced in two steps. First, the calculations of Section 2.3 were done for the whole estate (Table 3). This step defined the targets to be strived for in the compromise plan. The second step was to produce the compromise plan.

**Table 2.** Values of goal variables for different strategies in individual blocks.

| | Block one | Block two |
|---|---|---|
| **Financing strategy, Owner A** | | |
| Present value of soil expectation value in 2032 | 736 009 FIM | 1 142 167 FIM |
| Present value of net income 2001 – 2031 | 1 146 694 FIM | 2 043 437 FIM |
| **Profit strategy, Owner B** | | |
| Present value of soil expectation value in 2032 | 1 046 706 FIM | 2 291 435 FIM |
| Present value of net income (2001 – 2031) | 870 438 FIM | 1 237 358 FIM |

**Table 3.** The values of goal variables in different strategies for the whole forest estate.

| | Financing strategy | Profit strategy |
|---|---|---|
| Present value of soil expectation value in 2032 | 1 878 282 FIM | 3 338 140 FIM |
| Present value of net income 2001 – 2031 | 3 198 665 FIM | 2 107 797 FIM |
| Sum | 5 076 947 FIM | 5 445 937 FIM |

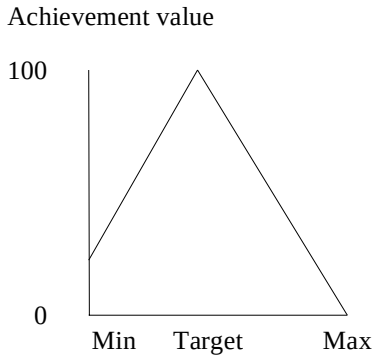


**Figure 3.** Example of an achievement function.

In producing the compromise plan the overall priority (P) of a plan was calculated as follows:

$$P = \sum_{k=1}^{n_h} w_k \sum_{j=1}^{m_k} a_{jk} A_{jk} \qquad (2)$$

where: $n_h$ is the number of individual forest owners, $w_k$ is the weight of owner $k$, $m_k$ is the number of goals for owner $k$, $a_{jk}$ is the weight of goal $j$ for owner $k$, $A_{jk}$ is the achievement value of goal $j$ for owner $k$.

The achievement values ($A_{jk}$) were calculated using 'achievement functions' (Pykäläinen et al., In press). These functions were used as technical means to strive for target values of the goal variables (Table 2). Symmetric one-peaked achievement functions were formulated by making their left and right sides reflective with respect to the target values (Figure 3).

The first formulation of the priority model (Equation 2) did not produce an acceptable compromise at the first attempt. Instead, finding the final compromise called for several changes in the weights of the owners ($w_k$) and their goals ($a_{jk}$). During this process the solutions were evaluated by using a criteria called relative achievement value. It was calculated by dividing the value of current solution by the target value. In searching for the best compromise negative deviations from the target levels were minimized. However, this was done so that the goals of different owners were equitably strived for (Table 4).

**Table 4.** Values of the goal variables in the compromise plan, and the relative achievement values for the forest owners' goal variables.

| | Value of the goal variable | Relative achievement Owner A | Owner B |
|---|---|---|---|
| Present value of soil expectation value in 2032 | 2 717 763 FIM | 145 % | 81 % |
| Present value of net income 2001 – 2031 | 2 668 604 FIM | 83 % | 127 % |
| Sum | 5 386 367 FIM | | |

### 2.5 Comparison of the alternatives

Both owners were supposed to own 50% of the jointly owned forest estate. Hence, the goal variable values of the compromise plan were divided by two for this comparison (Table 5).

In reality dividing an estate into blocks typically calls for making the blocks equally valuable. If the boundaries of the blocks cannot be changed this will often be done by transferring money. In this planning example a sum of money (492 453 FIM) was transferred from the owner of Block 2 to the owner of Block 1 (Table 5). The transfer was based on the difference in present (2001) expectation values of the blocks (1 786 900 FIM for Block 1; and 2 771 800 FIM for Block 2).

The total present value, as it was calculated in this planning example, cannot be directly used for evaluating the compromise plan (Alternative 3) because the compromise plan does not fully fulfill the owners' strategies. Thus, the compromise plan must be evaluated by taking also the values of the initial goal variables into account. On the other hand, alternatives 1 and 2 can be evaluated toward each other by using total present value. In actual cases, the final selection is always a result of negotiation, and the method presented is a way to support this negotiation. The method does not offer final solutions.

## 3. Discussion

The planning example of this paper illustrates the need for taking the goals of different members of death estates and production possibilities of the forest areas into account in deciding whether to continue with the joint forest ownership or to divide the estate into smaller parts. The method is just a prototype, and it can be improved in many ways. Some development needs are briefly discussed here.

In actual planning there is a need for making the planning calculations by varying discounting rates. For example, the profit strategy of this planning example would have produced remarkably different results with higher discounting rates. Instead of conserving forest for the year 2032 more cuttings would have been done during the planning period.

**Table 5.** Comparison of different ownership arrangements.

| | Alternative 1<br>Block one | Alternative 2<br>Block two | Alternative 3<br>Compromise |
|---|---|---|---|
| Financing strategy, Owner A | | | |
| Present value<br>of expectation value 2032 | 736 009 FIM | 1 142 167 FIM | 1 358 882 FIM |
| Present value<br>of net income 2001 – 2031 | 1 146 694 FIM<br>492 453 FIM | 2 043 437 FIM<br>- 492 453 FIM | 1 334 302 FIM |
| Total present value | 2 375 156 FIM | 2 693 151 FIM | 2 693 184 FIM |
| Profit strategy, Owner B | | | |
| Present value<br>of expectation value 2032 | 2 291 435 FIM | 1 046 706 FIM | 1 358 882 FIM |
| Present value<br>of net income 2001 – 2031 | 1 237 358 FIM<br>- 492 453 FIM | 870 438 FIM<br>492 453 FIM | 1 334 302 FIM |
| Total present value | 3 036 340 FIM | 2 409 597 FIM | 2 693 184 FIM |

Compensating for the differences in present expectation values of the blocks by transferring money is not always an applicable procedure. Defining the price may cause unnecessary conflicts between the members of the estate. Furthermore, the members do not necessarily have enough money. On the other hand, money could be liquidated by cutting forest. However, the problem of defining the price still remains. Hence, the best way would be to generate equally valuable blocks. Algorithms for automatic generation of this kind of blocks might have use. The possibilities to achieve different owners' goals should be taken into account in these algorithms.

In reality forest owners do not necessarily have clear finance or profit strategies and respective goals before the planning process. Instead the goals vary considerably, and they must be defined case by case. Furthermore, including the goals into planning often calls for interactive studying of the production possibilities (e.g. Pykäläinen 2000). The owners' strategies may change when they learn about the possibilities of their forest. Interactive planning is also useful when non-monetary goals are included in planning. In these cases, no monetary decision criteria can be used, and the role of supporting the negotiation by appropriate planning systems becomes even more important.

## Acknowledgements

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# Monitoring the Socio-Economics of Small-Scale Forestry

# Research Approaches to Environmental-economic Issues in Small-scale Forestry

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## Abstract

This paper examines some of the topical socio-economic research issues in small-scale forestry, and the appropriate research methods to shed light on these issues, based on experience in the Cooperative Research Centre for Tropical Rainforest Ecology and Management in Australia. CRC projects have been conducted in Queensland, Australia, and in the Philippines and India. On the basis of this experience, comments are also made about future research directions and prospects in relation to reforestation in the tropics and sub-tropics. Small-scale forestry faces a large number of constraints and presents a wide variety of policy issues. Critical amongst these issues is how to promote non-industrial forest industries, the role of government (if any) in supporting farm and community forestry investments, and the potential contribution of non-farm investors. A number of innovative methods appear to offer promise for enhancing the economic attractiveness of small-scale forestry. A variety of research approaches – involving techniques of the economist, sociologist, environmentalist and planner – are found to be relevant to analysis of forestry issues, and to generate information for policy makers.

*Keywords: small-scale forestry, socio-economics, research methods, Cooperative Research Centre, environmental issues*

## 1. Introduction

Since the establishment of the Cooperative Research Centre in Tropical Rainforest Ecology and Management in 1993, a variety of research activities have been undertaken on socio-economic issues in small-scale forestry at member institutions, including the University of Queensland and James Cook University. This paper draws on experiences in the Rainforest

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CRC, including in projects in the Philippines and India. The comments here apply in particular to tropical countries, and may be less applicable to countries with a long history of investment in small-scale forestry, such as Europe and Japan.

To provide input to forest policy, it is necessary to determine the return to the community from forestry and the values the community places on forests. There is a need for research methods which can examine the appropriateness of various policy alternatives, and provide guidance on desirable directions of government policy. These research approaches are the central theme of this paper, although it is necessary to place them in a decision-support perspective.

The paper first outlines the nature and role of socio-economic analysis. The role of government in forestry is then examined, including the instruments which governments use to support farm and community forestry. The critical policy questions which socio-economic analysis techniques may be used to address are then surveyed. Next, various techniques are presented, followed by a discussion of the relevance of these techniques to address particular issues. Some comments are made about research issues and methods that are likely to figure prominently in the future. A brief discussion section follows.

## 2. The nature and role of socio-economic research in relation to small-scale forestry in the tropics and sub-tropics

Forestry training has traditionally concentrated on large-scale production and silvicultural technology, relevant to the maximization of forest biomass production, from monoculture plantations of a few well-known conifer species. A policy interest in small-scale forestry – particularly farm and community forestry – is relatively new. In these areas, financial aspects usually remain important, but there is also considerable emphasis on social and environmental objectives. Research in this situation requires a different mindset to that of traditional silviculture[1]. A wide variety of research techniques or approaches are available for socio-economic studies. In general, it is not possible to rely on so-called 'objective methods' of silvicultural research, and a good deal of subjectivity may be involved[2].

Socio-economic research is in general designed to support government policy-making, i.e. a social rather than private producer perspective is taken. The research output augments the information decision-makers already have, confirming or challenging tentative decisions. The aim is to generate qualitative and quantitative information, which will assist in the making of good decisions from the viewpoint of the wider community. The spatial focus is often on a community, district, watershed or wider region.

Socio-economic research provides one of the inputs to government policy. It moves beyond technical considerations and examines the impact of forestry policies on people and on the environment. In the case of environmental impacts, these may be assessed by scientists, but again the view of the community towards environmental issues is critical to policy. For example, if deforestation leads to flooding of coastal cities, sedimentation of fisheries and depletion of groundwater supplies, then these issues very much affect human settlements and place high priority on reforestation.

Desirable policies are not static, but rather evolve over time (e.g. as technology, environmental conditions and community attitudes change). Governments do not

[1] We have found that when socio-economic research proposals on tropical small-scale forestry are evaluated by traditional foresters, the response is not supportive of the research.

[2] In this context, a report on estimation of harvest ages and yields of non-traditional species by consensus of experts was criticised by a traditional forester for lacking objectivity (Nicholson 1999), the response to which was that this may be the most appropriate approach in the face of limited data (Herbohn et al. 1999b).

automatically support environmental and social causes, but need to be convinced or pressured into recognizing their worth. Strong environmental lobbies are now well established, and do not appear to be losing their influence. In recent Australian state elections (Western Australia, 2 February 2001), a green party with a strong pro-forest agenda gained a large number of votes and influenced the election outcome. In low-income developing countries, environmental pressure often comes for external loan agencies and donors.

The emphasis of this paper is on research into small-scale forestry in the tropics and sub-tropics, and this has some differences from small-scale forestry in developed countries in temperate zones. Typically, there is a history of relatively recent deforestation, and recognition of the critical need for reforestation. Forestry activities typically involve reforestation of agricultural land, rather than management of a relatively 'normal' forest. This leads to greater emphasis on impediments to planting, benefits of reforestation (including carbon sequestration and watershed protection benefits) and government assistance programs, and less on financial monitoring and harvesting systems. Terms such as 'farm foresters' and 'tree growers' rather than 'woodlot owners' are used.

## 3. Involvement of government in small-scale forestry

Governments are involved in the support and regulation of small-scale forestry. Taxpayer support is generally justified on the rationale that forestry provides various positive externalities to the community, beyond the benefits to individual tree planters, such as watershed protection, wildlife habitat, carbon sequestration and landscape amenity. Regulation is generally concerned with protection of native forests and prevention of negative externalities, and imposes various limitations on the property rights of individual timber growers, transporters and processors.

The private profitability of small-scale forestry is often marginal, and a variety of impediments to planting may exist (including government regulations), such that additional support is needed to motivate landholders to plant trees. Some of the wide variety of measures used by government to support small-scale forestry are listed in Table 1. Often, various measures will be combined into support packages, such that the practical design of forestry intervention measures can be highly complex.

The level of government support and the stability of programs varies greatly between countries. For example, farmers can receive woodland planting and maintenance grants in the UK of up to about £5000/ha, whereas in New Zealand no direct government assistance is

**Table 1.** Some government support measures for small-scale forestry.

| |
|---|
| Provision of free seedlings |
| Planting grants |
| Plantation maintenance grants |
| Grants for facilitating public recreation in private forests |
| Livelihood payments |
| Support for development of community organisations |
| Local government rate remissions on planted areas |
| Improved taxation treatment |
| Extension and moral suasion |
| Market facilitation |
| Plantation joint ventures |
| Support for forestry research |
| Improving the regulatory environment |

available to farm foresters. The UK support is associated with a high priority on landscape amenity and import replacement, as well as the need to compete with high agricultural prices and agricultural land set-aside. New Zealand is a large timber exporter, plantation growth rates are impressive (25 year rotation for *Pinus radiata*), and small-scale forestry has been found able to prosper in a deregulated market environment.

Improving the regulatory environment can be an important form of government assistance to tree growers, and can replace direct support measures. Examples are assurance of harvest rights, removal of obstacles to log transport, removal of an embargo on log exports (thought to have been a major factor in increase in log prices to growers in New Zealand), and support for higher log prices (government often being the price leader).

Government policy is often an ad hoc 'try it and see' approach. In this context, various of the above support measures are often implemented in particular areas, on a short-term basis, then later dropped. An exception is the long-term stability of woodland grants in the UK. The short-term nature of government policy is to some extent explained by the short period between elections (typically three to five years).

The choice for government support packages for small-scale forestry are often heavily influenced by political factors. For example, the Community Rainforest Reforestation Program in north Queensland would appear to have been at least in part a move by the federal government to appease the state and local governments and assist in re-establishment of a timber industry, following the Wet Tropics World Heritage listing, which was highly unpopular locally.

Government policies to forestry in developing countries often depend on access to finance from overseas donors and lenders, and the kinds of activities these agencies favour (frequently influenced by environmental considerations), rather than on a careful comparison on the relative merits of alternative programs. In contrast, particularly in developed countries, international conservation conventions influence the design of support packages. In the future, agreements on greenhouse gas emissions and use of plantations as carbon sinks may dictate programs with rapid biomass production.

Policy advice, even when prepared at the direct request of resource management agencies, will normally be filtered and adapted before use in policy formulation. Filtering will take place in terms of the level of understanding of the research and perceptions of its relevance by government officers[3]. Adaptation may be needed to make the findings applicable to specific situations. The changing nature of government agencies (e.g. arising from public sector reform, change of government, privatisation and devolution) can create further obstacles to the adoption of research findings.

It is notable that even within the limitations on formulation of government policy discussed above, the motivation for support programs often is not driven purely by considerations of community interests. There is considerable literature and observational evidence that the 'market failure – government fix' model is not always a realistic perspective, and that regulatory failure frequently takes place. Government agencies may pursue their own 'agency goals', government owned enterprises may benefit from unfair competition with private enterprises, and there may be unintended negative spillovers of government legislation and regulations. Agency goals may concern growth in size and influence of the agency and status of individuals. In that government departments are often to some extent 'adversarial', the relative influence of particular departments and agencies can affect what policies are adopted. In some cases, government is simply unable to introduce sound policies (e.g. due to lack of resources, high enforcement costs, the power of special interest groups, or corruption of government officials). Government can thus be viewed as both a potential ally and an impediment to small-scale forestry.

[3] An example concerns the author's experience as economic adviser on the Commission of Inquiry into the Conservation, Management and Use of Fraser Island and the Great Sandy Region in Queensland, Australia. Various consultancy reports were obtained by the inquiry, one of which was a contingent valuation of forest preservation on Fraser Island. The impact of this valuation was reduced by the low response rate in the postal survey (and hence possibility of non-response bias), and the perception that the very high values obtained may have applied particularly to areas of old-growth forest.

## 4. Some critical policy questions

The nature of socio-economic research is directed by what issues in forest management are perceived by the community and government as being important. Some of these are perennial, and some change over time as community attitudes change. A number of issues or questions which experience of the Rainforest CRC socio-economic research group suggests are important are now reviewed.

*What government policies or practices impede development of small-scale forestry?* Environmental regulations may have unexpected negative impacts. For example, measures to control illegal logging – such as prison sentences for farmers cutting down trees on their own land – may generate strong negative signals for tree planting. Issues arise in terms of regulatory failure (unsatisfactory policies) and sovereign risk (changing the rules to the detriment of tree growers). A recent change in taxation arrangements in Australia has meant that in general farm expenses cannot be offset against non-farm income, and this could severely reduce tree planting on farms.

*Can we expect widespread adoption of forestry by smallholders?* In many areas, particularly in developing countries, the rate of tree planting is disappointingly slow. Long lists of potential impediments to small-scale forestry may be identified, and some of these found to be relevant in any particular situation. However, when conditions are right, it would appear that rapid adoption of farm forestry is likely (Byron 2001). This raises questions about how best to overcome impediments and facilitate adoption.

*Is farm forestry a profitable investment?* In many situations, there is little information for potential tree growers to gain an idea of whether a forestry investment would be worthwhile. This lack of financial information is repeatedly identified as an impediment to small-scale forestry.

*Will timber prices increase in the future (in real terms)?* Expectations of future timber prices are a key factor in forestry investment decisions. Recent rapid deforestation in many countries would suggest future timber shortages. On the other hand, particularly in the case of fast-growing softwoods and eucalypts, timber may be viewed like other agricultural crops, where there is potential for oversupply. Careful forecasting efforts are needed to guide investment decisions.

*To what extent is government support for small-scale forestry warranted?* This depends on the externalities and flow-on benefits, hence the need for information about these. In essence, it is necessary to identify the relevant stakeholder groups, and the extent to which they benefit, and hence the social payoff from taxpayer support for forestry.

*How can assistance programs be targeted for greater cost-effectiveness?* There may be a possibility of identifying instruments most likely to induce planting, and landholder groups most likely to respond, allowing more precise subsidy and extension targeting. This introduces a requirement to understand the sociological characteristics of potential individual planters and community groups.

*What are the advantages and limitations of common property forestry arrangements, and how can these advantages be maximized?* Common property systems of forest development and management have become important, for example, in India (joint forest management, JFM) and in the Philippines (community based forest management CBFM, community based resource management CBRM). These allow pooling of inputs and economies of scale, while harnessing people power to protect forests from illegal logging. However, they are sometimes rather dependent on financial assistance, and equity problems can arise between participants and non-members.

*If governments reduce or eliminate direct support for small-scale forestry, what new measures may be introduced to encourage tree planting?* In this time of economic rationality and fiscal conservatism, it would appear that government assistance for small-scale forestry in

on the decline. This would create a vacuum in terms of forestry incentives, and the need to devise innovative assistance measures which have low cost to government. In that environmental and social externalities of forestry are generally unpriced, they do not provide an incentive for planting. Recently, there has been considerable interest in commodification of these externalities and creation of a revenue stream for tree growers early in plantation life[4]. If an annuity payment can be made for externality benefits, landholders will be in a better position to afford to grow trees. Of course, careful consideration is needed of transaction costs of these measures. For example, it is clear that there will be considerable cost in validation and monitoring of carbon sequestration, which will probably outweigh the benefits of trade in carbon credits for small woodlots. Possible measures for creating economies of scale include the grouping of producers, e.g. through brokers, as grower cooperatives, or through joint venture schemes with governments or timber companies. Further, tax arrangements may be needed in order to claw back benefits if forestry projects are terminated prematurely but after receipt of environmental payments.

*Can small-scale producers come up with a high quality product?* Anecdotal evidence suggests that in tropical developing countries, where there is not a tradition of small-scale forestry, silvicultural management may not be of a high standard, e.g. seedling quality is often low, landholders are reluctant to thin their plantations, the best trees may be harvested first. And even in developed countries, the standard of silvicultural management and on-farm timber milling and drying may be well below that of professional forestry organisations.

*Can small-scale growers ever expect to obtain 'fair' prices for their timber?* Even where product quality is high, small-scale growers lack market power, with small volume and intermittent turnoff. Often sales are made when cash is needed – a form of forced sale. It has been notable that farmers typically receive about $\$40/m^3$ for timber (roundlog basis) in Australia, whereas woodpacks of the same species can be priced at $\$2000/m^3$ or more. In some cases, timber in farm woodlots is simply unsaleable; this has been the case for *Pinus caribaea* woodlots in north Queensland.

*How equitable is the distribution of benefits from small-scale forestry?* Analysis of this question required a knowledge of the costs and markups along the timber production pipeline, from growing trees through logging, milling, further processing and storing, and marketing of lumber and other timber products. Evidence suggests that growers do not receive a fair return for their timber, but at the same time closure of timber mills indicates that mill owners are not making huge profits either. It may be that lack of resource security discourages new investment in milling equipment, and dated equipment together with low throughput leads to high unit milling costs.

*How real are the non-wood benefits of small-scale forestry?* Forestry is often advocated on the basis of the non-timber products and services it generates. Particularly in the case of services, there is sometimes the feeling that value estimates are 'funny money'. Much of the reported forest benefits concerns existence value of native forests, rather than values of plantations. Further documentation of non-wood benefits is required.

*How important are the negative environmental externalities of small-scale forestry?* Farm and community tree plantings can form habitat for pest animals, create erosion (particularly under deciduous species), and reduce soil water for other vegetation. In some cases there is a community preference for grassy rather than wooded landscapes.

[4] There is potential for creating a market for carbon credits, and sales of these credits as a joint product by tree growers (Lamb 2000). In some instances in Europe, landholders are given greater financial support for forestry if broadleaved species are grown and if private forests are made available for public recreation (Harrison 1998). There is a case for providing compensation to growers for contribution to watershed protection, flood mitigation and generation of wildlife habitat. Certification of timber as having been produced sustainably has been found to increase the price to growers by about 20% in some instances in the Philippines (Lasco personal communication). In the Philippines, forward selling by farmers has allowed an early return and transferred the risk of typhoon damage to the buyer, although at a sacrifice in timber price (Lasco personal communication). In countries where logging residue is not fully utilized, there is scope for development of biomass fueled small-scale electricity generators.

*Will small-scale forestry have much impact on regional economies?* In general, forest industries are important sources of rural earnings and employment, although this is not necessarily the case with new plantings. Particularly when large areas are planted with trees and other rural industries are displaced, community unrest may arise from loss of jobs in rural communities with conversion of agricultural land to forestry, curtailment of social infrastructure, noise and road damage by timber trucks (Emtage et al. 2001).

*To what extent should biodiversity be pursued in plantation forestry?* Plantations may be designed and managed for high biodiversity (e.g. use of wide buffers of native vegetation around watercources, use of native species and species mixtures, tolerance of understory development) but there will be usually a tradeoff between timber yield and such measures. The optimal arrangement will depend on the technical tradeoff considerations and the objectives of the stakeholder groups.

*To what extent are environmental issues proxies for social issues?* 'Social forestry' is in general a discredited concept, and environmental criticisms of plantations appear to be sometimes motivated by social rather than ecological impacts. In some developing countries, eucalypts have been called ‘the tree that causes riots’, and a litany of adverse environmental impacts of eucalypts impacts have been named (makes rivers go dry, allelopathy, increased soil erosion, desertification, etc). To some extent, these are responses to establishing plantations for industrial use (newsprint, rayon) on common land that was previously available to local communities (e.g. in India in the 1980s). Generating support for policy here requires a clear understanding of social as well as environmental issues.

*What is the potential role for vegetation corridors*? Vegetation corridors provide conservation benefits, but they may also allow pests to invade farms (e.g. feral pigs in north Queensland, elephants in Sri Lanka), and require taxpayer support. Designs include long narrow strips (which can suffer from edge effects), and wide (2–7 km) but not necessarily fully planted corridors.

*Should government policy favour native species?* Sometimes strong preferences for native species are apparent among policy makers[5]. Obviously, both advantages and disadvantages will arise with use of native species. They may fit better from a biodiversity perspective, and adoption may be easier to promote. Where the aim is timber production, there is likely to be greater knowledge of their silvicultural requirements and timber properties, and greater market recognition and acceptance. On the other hand, exotics may have higher growth rates and be less prone to fire damage and pest attack. There is a need to compare species on both biological and socio-economic terms. A grey area arises where exotic species have been used for a considerable time, and are regarded as 'traditional' or 'naturalised species', as in the case of *Gmelina arborea* and mahogany species (*Swietenia* spp.) in the Philippines.

## 5. Socio-economic research methods in small-scale forestry

Prior to carrying out research, there are a number of steps to undertake in terms of what may be broadly called 'problem definition'. Some steps typically relevant in relation to forestry research are listed in Table 2. When dealing with regional forestry planning, a variety of stakeholders may be involved, including landholders and communities who may grow trees, but also resource suppliers, people in the processing chain, and those with an administrative or monitoring role (Harrison and Qureshi 2000). A host of property rights and responsibility issues may arise; these can be defined in terms of such characteristics as physical extent of

[5] In project work in Leyte in the Philippines, the president of the collaborating organisation expressed strong views in favour of use of native species for reforestation activities.

**Table 2.** Problem definition steps.

| |
|---|
| Identification of stakeholder groups |
| Analysis of property rights and responsibilities of stakeholders |
| Identification of impediments to small-scale forestry |
| Identification of forest products, services and externalities, and their inter-relationships |
| Specification of research questions |

resource, duration, transferability, divisibility, excludability, payment of charges and prevention of adverse externalities.

A surprisingly long list of impediments to small-scale forestry can arise (e.g. Venn et al. 2000b; Vize and Creighton 2001). The opportunities to assist small-scale forestry, and specific research questions, need to be formulated. Also critical are the steps in developing a research proposal, grant application and project budget, and in developing a research team and managing the research (planning, supervision, reporting), as well as the technology transfer (including publication) strategy.

A wide variety of research techniques, both qualitative and quantitative, have been applied to examine socio-economic issues in small-scale forestry. Some of the more important of these are listed in Table 3. It is not possible to elaborate each of these research methods in detail here, but comments will be made about some of them. In recent years, considerable emphasis has been placed on so-called 'qualitative research methods', often involving case studies, particularly when a relevant population of substantial size is not available from which to draw data (e.g. see Patton 1990). SWOT analysis (group identification of strengths, weaknesses, opportunities and threats) is sometimes used when evaluating a specific program or enterprise and exploring improvement measures (e.g. see Hobbs et al. 2001). The focus group in which a number of experts are brought together to pool ideas and interact is another qualitative method, sometimes used as a precursor to other research techniques (such as those employed in non-market valuation). Similarly, the Delphi technique of working towards a consensus view of experts while limiting their interaction can be a powerful subjective method of collecting information, such as about yields and harvest ages of non-traditional species.

Participatory rural appraisal has been useful in designing research programs in relation to small-scale forestry in the Philippines (e.g. Singzon et al. 1993). The PROCESS Foundation gave the following description of PRA (1996, p. 2)[6]:

> *A systematic, semi-structured approach and method of assessing and understanding ... village situations with the participation of the people and through the eyes of the people. It comprises a rich menu of visualisation, inteviewing, and group work methods that have proven valuable for understanding the local functional values of resources, for revealing the complexities of social structures and for mobilizing and organizing local people. It is therefore a group of methods and approaches that enable local people to present, share, and analyse their knowledge of life and conditions, to plan, to act, monitor, and evaluate.*

Pratt (2001) provides a recent evaluation of PRA applications in Nepal.

Landholder surveys are used to obtain information about attitudes and impediments to small-scale forestry. While these 'stated' opinions may not exactly reflect the real decisions of landholders, attitude surveys are much easier to carry out than observing actual behaviour, and in

[6] PROCESS Foundation (1996) observes that PRA draws on five traditions – activist participatory research, agroecosystem analysis, applied anthropology, field research in farming systems, and rapid rural appraisal – in an attempt to achieve 'people empowerment' and avoid the mistakes of 'rural development tourists'.

**Table 3.** Socio-economic research methods in small-scale forestry.

| | |
|---|---|
| Data collection | Qualitative research methods<br>Sample surveys<br>SWOT analysis<br>Eliciting expert opinion (including the Delphi method)<br>Participatory rural appraisal |
| Data analysis | Analysis of survey data – descriptive statistics<br>Multivariate analysis (including cluster analysis and factor analysis)<br>Price forecasting (time series models) |
| Non-market valuation | Valuation of non-wood forest products and services<br>Evaluation of forest recreation benefits using the travel cost method<br>Estimation of total economic value – the contingent valuation method<br>Choice modelling or choice experiments<br>Hedonic price method<br>Benefit tranfer |
| Reporting | Reporting systems for forest enterprises and agencies |
| Physical and financial modelling | Stand yield modelling (including under sparse data)<br>Discounted cash flow analysis and sensitivity analysis<br>Optimal economic rotation (the Faustmann formula)<br>Development of financial models of forestry enterprises<br>Whole property financial modelling<br>Modelling carbon sequestration<br>Estimation of activity costs and economic rent along the timber production pipeline<br>Cost-effectiveness and cost-benefit analysis<br>Risk or venture analysis |
| Watershed and regional modelling | Geographical information systems (farm, watershed and regional level)<br>Inter-industry input-output analysis<br>Trans-shipment modelling (locational efficiency and logistical analysis)<br>Multi-criteria analysis (and the analytic hierarchy process)<br>Resource allocation models – linear programming<br>Resource allocation models – goal programming<br>Regional development models |
| Policy analysis | Synthesis of policy directions (transferring research to policy) |

practice a combination of both may be the optimal approach. For sample surveys, it is necessary to obtain a population sampling frame (simplified when two-stage sampling is used), and to develop a questionnaire. Often a semi-structured approach will be useful, where some questions can be adapted to the kinds of responses obtained; often a transcript is recorded.

Electronic spreadsheets have become extremely popular for data entry and storage, relatively simple descriptive statistical analysis (frequency distributions, means and variances) and presentation (line and bar graphs, pie diagrams). The SPSS package has proved useful for more complex analysis (e.g. cluster analysis for identifying distinctive groups of landholders in terms of their attitudes to tree planting).

Over about the last 20 years, non-market valuation techniques have become widely applied in forestry research. The (zonal) travel cost method (TCM) allows demand to be estimated for recreation sites. The hedonic price method involves a multivariate analysis of the relationship between the market value of an asset and its characteristics, including environmental

charactersitics such as freedom from pollution and good views. Contingent valuation (CV) and choice modeling (environmental choice modelling, choice experiments) are used to estimate total economic value (TEV) of forests, including user and non-use values. Benefit transfer – inference of values from a source to target – provides a time-saving alternative to making new estimates for each specific site.

Agencies concerned with forest management have a reporting responsibility to government in regard to the achievements from spending public funds. While financial outcomes are normally reported, it is only in recent times that serious attempts are being made in environmental reporting (Herbohn 2000), and these reporting systems are still very much at a research stage.

A variety of modelling approaches are used by researchers in relation to small-scale forestry. On the physical side, it is necessary to generate estimates of the yield of woodlots and border plantings. This may involve particular difficulties in the case of small-scale forestry, where yield observations, upon which models are based, are scarce and performance is generally considerably below that of trial and commercial yields. This problem is compounded when non-traditional species are grown. Stand yield modelling in such situations is examined by Venn et al. (2000a).

Financial modelling – which requires yield estimates, and is usually carried out using a spreadsheet package and applying discounted cash flow functions – allows the payoff from forestry to be predicted; this may be restricted to modelling of a forestry enterprise or involve modelling at overall farm business or community forestry level. Since forestry is a long-term enterprise, with uncertain stand yield and future timber price, some form of risk analysis is normally attached to the financial analysis, as a sensitivity analysis or a risk simulation, say using the @RISK simulation add-on to Excel or Lotus 1-2-3 (Harrison et al. 2001). Economic modelling may be viewed as an extension to financial modelling, in which an effort is made to include shadow prices rather than simply market prices, and in which non-market values are included, typically in an extended cost-benefit framework.

A variety of approaches have been developed for forestry planning at a regional level. When dealing with a number of stakeholder groups with often conflicting objectives, it has become apparent that the method of analysis should take account of multiple goals. One approach has been goal programming, in which a number of goals can be specified, and given differing weights (weighted goal programming) or priorities (pre-emptive goal programming). Goal programming is being trialled by Venn to compare alternative forest utilization policies by the indigenous community in Cape York in Australia.

In recent years, there has been much interest in multi-criteria analysis (MCA) or multi-objective decision support systems (MODSS) as an approach to planning land-use at a catchment level, including for reforestation planning (e.g. RAC 1992; Robinson 2000; Qureshi and Harrison 2001). The analytic hierarchy process (Saaty 1995) is sometimes used to elicit stakeholder preference weights in relation to various goals in MCA. Trans-shipment modelling provides a useful approach for examining locational efficiency and plant location issues in forest industry development.

Devising strategies for small-scale forest industry development in any particular region is a challenging task. Theoretical foundations for this kind of analysis are provided by Tykkyäinen et al. (1997). The FLORES model of Vanclay et al. (2000) is an attempt to develop structured methodology for examining the requirements for more rapid adoption of small-scale forestry, and is to be trialled in the Philippines.

The output of research has to be communicated to policy makers, and taken up by them, if it is to have practical outcomes. This requires assembling the information as an integrated package which can be comprehended by agency staff, and is viewed as sensible and politically acceptable.

## 5. 'Horses for courses': matching research techniques to information needs

The various techniques listed in Table 3 have their particular application areas, although sometimes a choice must be made between approaches. When attempting to develop stand yield models, particularly for non-traditional or mixed species planting, it is unlikely that yield observations will be adequate for a comprehensive statistical analysis. Options then arise such as applying statistical methods to develop yield models on the basis of sparse data (as carried out by Venn et al. 2000a), or applying the Delphi method to elicit expert opinion about likely growth rates (as adopted by Herbohn et al. 1999a).

Inter-industry input-output analysis is designed to estimate the impacts of a change of expenditure (e.g. large on-off investment) in an enterprise, and yields various types of 'multipliers' (income, output and employment) which are indicators of community benefit from the investment. Multiplier values for a 'normal forest' are reasonably well established, but when it comes to reforestation the evidence is sparse. In practice, the upstream investment in tree planting is usually modest, with a long delay to harvesting, so that the multipliers tend to be quite small (e.g. Todd et al. 1997; Eono 2001), raising questions about the usefulness of estimating multipliers.

Relative to other small-regional analysis techniques (including goal programming), the MCA and MODSS approaches have the advantage of being able to take into account the preferences of the various stakeholder groups, to utilize both quantitative and qualitative information, and to be reasonably rapid to apply. A criticism can be the high level of subjectivity involved. The approach of Vanclay et al. (2000) is more relevant for larger regions such as states and provinces.

The use of various non-market valuation techniques has been somewhat controversial. The travel cost method (TCM) now seems widely accepted for estimating the value of recreation benefits on natural areas including forests. The hedonic price method similarly allows acceptable estimates of the property value impacts of trees and views to be estimated, provided that transaction data are available (a major proviso). Contingent valuation (CV) has been controversial due to the large number of potential biases and apparently unrealistically high values obtained in some applications (Harrison 1999). In practice, benefit transfer methodology is the most widely used approach to non-market valuation, and is being supported by development of databases of environmental values (e.g. see Morrison 2001).

Information has to be presented in a form that policy makers can comprehend. This may involve synthesis of information from various sources into a package of sufficient breadth for policy relevance to become apparent.

## 6. Future prospects

In the future, there are likely to be changes in the issues facing small-scale forestry, and changes in the type of socio-economic analysis conducted. Reduced public sector support may place a greater imperative on adopting innovative measures to make small-scale forestry more attractive, particularly in terms of generating an earlier cash inflow. Saleable carbon and other environmental credits could be important in this context, if efficient market mechanisms can be established, and a demand can be created through industry or international organisations (including environmental or aid organisations). The relative larger scale of community forestry projects relative to farm forestry could make these candidates for trade in environmental credits.

Improved timber technology (e.g. ability to use smaller board lengths, and advances in quality of composite wood and plywood products) is likely to lead to greater log demand and

prices, increasing incentives for planting. At the same time, the strength of community support for the environment is likely to lead to more sustainable forms of forestry, including plantings which are managed for both conservation and low-intensity production. Greater attention to site-species-circumstance matching can be expected. Regulatory reform – by government – can be expected to take place, which will favour forestry, although the rate of progress may be slow.

Further improvement in – and greater acceptability of – socio-economic research methods can be expected in the future. Attention may be paid to refinement of methodology for examining the development of small-scale or non-industrial forest industries, this being an issue attracting widespread interest. It is likely that there will be greater integration of methods of analysis in the development of a more powerful research approach. For example integration of MCA, financial and discounted cash flow (DCF) analysis, and geographic information system (GIS) (see Qureshi and Harrison 2001).

## 7. Concluding comments

Socio-economic analysis of forestry systems has been a neglected research area. It is unlike silvicultural research, and draws on the techniques of the social scientist, recognizing the community setting and multi-goal nature of small-scale forestry. Particular issues arise in the tropics and sub-tropics, where reforestation is urgently needed following extensive deforestation. There is a severe lack of information about the performance of non-traditional species and mixed-species plantations. Small-scale forestry faces a large number of constraints, and presents a wide variety of policy issues. Critical amongst these issues are: how should non-industrial forest industries be promoted? the role of government (if any) in supporting farm and community forestry investments; and, the potential contribution of non-farm investors. A number of innovative methods appear to offer promise for enhancing the economic attractiveness of small-scale forestry.

A wide variety of issues and research approaches are available in relation to small-scale forestry. The techniques of the economist, sociologist, environmentalist and planner are relevant to analysis of forestry issues, and they all generate information for policy makers. Non-market valuation methods, including stated preference methods, are likely to have a continued role, because of the critical need for the information they generate.

The need to have sound information to support policy for small-scale forestry can be expected to intensify, particularly as governments appear to be reducing the level of support for tree planting. While it is critical to appreciate the various research techniques, any research program needs to be viewed in a broader context, including research objectives, project design, team building and project management, and the policy context in which results will be viewed.

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# Analysis of Profitability of Small-Scale Farm Forestry (SSFF) by Means of a Forest Accountancy Data Network – Austrian Experiences and Results

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## Abstract

The Austrian example illustrates the potential as well as the limitations of forest accountancy data networks as devices for investigating and furthering the profitability of small-scale farm forestry. Special reference is made to the experiences gained in the process of adaptation and renewal of the system of data management and reporting, which took place in the year 2000. The sampled farms taking part also in the national Farm Accountancy Data Network (FADN), the nowadays quite easily accomplished incorporation of non-forestry data at the farm level is a most valuable step towards a more comprehensive documentation of the economics of farm forestry and allows for various additional analyses. The paper focuses on the following aspects of the topic: sampling scheme, ratios, significance of imputed costs and revenues, individual reporting, aggregated data and questions of consistency.

*Keywords: farm forestry, farm accountancy data network, ratio analysis*

## 1. Definition and significance of small-scale farm forestry in Austria

In Austria, there is no official definition of small-scale farm forestry. Moreover, different statistics refer to various concepts of farm typology on the one hand and forest classification on the other, depending on the context (Sekot 1998a). Small-scale forestry is usually associated with an upper limit of 200 hectare of woodland. According to the official terminology of the agricultural census the term 'farm' comprises all privately owned agricultural and/or forestry estates where the proprietor is an individual, thus just excluding any kind of industrial, company-owned or public holding. For practical reasons, a lower limit

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of one hectare has been introduced. By combining these two items, the following operational definition of small-scale farm forestry can be derived: a private forest holding of between 1 and 200 hectare where the proprietor is a normal (and not juristic) person.

According to the national forest inventory, small-scale forestry accounts for some 53% of the forest area, its share of productive forest being even 56% (Bundesministerium... 1998: Tables 2–3). The predominance of small-scale forestry is also documented by the respective figures for the growing stock (55%), the annual increment (63%) and the removals (51%).

The vast majority of all estates in Austria is privately owned by individuals or families. Hence, only less than 5% of all agricultural and forestry enterprises or properties (some 9000 out of about 260 000) are not classified as farms. In spite of this predominance in number, the farms manage only about 54% of the forest resource, the national forests alone accounting for some 15% of the total forest area (Bundesministerium... 2000). As documented by the agricultural census, 80.5% of all enterprises are not purely agricultural ones but manage also some forest, whereas only 9.5% are purely forestry ones (Österreichisches... 1997). Some 84% of the total forest area being managed by combined agricultural and forestry enterprises, the interrelationships between these two lines of production are of great significance.

According to the 1995-census, there are 207 150 forest holdings (mainly connected to agriculture), managing about 3.3 million ha of forest land. Some 204 692 (98.8%) of these forest holdings can be classified as small-scale forest enterprises, their forest area being under the limit of 200 ha. The total forest area in this category being 1.34 million ha (46.7%), the average area of small-scale forestry is about 6.5 ha per forest enterprise.

On the other hand, there are 200 511 farm foresty enterprises, which account for a forest area of 1.79 million ha. The respective shares are 96.5% in terms of forest enterprises and 54.5% in terms of forest area. As indicated by an average area of 8.9 ha of forest land, farm forestry comprises also some bigger forest holdings exceeding the limits of small-scale forestry. Although the original data would allow figures for number of enterprises and forest area to be derived also for small-scale farm forestry, no such results have so far been published or can be calculated from published data. The respective shares can just be estimated at about 95% in terms of enterprises and 40% in terms of forest area. This would correspond to roughly 195 000 enterprises, 1.30 million ha of forest land and an average area of about 6.6 ha per enterprise.

## 2. Economic monitoring of SSFF

### 2.1 Farm Accountancy Data Network (FADN)

The FADN is a representative network of some 2400 farms. It has been established for purposes of agricultural policy. Participation in the network is voluntary. Apart from a possible self-selection bias, representativeness is secured by means of quota sampling, the quotas being derived from a thorough statistical analysis of the agricultural census data. With a sampling ratio of about 2%, the standard error percent of the national average of the agricultural income lies in the range of 2% to 4% (probability of error: 95.5%) (Bundesministerium... 2000, p. 329).

In extension of the requirements as defined by the EU, the sampling frame of the Austrian FADN takes also forestry into account in terms of area as well as in terms of standard net return. The Austrian classification of farms being based on a combined view of agriculture and forestry, the results of the FADN are also representative for a major part of farm forestry (Hyttinen et al. 1997; Sekot 1996b, 1998a, 1998b). The sampling frame of the FADN is

designed so as to represent the agricultural and forestry enterprises which are owned by individuals or families ('farms'). For reasons of efficiency, the following cut-offs have been defined and hence must be observed when interpreting the results:

- enterprises with more than 200 ha of forest land;
- enterprises with a standard net return of less than 90 000 ATS (Austrian Schillings) (~ 6540 EUR);
- enterprises with a standard net return of more than 1.5 million ATS (~ 109 010 EUR).

Due to the restriction of forest area to less than 200 ha , the forestry results are in fact directly related to small-scale farm forestry. The sampling frame thus reduces the representation to some 61% of the forest area of all farm forests (corresponding to one-third of the total forest area in Austria). The published results refer to seven categories of holding as well as to eight regional groupings (Bundesministerium... 2000).

Despite these very favourable preconditions for monitoring the economics of SSFF, the FADN provides only a limited set of forestry related data. In essence, it is just the average forest area per farm as well as the forestry revenues which can be derived. The respective figures for 1999 were: an average of 11.3 ha of forest land per farm, and forestry revenues of some 50 000 ATS (~ 3615 EUR), corresponding to about 4400 ATS/ha (~ 320 EUR/ha).

The potential for a more comprehensive utilisation of the FADN also in forestry terms is indicated by some complementary statistics, providing averages concerning the following items (LBG... 1999):

- wood revenues (per farm)
- non-wood forestry revenues (per farm)
- working days spent for forestry affairs (per farm)
- volume of wood harvested (per farm)
- assessed value of forest property (per ha)
- value of the forestry asset (per farm)
- forestry sales revenues (per farm)
- forestry related subsidies (per farm)

Respective figures expressed in terms of shares of farm totals describe the significance of forestry at the farm level (Figure 1). However, as forestry related costs are not recorded separately, the profitability of SSFF cannot be assessed even on this basis.

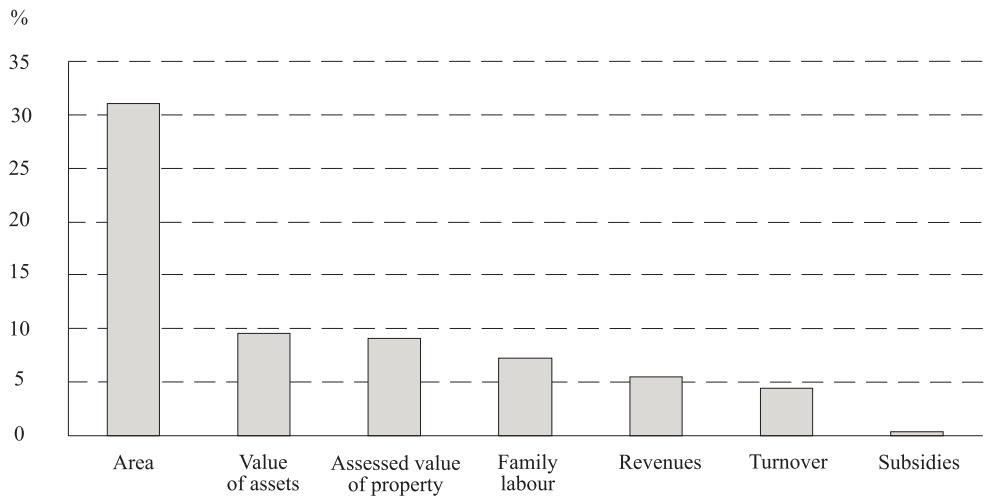


**Figure 1.** Significance of forestry for Austrian farms (FADN, national averages 1998).

**Table 1.** Profile of the Austrian SSFF-network (1999/2000).

| | | |
|---|---|---|
| established in | 1973 | |
| represented forest holdings (all farms) | 254 194 | |
| represented forest area (all farms) | 1 789 094 | ha |
| sampled holdings | 110 | |
| forest area of sampled enterprises | 5535 | ha |
| sampling ratio (enterprises) | 0.04 | % |
| sampling ratio (woodland) | 0.3 | % |
| allowable cut of sampled enterprises | 23 836 | $m^3$ |
| fellings of sampled enterprises | 26 484 | $m^3$ |
| forest area per farm (sample) | 50 | ha |
| fellings per farm (sample) | 240 | $m^3$ |
| forestry revenues per farm (sample) | ~ 14,100 | EUR |
| family income out of forestry (sample) | ~ 9 020 | EUR |
| costs of the network | ~ 50 500 | EUR |
| costs per enterprise sampled | ~ 460 | EUR |
| costs per hectare sampled | ~ 9 | EUR |
| costs per $m^3$ of allowable cut sampled | ~ 2 | EUR |

## 2.2 Accountancy network of farm forests

Due to the shortcomings of the FADN as a means for monitoring small-scale farm forestry, a specific network of farm forests had already been established in the early 1970s (Bürg and Sekot 1997: 169–174, Table 1). From the very beginning, this network was designed as a limited panel without claiming representativeness of the results. The participants were purposively selected from the test farms of the FADN, so that the network of farm forests is in fact a sub-sample of the FADN. In the process of selection, a minimum of 5 ha of woodland was observed. Consequently, the forestry network is biased towards forestry when compared with the FADN (Figure 2). However, the network does not comprise all of the test farms of the FADN characterised by a share of forestry standard net return beyond 75%, but is in fact a mixture of five out of seven categories of holding (Bürg and Sekot 1997: 170). Therefore, it is not possible to derive representative results for any specific category. The farm forests being scattered over four out of the eight production regions, the same is true also as regards regional averages.

The sample currently comprises 110 farms. Although it is usually regarded as a kind of panel, the number as well as the composition of participants is somewhat dynamic (Figure 3). Almost every year, some of the former participants leave the sample. One of the reasons for this is, that the sample of the FADN is permanently readjusted and individual farms may have to leave the FADN so as to avoid over-representation. On the other hand, additional participants may be asked to join the forestry network, so as to maintain a certain minimum participation. Consequently, only 96 out of the 110 test farms documented in 1999 (corresponding to some 87%) still belong to the panel as it existed in 1991. Some 84% of the 1991-panel participated each year during the period 1991–1999. Consequently, the average rate of decrease of the real panel can be estimated at about 2% per year.

For purposes of the forestry investigation, the participants in the SSFF-network keep separate records in addition to their agricultural book-keeping as required by the FADN. In essence, these records document the forestry-related input in terms of costs, working hours and tractor hours as well as the output in terms of a breakdown of wood revenues (including

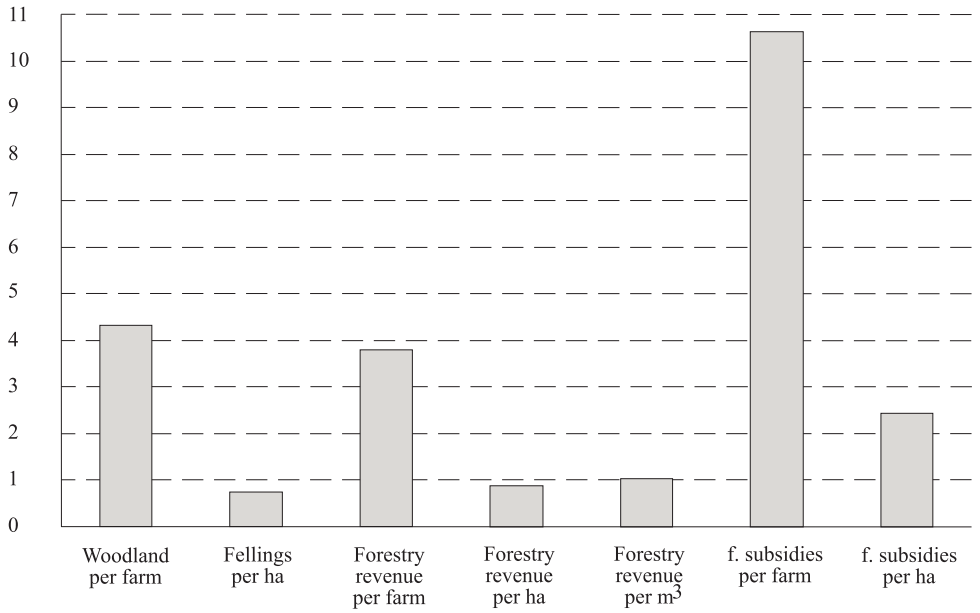


**Figure 2.** Distortions due to purposive sampling: sub-sample of farm forests in relation to the FADN (1998).

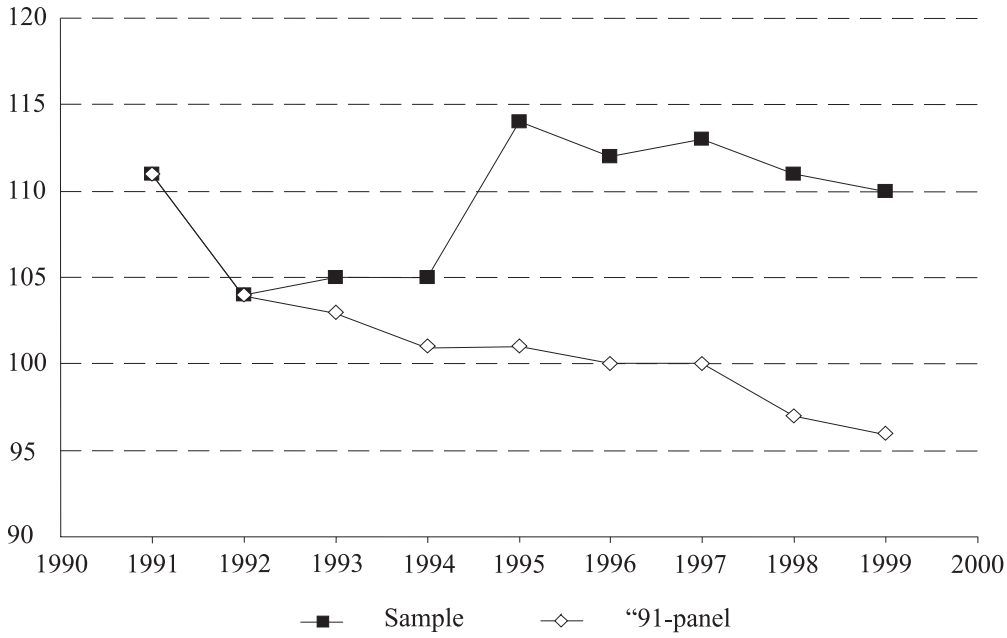


**Figure 3.** Development of the SSFF-network in terms of participants.

associated volumes) and other forestry related revenues. The standardised reports comprise averages per cubic metre and per hectare for the various elements of forestry costs and revenues. According to the design of the sample, no additional statistical measures like standard deviation or standard error percent are calculated.

When assessing the profitability of SSFF, one has to be aware of the predominant significance of imputed items. As regards forestry costs, the respective share can easily exceed 80% of total costs, the most important items being family labour, the costs of the agricultural tractor as well as depreciation (Figure 4; Sekot 1998c). In-house consumption of wood harvested accounting for some 10% of all revenues, the imputation of revenues has a minor impact on the results.

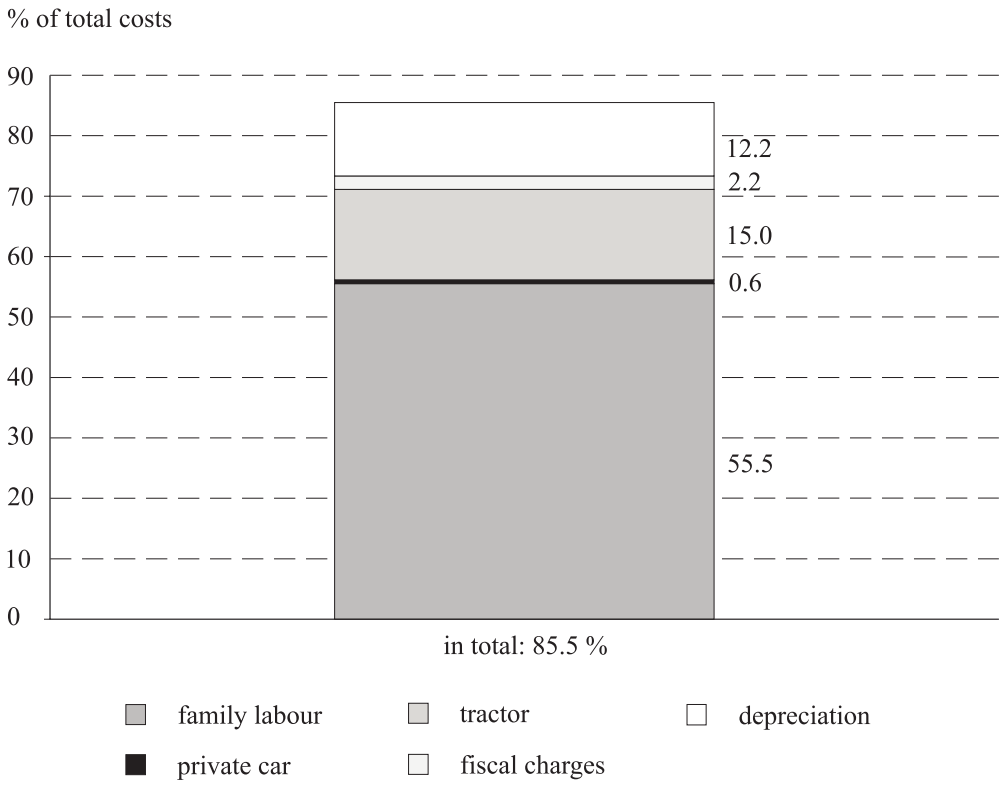


**Figure 4.** Significance of imputed costs (SSFF-network 1999).

Standard groupings refer to four agricultural production regions. Usually, the three alpine regions are aggregated to one group and as such opposed to the results of the northern region 'Wald- und Mühlviertel'. As illustrated by Figures 5 and 6, this can be justified for some, but not for all of the items.

## 3. Recent developments in monitoring SSFF in Austria

### 3.1 Outline of the project

After quite a long period when the results out of the network of farm forests used to be just published in terms of a single standardised table each year, the ministry of agriculture and forestry was confronted with the question 'for what purposes and by which means this kind of monitoring could or should be carried on?'. The software for processing the data was definitely out-dated and the cost-benefit ratio of the undertaking appeared to be very poor. Taking into account the significance of small-scale forestry in Austria as well as the potential relevance of respective data for forestry extension, the forestry accounts of the national statistics and economic research (e.g. Sekot 1996a, 2000b, 2000c, 2000d) to name just a few purposes, it was decided to commission the renewal of this forest accountancy data network.

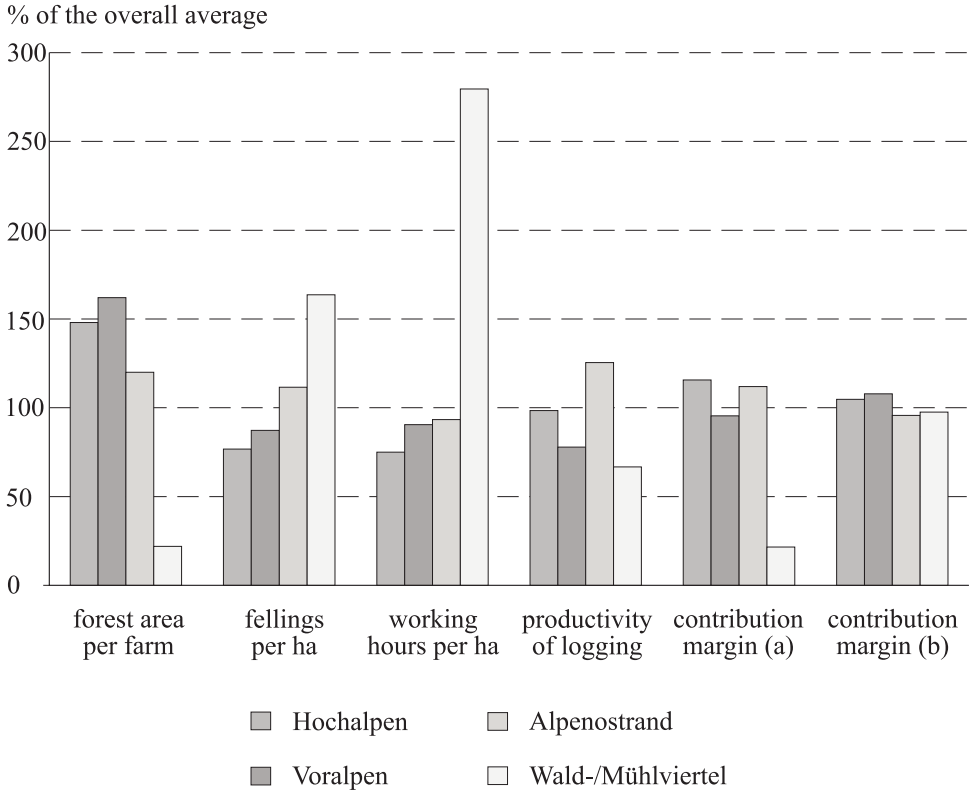


**Figure 5.** Comparison of regional results I (SSFF-network 1999. (a): including costs of family labour, (b) without costs of family labour).

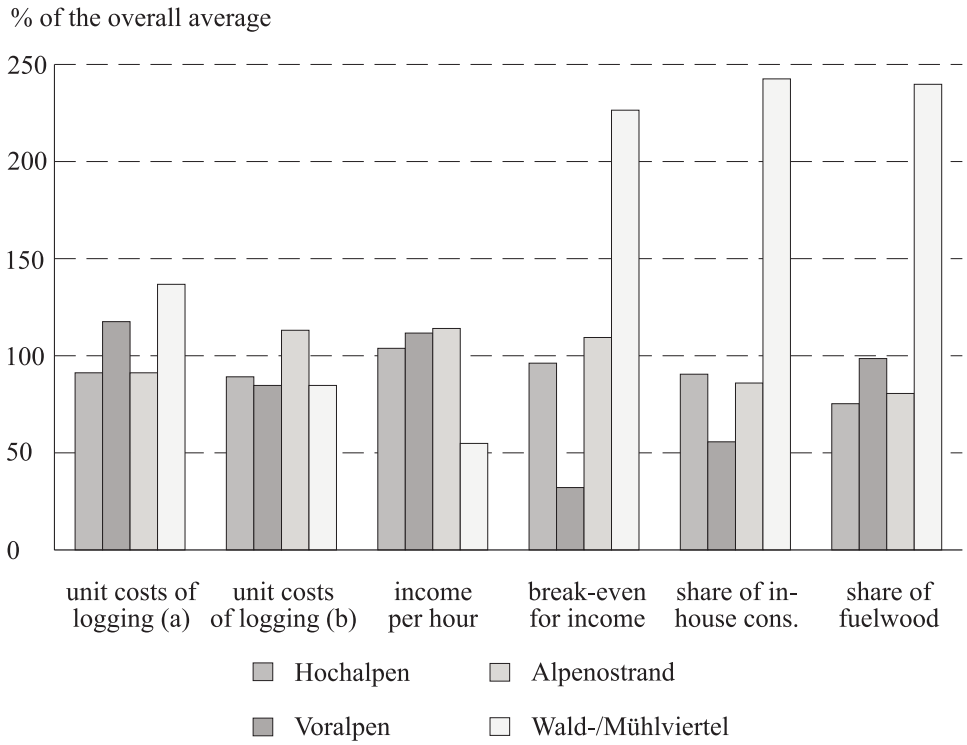


**Figure 6.** Comparison of regional results II (SSFF-network 1999. (a): including costs of family labour, (b) without costs of family labour).

The idea was to integrate all the respective data management into the database application developed for the network of bigger forest enterprises some two years before, thereby harmonising the accountancy schemes and providing more and better information at all levels of reporting (individual as well as aggregated results).

In essence, the project comprised the following tasks: (1) adaptation of the database system which has been developed for the network of bigger forest enterprises for handling also the data out of the farm forestry network; (2) import of the data of previous years as far as available into the database including recodification, etc.; (3) development of new guidelines for data collection in the field compatible with those of the network of bigger forest enterprises; (4) holding of a training course for the field work; (5) development of new and specific reports at the farm level as well as at the aggregated level; and (6) incorporation of complementary data out of the FADN-scheme. The project was carried through in the first half of the year 2000 (Sekot and Hellmayr 2000). Thus, the results for 1999 were already produced by the new system (Sekot 2000a).

### 3.2 Experiences and results

As a result of the project, large strides as concerns the analysis and the monitoring of SSFF could be achieved. The quality as well as the quantity of information provided by the individual reports on farm level as well as by the aggregated reports were enhanced considerably.The farmer participating in the network is now provided with a user-friendly

documentation suitable for analysis and interpretation. The standard reports at the aggregated level provide time series as well as a comparison of group averages. The database system allows for a flexible and thorough analysis of the data.

However, the project implied two conflicting goals, necessitating some kind of trade-off: on the one hand, the framework of costs and revenues was to be adjusted to the standards of the network of bigger forest enterprises; and on the other hand, consistent time series from 1991 onwards should be established. In some respect, it was possible to fulfil both goals by carrying on the former documentation or by further differentiating former categories. The latter was the case, e.g. with some types of cost as well as with one cost centre, where consistent time series can still be established by aggregating the now separately recorded sub-categories. An example for a consistent time series based on non-monetary data is depicted in Figure 7.

A bulk of additional items was newly introduced, including investments and book values of assets, working hours and tractor hours per cost centre and several typological characteristics. As regards some other cost items, the method of deriving the respective values had to be redefined, thus triggering some inconsistencies. Respective examples are the introduction of imputed interest instead of interest paid, the exchange of paid charges on assessed value of property with imputed figures and the calculations underlying the imputation of costs of family labour. However, these adaptations were of minor effect on the results.

Conversely, the classification of the social security contributions of the farmer as neutral private expenses and no longer as belonging to forestry, proved to exert a considerable impact on the results. This reclassification has been obligatory for the sake of harmonisation with other forestry as well as agricultural statistics. As these costs have not been recorded separately in the years before, it is not possible to introduce respective corrections in the time series. Only since 1999 it is possible to account for this item explicitly and hence to quantify the respective effects (Figures 8 and 9). Further changes of some significance are associated with the classification of some non-wood revenues and the calculation of results referring to the allowable cut.

So far, farm forestry has been documented separately, without any links to the agricultural results produced by the FADN. Although it was not intended and hence is not possible to

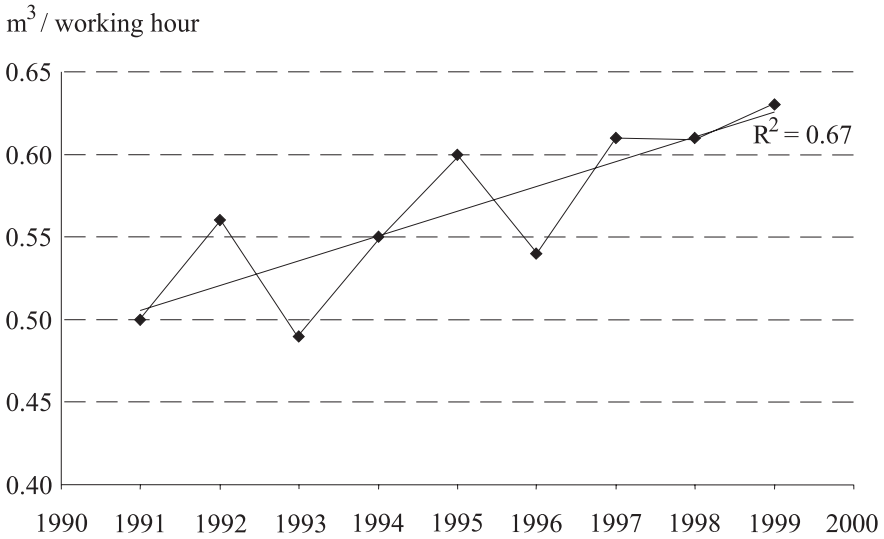


**Figure 7.** Productivity of logging operations (averages of the SSFF-network 1991–1999).

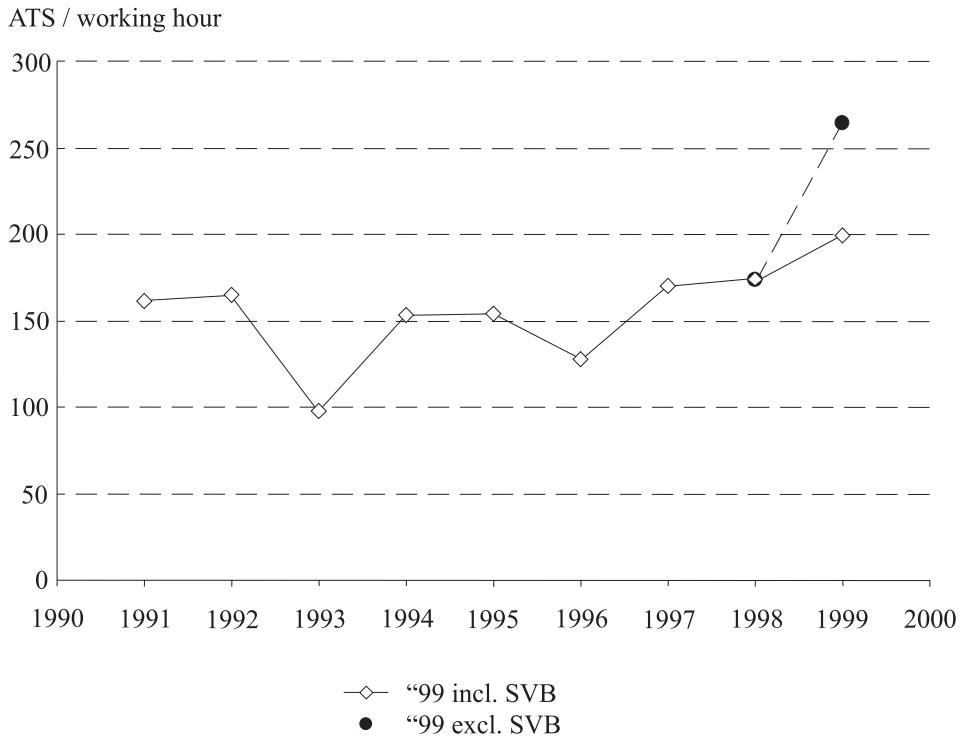


**Figure 8.** Income per working hour (SSFF-network 1991–1999. SVB... social security contributions of the farmer).

fully integrate the agricultural and the forestry database, there is now the possibility to import respective data from the FADN. For the time being, 47 additional items characterising the farm as such have been transferred into the forestry database, such as: assessed value of property, total productive area, area of arable land, level of education, total working hours of family labour, total revenue, total costs, income, subsidies, category of holding, total as well as forestry standard net return, value of the growing stock. These data allow for a new dimension in the economic analysis of SSFF in the sense that farm forestry can now be analysed in the context of total economy of farm.

## 4. Concluding remarks

Forestry usually accounting only for a minor part of all farm activities, it would be hardly possible to establish a purely forestry accounting network for monitoring the profitability of small-scale farm forestry. Conversely, a farm accountancy data network covering all kinds of non-agricultural activities and income provides an ideal framework for thoroughly assessing the role and significance of farm forestry. However, even in Austria, where in contrast to European standards the farm typology underlying the FADN recognises forestry explicitly, a full integration of agricultural and forestry monitoring schemes could not be achieved so far. The trivial reason for this seems to be, that the respective responsibilities lie with different departments in the ministry of agriculture and forestry and the agricultural department

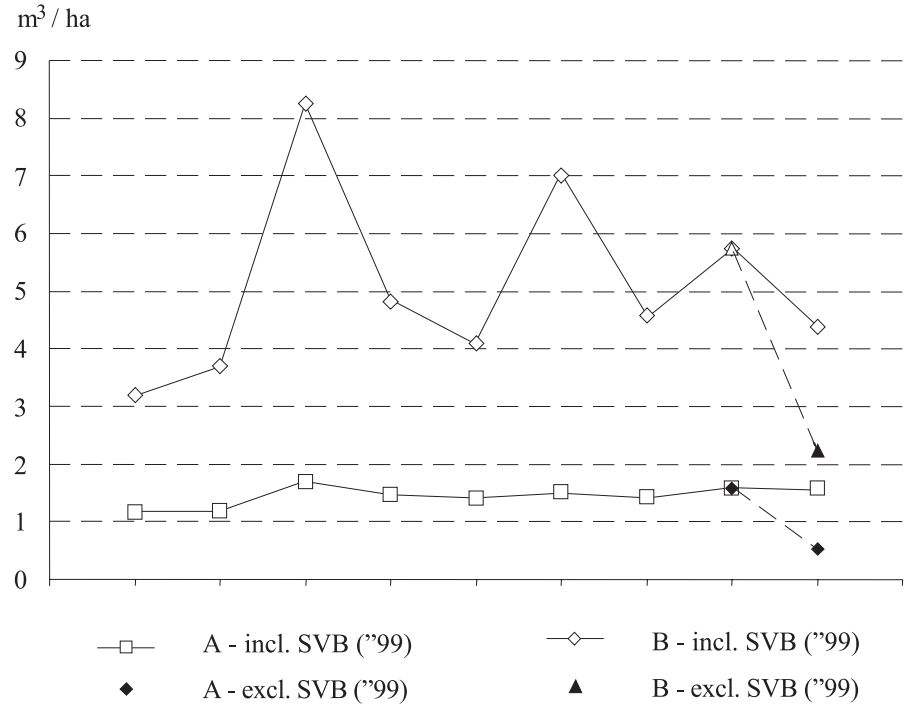


**Figure 9.** Break-even for income (A) and profit (B) (SSFF-network 1991–1999. SVB... social security contributions of the farmer).

financing the FADN has no special interest in forestry affairs. Under these circumstances, the present practice of data exchange between separate datebases is a second best solution and represents considerable progress offering new possibilities for the investigation of the economics of small-scale farm forestry in Austria.

The major drawback of the current monitoring system is its lack of representativeness. The ideal concept for monitoring SSFF would be to focus the forestry investigations and to extend them to all of the farms participating in the FADN which belong to one of those categories of holding characterised by a share of forest standard net return exceeding 25%. However, this would mean an increase of the sample from currently 110 to a number of 316. From this the price of partial representativeness can be concluded: an additional cost of some 100 000 EUR per year.

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# Measuring the Direct Financial Assistance in Small-Scale Forestry Accounting

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## Abstract

When taking the sustainability of forestry into account, non-industrial private forest (NIPF) owners tend to underperform in certain forestry activities due to a variety of factors (e.g. lack of information, time and profitability). In order to alleviate these economic losses at the macro-economic level, public financial assistance systems for forestry activities have been established in many countries. This paper focuses especially on the economic sustainability viewpoint of NIP forestry, and first, discusses the theory of forestry income, second, typologises the income effects of financial assistance, and third, demonstrates the findings by employing forestry bookkeeping case data from southern Finland. The public financial assistance can be measured at the forest holding level mainly with direct financing instruments. They include grants, favourable loans and tax concessions. The tax concessions are applicable only when taxable income of a forest owner is present. Financial assistance affects the profitability rate of roundwood production investments, increases co-operation willingness or supports socially important works. The approach of this paper focuses on the NIPF holding accounting measurements, and therefore, the immediate income effects of direct financial assistance. The effects of, for example, forest legislation restrictions and the discounted effects over the timber-growing rotation are excluded. The possible indirect financial assistance of, for example, below-cost-priced services of technical assistance, research and development or effects generated through public forests are also excluded. The demonstrative findings of the study indicate that grants and loans may hold a dominant role in investment works guidance in forest policy. The income effects for NIPF owners may still appear more significant via the tax concessions, but depend significantly on the forest taxation system. Some income effects due to tax concessions may appear unrealistic in accounting results, because certain tax concessions are aimed at substitution effects (e.g. at forest owners' self-employment in fellings, resulting in the delivery sales instead of stumpage sales).

*Keywords: income, substitution, tax concessions, grants, loans*

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Economic Sustainability of Small-Scale Forestry
EFI Proceedings No. 36, 2001

# 1. Introduction

## 1.1 Background and objectives

When taking the sustainability of forestry into account, non-industrial private forest (NIPF) owners tend to underperform in certain forestry activities due to a variety of factors (e.g. lack of information, time and profitability). In order to alleviate these economic losses at the macro-economic level, public financial assistance systems for forestry activities have been established in many countries.

The financial assistance system can be organised in two ways: (1) principally direct assistance is employed for supporting the selected activities of forest owners; and (2) in some cases, financial assistance via taxation, i.e. tax concessions, can be regarded as a more effective and less bureaucratic way to obtain the desired effect. Tax system or financial assistance via taxation system can create also unintended tax concessions.

Although grants and loans are normally recorded and reported and they are mostly transparent, the tax concessions for forest owners are more difficult to collect or estimate. The taxation of forestry income is normally closely related to forest owners overall income from also non-forestry activities. The definition of tax concession is not very clear. However, if tax concessions are excluded from the analysis of direct financial assistance, the results may be biased. Consequently, inefficient instruments may be employed in forest policies.

This study focuses especially on the economic sustainability viewpoint and first, discusses the theory of forestry income, second, typologises the immediate income effects of direct financial assistance for NIPF activities, and third, demonstrates the findings by employing forestry bookkeeping case data from southern Finland. The approach of this study focuses on the NIPF holding accounting measurements, and therefore, the immediate income effects of direct financial assistance.

The effects of, for example, forest legislation restrictions and the discounted effects over the timber-growing rotation are excluded. Also the possible indirect financial assistance of, for example, below-cost-priced services of technical assistance, research and development or effects generated through public forests are excluded.

The collecting of information needed for calculating total direct financial assistance for forestry is a quite demanding task. Therefore in this study, only a small sample of forestry bookeeping holdings is employed.

## 1.2 Financing the forestry activities

### 1.2.1 Taxable and economic forestry income

In the accounting theory, income definitions can vary depending on the purpose of the calculation. In forestry, due to long production period and the simultaneous product-production characteristics of the growing roundwood stock, the definition for income for a period can be quite vague in this respect. Basically, accounting can be based on current values, general price-level adjusted values or asset-valuation, or on combinations of these approaches. The last approach, asset-valuation can be understood to some extent to correspond to the ‘true and fair view’ principle in EU accounting directives.

First in this study, the versions of income known as taxable income are computed according to rules specified by governmental fiscal legislation (Figures 2 and 3). This procedure enables the definitions of tax concessions and makes the corresponding calculations feasible. In Finland, there is at the moment a transitional stage of two alternative simultaneous forest

taxation systems lasting from 1993 to 2005. Therefore, two different concepts of taxable income can be employed.

The old system, the site-productivity taxation will end at 2005. The new system, wood sales profit tax system has been applicable since 1993. The forest holdings selected the system to be applied between the transitional period by the end of 1993. About two-thirds of the holdings are already in the new system, and one-third have stayed in the old one (Pesonen and Räsänen 1994). The systems are characteristically different, because the site-productivity taxation is not defined according to the realised income of a forest holding. The wood sales profit taxation system is strictly determined according to realised wood sales and management expenses.

Second in this study, an accounting approach and income concept is selected, which can be compared with taxable income definitions applied in Finland. In public economics, the concept of 'Haig-Simons income' is widely employed (Rosen 1995). The economic income can be defined as follows (Riahi-Belkaoui 2000). This is measured with a sum of realised income and the change in the value of property (assets):

$$Y_e = C + (K_t - K_{t-1}) \quad (1)$$

where: $Y_e$ is the economic income, $C$ is consumption, $K_t$ is capital as of period $t$ and $K_{t-1}$ is capital as period $t–1$.

When applied to forestry, consumption can be calculated as the realised net income, and the change in assets ($K_t - K_{t-1}$) can be defined with timber balance. A practical way to calculate timber balance is to multiply the growing stock assortment volumes with corresponding stumpage prices (Hakkarainen et al. 1995). A full adjustment of the change in the value of growing stock (both income and asset-valuation adjustments) or partial adjustment (only income adjustment) are both possible approaches. In this study, the partial adjustment measured with the change in the value of the growing stock is employed and defined as follows (see Leppänen 2000; Leppänen and Veijalainen 1999):

$$T_t = \sum_{i=1}^{n} \left[ \left( V_t^i - V_{t-1}^i \right) p_t^i \right] \quad (2)$$

where: $T_t$ is the dynamic measurement of timber balance (i.e. no price change of the period is taken into account), $V_t^i$ is the growing stock volume of a roundwood assortment $i$ as of period $t$ and $p_t^i$ is the corresponding average stumpage price of the period.

To conclude, the economic income in forestry is determined by employing the: (1) general price-level adjusted historical-cost accounting in investments like machinery, drainage and road constructions; (2) general price-level adjusted present-value accounting in other forestry expenses (although, for example, the reforestations are investments); and (3) general price-level adjusted net-realisable-value accounting for growing stock valuation. The deflator employed in this study is the cost-of-living index.

### 1.2.2 Financial assistance

Financing of the activities of an enterprise can have various sources. Basically, according to going-concern principle, the revenues from regular activities are further allocated to cover costs. The production is, however, also coupled with use of assets, which has to be financed.

The financing problems are in close connection to investment decisions. This means that financing problems are inter-temporal, relying on the borrowing and lending opportunities.

However, there are normally some special financing opportunities, which can be employed in the NIPF, of which some may include public financial assistance components. In this respect, these special financing opportunities include:

1. Value of own labour is employed in financing of forestry costs:
- Silvicultural works: investments for future income;
- Improvement works: investments to increase immediate and future income levels;
- Harvesting works: immediate realised income.

2. Public financial assistance is employed in financing of forestry costs:
- Direct financial assistance: grants and favourable loans;
- Direct financial assistance: tax concessions;
- Other financing opportunities via taxation system, but not tax concessions;
- *Indirect financial assistance: technical assistance and via this below-cost priced forestry services;*
- *Indirect financial assistance: effects generated though public forests;*
- *Indirect financial assitance: research and development, etc.*

This financial assistance can be given to forest owner directly through grants, loans or tax concessions (income or substitution assistance). It is usual that financial assistance form also incentives for proprietor's own work or contracted labour (labour assistance). In addition, some forms of indirect financial assistance is normally available together with the direct financial assistance (e.g. technical assistance). However, the indirect financial assistance forms are not considered in this study.

## 2. Materials and methods

The study material consists of case bookkeeping NIPF holdings from southern Finland. The original case sample consists of 15 holdings (Pynnönen 2000; Leppänen 2000; Leppänen and Veijalainen 1999), from which five holdings had a bookkeeping detailed enough for the requirements of recording the overall incomes and taxes i.e. also including non-forestry (Pynnönen 2000). These five holdings have an average forest area of 75 ha. The applicable study period is years 1993–1998 in order to smooth the annual activity-level variations normal to forest holdings. Another reason for the period is, that since 1993 there has been two alternative forest taxation systems in Finland.

Although the forest holdings had to select only one system to be applied during the transitional period, both tax calculations are still possible for all holdings. Therefore, comparisons can be made within a single sample. In reality, four of the holdings are at the moment in the new wood sales profit taxation (capital income taxation) and only one holding is staying in the old site-productivity taxation (earned income taxation) until the end of the transitional period at 2005.

The tax concessions are determined by comparing the tax expenses of two different taxable income statements between the economic income statement ('strictly' accrual site-productivity income statement) or profit (loss) account based on realised revenues. The comparison is made depending on the income definition of the taxation system. The profit (loss) account, including the income statement concepts applied in this study, is in Figure 1. The taxable income statements are based on the income and cost definitions, which are described in Figure 2 (site-productivity taxation) and Figure 3 (wood sales profit, i.e. capital income taxation).

| | PROFIT (LOSS) ACCOUNT, EUR / HA / A | Average |
|---|---|---|
| + | Stumpage sales revenue | 88.23 |
| + | Delivery sales revenue | 38.86 |
| + | Other sales revenue from wood | 0.65 |
| + | Owner's consumption of wood | 0.70 |
| = | TURNOVER FROM THE ROUNDWOOD SALES | 128.45 |
| + | Sales revenue other than wood | 0.00 |
| = | TURNOVER OF THE FOREST HOLDING | 128.45 |
| - | Harvesting costs | 17.64 |
| +/- | Change in the roundwood reserve | 0.00 |
| = | TURNOVER OF THE FOREST PROPERTY | 110.81 |
| - | Marketing costs | 0.44 |
| - | Reforestation costs | 8.93 |
| - | Other silvicultural costs | 5.54 |
| - | Costs of administration | 0.48 |
| - | Maintenance costs | 1.38 |
| -/+ | Change in the reforestation reserve | 4.09 |
| +/- | Change in the stocks reserve | 0.00 |
| - | Other ordinary expenses | 6.77 |
| = | OPERATING MARGIN | 83.17 |
| - | Depreciations according to plan | 2.09 |
| - | Reduction in values of non-current assets | 0.00 |
| - | Exceptional reduction in values of current assets | 0.00 |
| = | OPERATING PROFIT (LOSS) | 81.08 |
| + | Income from financial investments | 0.56 |
| + | Other interest and financial income | 0.00 |
| - | Interest expenses | 1.20 |
| - | Silvicultural fee | 2.07 |
| -/+ | Direct taxes | 20.46 |
| = | PROFIT (LOSS) BEFORE EXTRAORDINARY ITEMS AND APPROPRIATIONS AND AFTER TAXES | 57.91 |
| + | Extraordinary revenues | 2.40 |
| + | Public financial assistance | 2.00 |
| - | Extraordinary expenses | 0.43 |
| = | NET PROFIT (LOSS) / NET INCOME | 61.87 |
| +/- | Dynamic change in the value of growing stock | 2.56 |
| = | ADJUSTED NET PROFIT (LOSS) / ADJ. NET INCOME | 64.43 |
| +/- | Increase/decrease in reserves | 4.09 |
| +/- | Increase/decrease depreciations | 0.00 |
| + | Value of the owner's own work (not delivery harvesting) | 4.87 |
| -/+ | Dynamic change in the value of growing stock | 2.56 |
| = | PROFIT (LOSS) FOR THE PERIOD | 70.84 |

**Figure 1.** Profit (loss) account (income statement in the USA) of five sample farms including the value of owner's work and with dynamic timber balance (unweighted annual average of real values from five forest holdings, in years 1993–1998, EUR/ha).

There are some complications in tax concession calculations, arising from the fact that in the site-productivity taxation, the taxable income is defined as earned income and in wood sales net profit taxation, capital income. In Finland, earned income is taxed according to

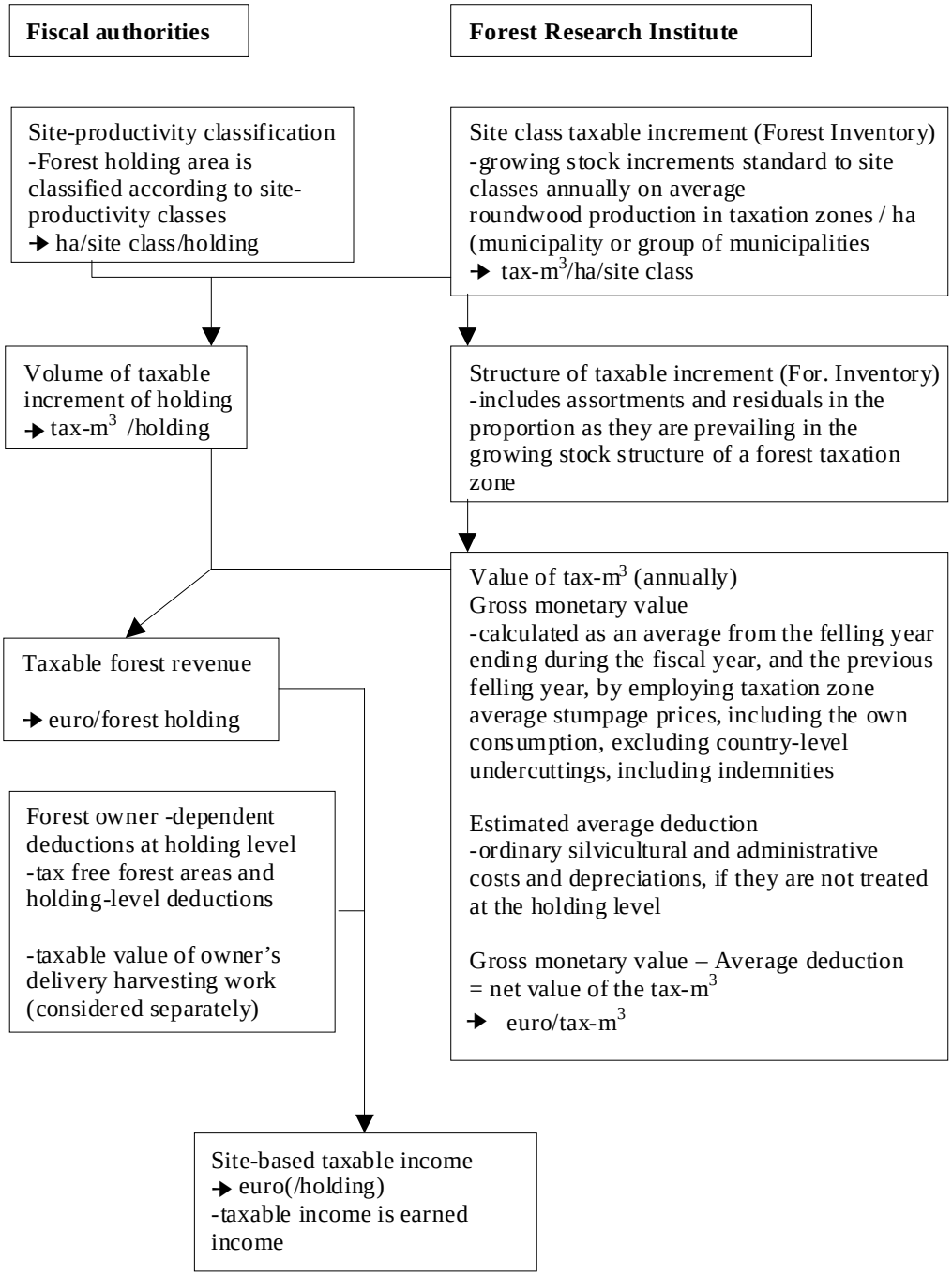


**Figure 2.** Site-productivity forest taxation system (earned income).

progressive tax rates, and therefore the marginal tax rate increases with taxable income. In the capital income taxation, the tax rate is proportional. At the moment, capital income is taxed at a rate of 29%. During the study period 1993–1998 the rate has been, first, 25% (1993–1995) and then 28% (1996–1998).

Technically, the tax concessions measured here are tax exemptions. The formula describing the measurement is as follows:

$$G_t = I_t \tau_t \tag{3}$$

where: $G_t$ is the grant equivalent of tax exemption, $I_t$ is the income excluded from the tax base and $\tau_t$ is the corresponding tax rate.

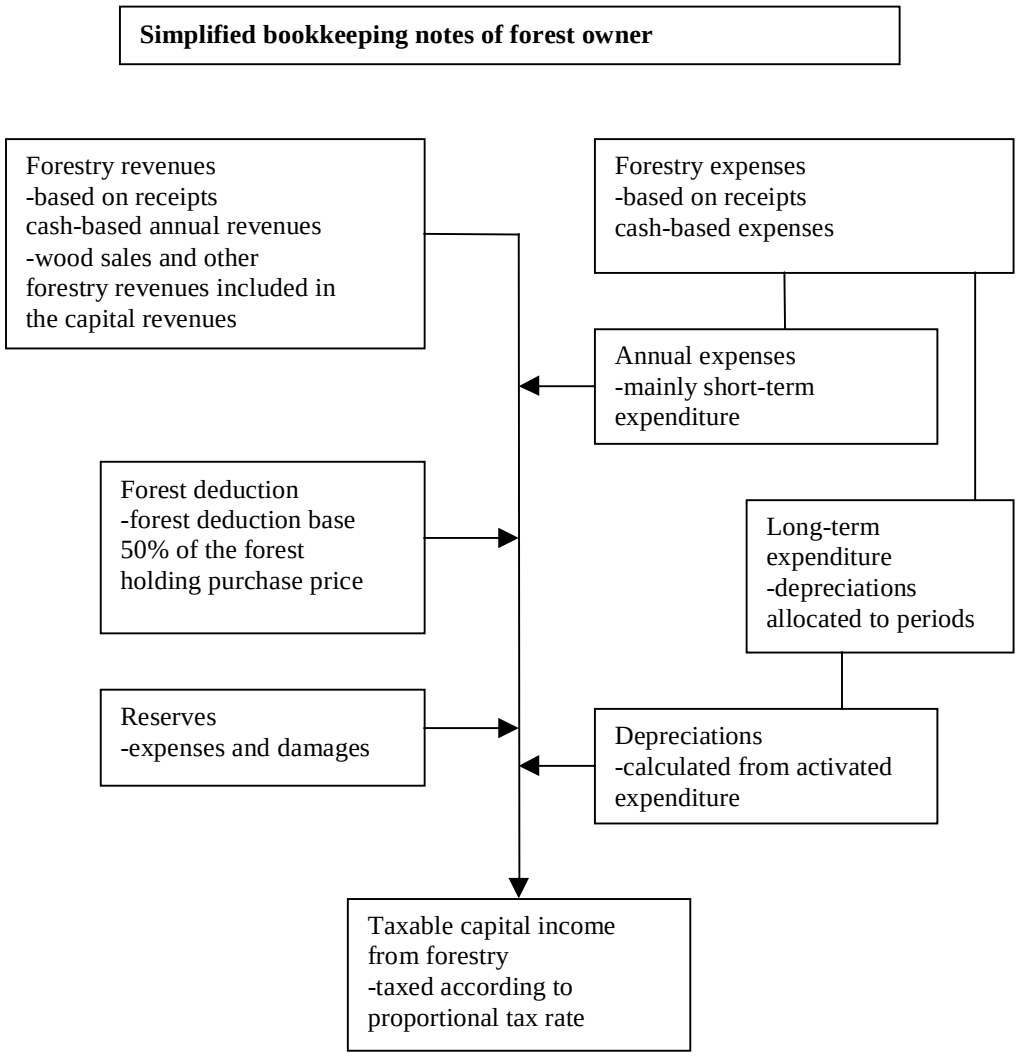


**Figure 3.** Wood sales profit taxation system (capital income).

In the following chapters, the grant equivalent of tax exemption is referred to 'tax concession' or 'value of tax concession'.

There are also other forms of tax concessions than exemptions. Those can be special allowances (additional deduction), special tax reliefs (lower tax rate applied to income), tax credits (deductible tax liabilities), tax deferrals and accelerated depreciations (OECD 1995). These are not considered in this study, and they would most probably not be of very significant magnitude in forestry.

The direct financial assistance recorded as grants (no reimbursement requirement) form the basic measurements of grant equivalents. Financial assistance component of favourable loans is calculated as follows:

$$G_t = b_t B_t - i_t + s_t \quad (4)$$

where: $b_t$ is the nominal government borrowing rate (at which interest rate the government can borrow), $B_t$ is the favourable loans balance at the beginning of the year, $i_t$ periodic interest expenses of favourable loans and $s$ loan write-offs during the period (OECD 1995).

## 3. Results

### 3.1 Taxable and economic income and corresponding tax expenses

#### 3.1.1 Taxable income in site-productivity taxation (earned income taxation)

First, in order to calculate the tax concessions, the taxable income statements are introduced. In the site-productivity taxation, the taxable income statement for all five case forest holdings is presented in the Table 1.

In the site-productivity taxation, fiscal authorities calculate taxable forestry revenue employing different sources. The speciality of this concept is, that taxable forestry revenue is independent from realised revenues or cost, principally based on the site-productivity classification of a holding. In order to cover some holding-level realised costs, there are holding level deductions, after which the taxable forestry income is determined. This is earned income, taxed jointly with non-forestry earned income. The average tax rate in Table 1 corresponds to the average tax rate applied to all earned income. Marginal tax rate corresponds to additional tax, which is levied on taxable forestry income when non-forestry taxable income is first taken into account and taxed.

#### 3.1.2 Taxable income in wood sales profit taxation (capital income taxation)

In the other taxation system applied in Finland, the taxable income is based on realised revenues and costs. Therefore, the taxation system is totally different from the site-productivity taxation. In Table 2, the calculation scheme of taxable capital income from forestry is presented. Taxable capital revenue is based on cash-based wood selling revenues. Value of owner’s delivery harvesting work is first deducted from cash revenues and taxed as earned income (a special tax exemption applied). Annual expenses are written off completely during the accounting period. Some investments are allocated to several periods with depreciation. There are no observations of 'forest deduction' in the sample. In fact, this is a

**Table 1.** Taxable site-productivity income statement with tax expenses according to progressive earned income taxation rates (forestry marginal/overall average). Non-weighted results from five forest holdings, average annual real values for the period 1993–1998.

| EUR / ha / a | | Average | Maximum | Minimum |
|---|---|---|---|---|
| = Taxable forestry revenue | | 66.56 | 101.61 | 22.15 |
| – Holding-level deductions | | 23.66 | 40.77 | 8.55 |
| = Taxable forestry income | | 42.90 | 73.42 | 5.33 |
| – Tax expenses | Marginal | 20.55 | 34.34 | 2.57 |
| | Average | 14.86 | 25.26 | 1.74 |
| = Net income | Marginal | 22.35 | 41.11 | 2.76 |
| | Average | 28.04 | 49.69 | 3.59 |

**Table 2.** Taxable forest capital income statement with tax expenses according to proportional capital income taxation rate. Non-weighted results from five forest holdings, average annual real values for the period 1993–1998.

| EUR / ha / a | Average | Maximum | Minimum |
|---|---|---|---|
| = Taxable capital revenue | 131.88 | 248.71 | 75.44 |
| – Value of owner's delivery harvesting work | 8.91 | 16.08 | 0.45 |
| – Annual expenses | 30.27 | 50.14 | 22.03 |
| – Depreciations | 3.01 | 4.41 | 1.91 |
| – Forest deduction | 0.00 | 0.00 | 0.00 |
| = Taxable capital income | 89.68 | 180.47 | 40.59 |
| – Tax expenses | 23.81 | 48.72 | 10.07 |
| = Net income | 65.88 | 131.76 | 30.52 |

good detail, because the 'forest deduction' is in close connection to purchasing a whole forest holding (or more forest land), and therefore does not account for regular activities of forestry.

If the tax expenses of the two different tax systems are compared, it can be easily seen, that they treat the taxable income quite differently. However, on average the realised tax expenses are a little higher in the capital income taxation.

### 3.1.3 Economic income and correspondingly estimated tax expenses

If the site-productivity taxation would include full information of the holding-level circumstances, then it could be described with 'strictly' accrual site productivity income statement. This is employed as economic income statement and it includes, besides the annual profit of the holding, also the change in the value of growing stock during the period. In this respect, the asset-valuation is income-oriented, in order to avoid the short-term fluctuations in asset-values. The principle is to employ the consumption-savings assumption within an accounting period as accurately as possibly.

**Table 3.** Economic ('strictly' accrual) income statement with correspondingly estimated tax expenses according to progressive earned income (forestry marginal/overall average) and proportional capital income taxation rates. Non-weighted results from five forest holdings, average annual real values for the period 1993–1998.

| EUR / ha / a | | Average | Maximum | Minimum |
|---|---|---|---|---|
| + Change in the value of growing stock | | 2.56 | 49.51 | -68.31 |
| + Turnover of the forest property | | 110.81 | 198.66 | 55.78 |
| = Accrual based forestry revenue | | 113.36 | 188.89 | 48.16 |
| – Annual expenses (not harvesting) | | 21.90 | 36.35 | 10.92 |
| – Depreciations (not harvesting) | | 2.52 | 3.98 | 0.00 |
| = Accrual based forestry income (taxable) | | 88.94 | 160.04 | 33.26 |
| – Tax expenses | Marginal | 44.83 | 81.37 | 15.96 |
| according to | Average | 33.21 | 62.68 | 11.60 |
| different tax rates | Capital | 23.60 | 42.21 | 8.91 |
| = Net income | Marginal | 44.11 | 78.67 | 17.31 |
| according to | Average | 55.73 | 97.37 | 21.67 |
| different tax rates | Capital | 65.34 | 117.84 | 24.35 |

In Table 3, the economic income statement is presented. If the forestry holdings cut with the annual growth, the results from the economic income statement and taxable capital income statements are quite similar. The only difference would result from the cash-basis of the taxable income statement.

## 3.2 Tax concessions

### 3.2.1 Tax exemptions of taxation systems

Forest holdings would have had slightly less tax expenses if the taxable income would have been measured with the economic income statement instead of the taxable capital income statement (Table 4). On the other hand, tax expenses would have been significantly higher if the comparison was made with site-based taxable income. The latter implication results from the progressive tax rates, where the exempted marginal income would have been taxed with 40–60% marginal tax rates, depending on the level of forest owners' overall earned income.

The measured differences in tax expenses are the grant equivalents of tax concessions. However, in the economic income statement, it has to be decided, at which tax rate the tax expenses should be calculated. First, the economic income could be defined as earned income, resulting in progressive taxation (Table 4, A). Second, it could be defined as capital income, resulting in proportional taxation (Table 4, B). Both are possible interpretations in the Finnish case. Because of the tax reform of 1992, which aimed to include all forests after transitional stage in the capital income taxation system, it is considered here that economic income statement tax expenses measured with proportional capital income rate (i.e. Table 4, B) are the most sound values for further analyses. Measured with this calculation, it is evident that some forest holdings are under-taxed and some overtaxed in the site-productivity taxation (the '+' or '–' in the maximum or minimum column).

**Table 4.** Tax expenses from accrual-based income statement compared with tax expenses from site-productivity based taxable income statement. The differences in tax expenses correspond to grant equivalent of tax concession. Non-weighted results from five forest holdings, average annual real values for the period 1993–1998.

| EUR / ha / a | | Average | Maximum | Minimum |
|---|---|---|---|---|
| = Accrual-based forestry income (taxable) | | 88.94 | 160.04 | 33.26 |
| = Site-based taxable forestry income | | 42.90 | 73.42 | 5.33 |
| Tax expenses | | | | |
| Accrual | Marginal | 44.83 | 81.37 | 15.96 |
| | Average | 33.21 | 62.68 | 11.60 |
| | Capital | 23.60 | 42.21 | 8.91 |
| Site | Marginal | 20.55 | 34.34 | 2.57 |
| | Average | 14.86 | 25.26 | 1.74 |
| A) Accrual-based taxable forestry income is earned income | | | | |
| Tax concession | Marginal | 24.28 | 47.04 | 10.84 |
| | Average | 18.35 | 37.42 | 8.33 |
| B) Accrual-based taxable forestry income is capital income | | | | |
| Tax concession | Marginal | 3.05 | 7.87 | -7.58 |
| | Average | 8.74 | 16.95 | 1.01 |

**Table 5.** Tax concessions in capital income taxation. Non-weighted results from five forest holdings, average annual real values for the period 1993–1998.

| EUR / ha / a | Average | Maximum | Minimum |
|---|---|---|---|
| Value of tax free wood consumption | 0.81 | 3.24 | 0.00 |
| Tax concession | 0.22 | 0.86 | 0.00 |
| Forest deduction | 0.00 | 0.00 | 0.00 |
| Tax concession | 0.00 | 0.00 | 0.00 |

In the taxable capital income statement, the comparison is made with realised revenues and expenses. There are two components, which can be considered as tax concessions (Table 5). First, there are exemptions, where the value of forest owner's own wood consumption is not taxed. The second tax concession is in connection to whole forest holding purchase (or more forest land), but as an irregular activity of forestry, it is not considered in this study. The case holdings did not have possibilities to use this tax concession. The results presented in Table 5 indicate the tax concessions included in the regular capital income taxation are not very significant.

### 3.2.2 A special tax exemption: proprietor's delivery harvesting work taxation

In Finland, there is one special tax exemption, which is applicable in both present forest tax systems. It is in relation with delivery harvesting work carried out by the forest owner or his/her family. The full cost of harvesting and local transport (i.e. including the value of own work) can be deducted from the taxable revenue. The value of own work is regarded as earned income, but it is not taxed if the harvested volume is under 125 $m^3$o.b.

**Table 6.** Tax exemption in earned income taxation with regard to value of the tax free delivery harvesting work by forest owner. Non-weighted results from five forest holdings, average annual real values for the period 1993–1998.

| EUR / ha / a | | Average | Maximum | Minimum |
|---|---|---|---|---|
| Value of the tax free delivery harvesting work | | 8.04 | 13.70 | 0.45 |
| Value of tax concession | | | | |
| Site-productivity taxation | Marginal | 3.88 | 6.50 | 0.26 |
| | Average | 2.72 | 4.60 | 0.18 |
| Capital income taxation | Marginal | 3.73 | 5.85 | 0.23 |
| | Average | 2.47 | 3.96 | 0.18 |

In the site-productivity taxation, the taxable revenue is defined with stumpage price levels. Therefore, forest owners have to report only the taxable delivery sales income, and otherwise the income determination is carried out by fiscal authorities. In the wood sales profit system, the forest owners have to deduct the total value of own delivery harvesting work from the sales revenue.

Because the delivery harvesting work would be added to overall earned forestry and non-forestry income, the significance of the tax exemption is evident due to progressive taxation. It is even more significant in the site-productivity taxation, where the taxable forestry income is earned income, increasing the marginal tax rate for additional income (Table 6).

### 3.3 Grants and loans

Thus far, the tax concession results have been presented in grant equivalents. Grants are the most transparent form of direct financial assistance, and the only form that is measured directly in the accounting. In order to calculate the remaining part of the direct financial assistance, grants and also the grant equivalent of favourable loans are presented in the Table 7. The grant equivalent of loans is calculated as the interest rate assistance, resulting from the difference between the interest expenses according to government borrowing rate and the actual interest expenses of loans.

### 3.4 Comparison: Tax concessions vs. grants and loans

Last, a comparison is made between tax concessions and grants and loans within the case forest holding sample. In Table 8, the magnitudes of the financial assistance forms are presented in both applicable forest taxation systems. In this case sample, tax concessions are at least as significant as grants and loans. However, in the capital income taxation, the grants and loans have a more significant role than in site-productivity taxation.

In 1994, in accordance with the EU-membership of Finland (1 January 1995), value-added tax (VAT) was also applied to forestry. This decreases the levels of costs including the VAT (22%), which on the other hand, increases the taxable income in the capital income taxation. The income effect of VAT seems to be two to three times as significant as the most transparent part of direct financial assistance (i.e. grants) in this sample. This is remarkable especially in the site-productivity taxation, in which realised revenues and costs are not, principally, affecting the forestry income taxation at the holding level.

**Table 7.** Grants and the interest rate assistance of loans. Non-weighted results from five forest holdings, average annual real values for the period 1993–1998.

| EUR / ha / a | Average | Maximum | Minimum |
|---|---|---|---|
| Direct financial assistance | | | |
| Grants | 2.00 | 4.80 | 0.64 |
| Loans (interest rate assistance) | 1.56 | 4.17 | 0.23 |

**Table 8.** Magnitudes of tax concessions, grants and loans, compared with VAT income effect. Non-weighted results from five forest holdings, average annual real values for the period 1993–1998.

| EUR / ha / a | Average | | | |
|---|---|---|---|---|
| | Site-prod. taxation | | Capital income taxation | |
| Tax concessions | | | | |
| Grant equivalent of tax exemption of the taxation system | 3.05 | 29% | 0.22 | 3% |
| Grant equivalent of tax exemption of delivery harvesting work | 3.88 | 37% | 3.73 | 50% |
| 'Transparent part' of direct assistance | | | | |
| Grants | 2.00 | 19% | 2.00 | 27% |
| Loans (interest rate assistance) | 1.56 | 15% | 1.56 | 21% |
| Total, direct financial assistance | 10.49 | 100% | 7.51 | 100% |
| VAT income effect (not tax concession, only years 1995–98 | 5.58 | 278% of grants | 4.01 | 200% of grants |

## 4. Discussion

In this study, the channels of direct financial assistance are discussed. The direct financial assistance can be divided at the forest holding level into grants, loans and tax concessions. Tax concessions are applicable only when taxable income of a forest owner is present. The demonstrative findings of the study indicate that grants and loans may hold a dominant role in investment works guidance in forest policy, but the income effects may be more significant via tax concessions.

In the Finnish financial assistance system nowadays, the main channels are practically only grants and tax exemptions. Still, as long as there are long-term favourable loans in the liabilities of forest holdings, the financial assistance element of loans can be calculated.

The measured income effects of tax concessions for NIPF owners depend remarkably on the forest taxation system. In the wood sales profit taxation, the tax concessions are not very significant. In the site-productivity taxation, the income effects of tax exemptions result partly from the system, because the fiscal authorities cannot determine very accurately forest holding level taxable revenue and income. In addition to holding-level non-neutrality resulting from the inaccuracy, the system is not neutral to taxable income, which is not realisable at the holding level. This is the case, when roundwood demand at the aggregate level is less than growth, although this is taken into account only at the country level by fiscal authorities. Therefore, some level of under-taxation in general has been accepted in order to avoid over-taxation of some forest holdings; however, there is not much information on how well this is functioning.

At the moment the most topical issue is, how much the maintaining of the biodiversity requires wood to be left unharvested and consequently as dead standing or dead on the ground in the forests in the long-term. Also the different intensities of environmental management creates non-neutrality between holdings in the site-productivity taxation.

It can be further discussed, how the financial assistance is affecting the forest owners' behaviour. The key question in this context is, can the measured grant equivalent to be assumed as an income effect or not. In short, are there substitution effects? In one case, the income measurement can be regarded unrealistic in accounting results: delivery harvesting work tax exemption is aimed at substitution effect resulting in forest owners' self-employment in fellings, and the delivery sales instead of stumpage sales. The tax exemption was introduced at the beginning of the 1980s, when the delivery sales were decreasing rapidly. The tendency was then slowed down, but was still visible.

Nowadays, especially in the pulpwood market, the delivery sales have been regarded as very important from the market competition viewpoint, because the pulpwood procurement on stumpage is concentrated into three major forest industry companies in Finland. The substitution effect of the tax exemption for the forest owner is then dependent on the forest owner's employment opportunities, delivery and stumpage price difference and the efficiency of the owner's harvesting work.

After all, more attention should be paid to measurements of direct financial assistance. With good measurements, in economical analyses especially the substitution effects would be of great interest. Also the short-term input restrictions of forest owners could be better taken into consideration in the forest policy. Despite the requirement for transparency of public funding, tax concessions should not be avoided, if they can be regarded more efficient with regard to individual forest owner characteristics and less bureaucratic with regard to public finance than grants or loans.

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# Monitoring Farm Forestry in Finland Using Wood Sales Profit Tax Information

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## Abstract

In Finland, the wood sales profit tax system has created a new data source for profitability studies of small-scale forestry. Statistics Finland uses tax return form information in Agricultural Enterprise and Income Statistics (AEIS) to evaluate the economic performance of active farms. In this study a section of AEIS data, farms which have opted for the wood sales profit tax, is used to evaluate the income and cost of forestry and the share of forestry income in the total farm economy.

*Keywords: forestry, taxation, farm, income, cost*

## 1. Introduction

Agriculture and forestry have always been closely connected in Finland. Farmers were clearly the most important forest-ownership category until the 1980s. In twenty years the number of active farms has fallen from 180 000 to 80 000 (Maatilatalouden… 2000), and the farmer's share of non-industrial forest ownership has shrunk to below one-fifth in terms of numbers, and to below one-third in terms of forest area (Karppinen et al. 2000). Regardless of the rapid change of forest ownership structure, most of the forest owners still live in rural areas and small population centres (61% and 18% respectively) (Karppinen et al. 2000).

Forestry income has always been an essential part of the total farm economy income in Finland. The share of forestry income has varied across the country between 4% and 30% during 1976–1994 (Nousiainen 1999). The highest share was during the economic boom in Eastern Finland (1980) and the lowest occurred in Northern Finland during the depression (1993). In Finland the most important factors affecting the share of forestry income are geographical location, forest area, field area, the agricultural production sector and the forest industry trade cycles.

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EFI Proceedings No. 36, 2001

There has been a chronic lack of empirical data on forest holdings economic factors in Finland. The new wood sales profit tax system (Lähteenoja 2000) alleviates the situation somewhat by creating a source for data collection. Statistics Finland uses tax return form information for the 'Agricultural Enterprise and Income Statistics' (AEIS) (Maatilatalouden… 1995, 1997, 1998, 1999 and 2000). Since the primary task of these statistics is to clarify the economic situation of active farms, the focus is on agricultural activities. Although these statistics have obvious shortcomings from the forestry point of view, it is a useful information source for small-scale and especially farm forestry studies.

The aim of the study is to evaluate farm forestry income and cost during a five-year study period (1994–1998) and to illustrate forestry income as a part of the farm economy in 1998. The classification is based on forest area and farm economic size. The economic classification is based on the European Union standard, which classifies farms into 'economic size unit (ESU)' categories by 'standard gross margin' (Commission decision 85/377/EEC). A secondary task is to evaluate the usefulness of AEIS data as an information source for farm forest profitability studies.

## 2. The agricultural enterprise and income statistics (AEIS)

The agricultural enterprise and income statistics (AEIS) compiled by Statistics Finland includes almost all agriculture and forest tax return form information (Maatilatalouden… 2000). Information from the Rural Business Register and an extra inquiry offer background information on holdings and their owners for classification purposes. The number of variables in the 1998 data was 462. The data is based on a sample of over 10 000 active farms. The final figure includes about 9000 observations (1998). One-third of the panel data observations changes from year to year.

Statistical generalisation from the forestry viewpoint is difficult to achieve, because agricultural factors define the sample. This is a problem especially in Northern Finland (Oulu and Lappi counties). Since there are only a few active farms, the number of observations in the sample is low, especially compared with forest area. One-third of the forest area owned by non-industrial private forest owners lies in Northern Finland, but only 12% of the AEIS observations do (Uotila 2000).

The holdings applying the wood sales profit tax system are the most interesting part of the AEIS from the forestry viewpoint. Only that part of the data can be used to observe the transactions in forestry. The data for the period 1994–1998 include 4000–5100 of such observations annually (Uotila 1997, 1998, 1999 and 2000). The forest area has been reported as 213 000–223 000 ha during this period.

The data in this paper includes only those farms which apply the wood sales profit taxation and are located in the southern parts of Finland. These farms represent over 10% of the forest area owned by all non-industrial private (NIP) forest owners in Southern Finland. The border between Western Finland (six forestry centres) and Eastern Finland (four forestry centres) runs northward roughly from Loviisa (a town about 100 km east of Helsinki).

The section of the AEIS statistics used in this article includes information about:

- forest area;
- stumpage and delivery sales income;
- other forestry income;
- salary cost;

- travelling costs;
- other costs; and
- depreciation and investment (for machines, roads and ditches and buildings).

In addition to forest tax calculation, the data is suitable for cash flow and coverage calculations. Perhaps the worst problem of data based on forest tax returns is the inaccuracy of cost categorisation. It is not possible to separate harvesting cost from other costs, which prevents calculations for instance of items such as the purely timber sales income of delivery sales. This has to be taken into account especially in drawing a comparison with other statistics. A temporary problem is that the timber sales income of forest owners who have chosen the wood sales profit taxation are likely to be lower than the average forestry income during the transitional period 1993–2005. Other obvious deficiencies in the AEIS data are that no growing stock or timber sales volume information is available.

## 3. Forest owners and holdings

In this group of forest owners, private persons or families possess the holdings more often (91%) than among all small-scale forest owners in Finland (75%) (Karppinen et al. 2000). Other ways to control NIPF-holdings are undistributed estates (6%) and private partnerships (3%). The age of the owner averages 47 years. Some 31% of owners are under 40, and 9% are over 60. On average, owners are 10 years younger than small-scale forest owners (Karppinen et al. 2000). Out of these 10% are under 40 and 46% are over 60. In AEIS data 73% of farmers are practically 'full-time-farmers', their income from agriculture being over 75% of their total income. Some 18% are clearly 'part time-farmers', with less than 50% of total income being earned from agriculture.

In this data one farm in ten has a forest area over 100 ha, while one in four has an area of less than 20 ha (Figure 1). The average forest area of holdings (54 ha) is more than twice the

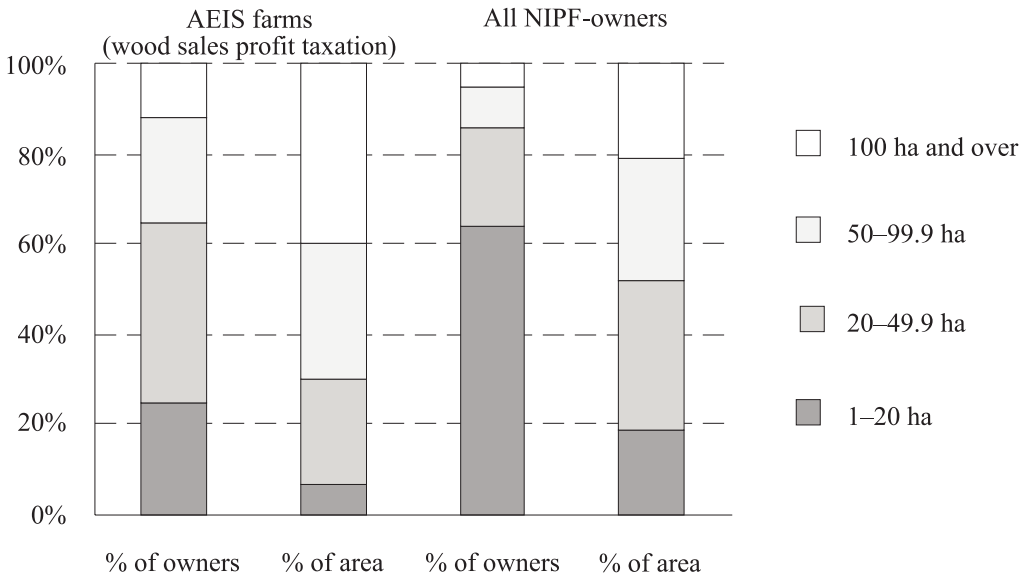


**Figure 1.** Forest owner and area category shares of AEIS farms and all non-industrial private forest owners in Southern Finland, 1998.

average small-scale forest holding in Southern Finland (23 ha, forest area 1 ha or over) (Finnish statistical…2000). The share of large forest holdings (100 ha or over) is particularly high, and that of the small holdings is low compared with the average situation.

## 4. Gross forestry income

Gross forestry income has been relatively high during the study period (averaging 123 EUR/ha in Southern Finland; Figure 2). Practically all forestry income is from timber sales (94%) and the most important source of money is stumpage sales (67%), which is purely timber sales income. Delivery sales income includes the forest owner's logging equipment cost and the value of logging done by external labour or an entrepreneur. The farmer's income from delivery logging work (4% of gross income, actually part of delivery sales income) has no great significance on average, but for some farms it can still be a meaningful secondary business. Some 8% of farmers reported more than 1000 EUR delivery sales logging work income in 1998.

## 5. Gross cost of forestry

Average forestry cost per year was 23 EUR/ha and the level was quite stable during the study period (19.7–23.3 EUR/ha; Figure 3). This is usually the case when aggregate Finnish small-case forestry data is used. Cost per area was highest in the category of largest holdings (27.3 EUR; see Figure 1). In this category the salary cost was 2.4 times higher than in other categories.

Forestry cost was clearly related to timber sales. Beside delivery sale logging cost, timber sales cause compulsory reafforestation cost (after the final felling) and perhaps the income

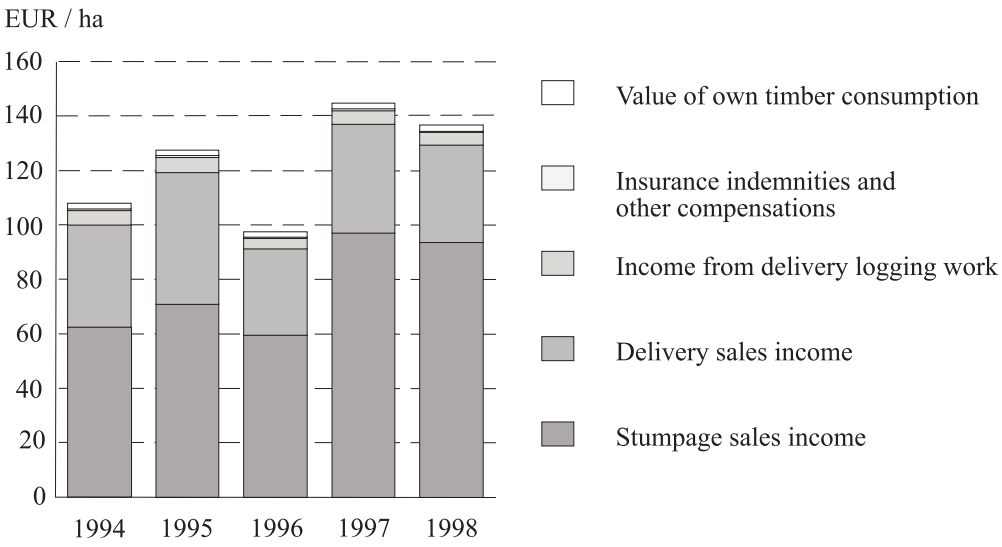


**Figure 2.** Gross forestry income of AEIS farms, 1994–1998 (wood sales profit taxation, Southern Finland).

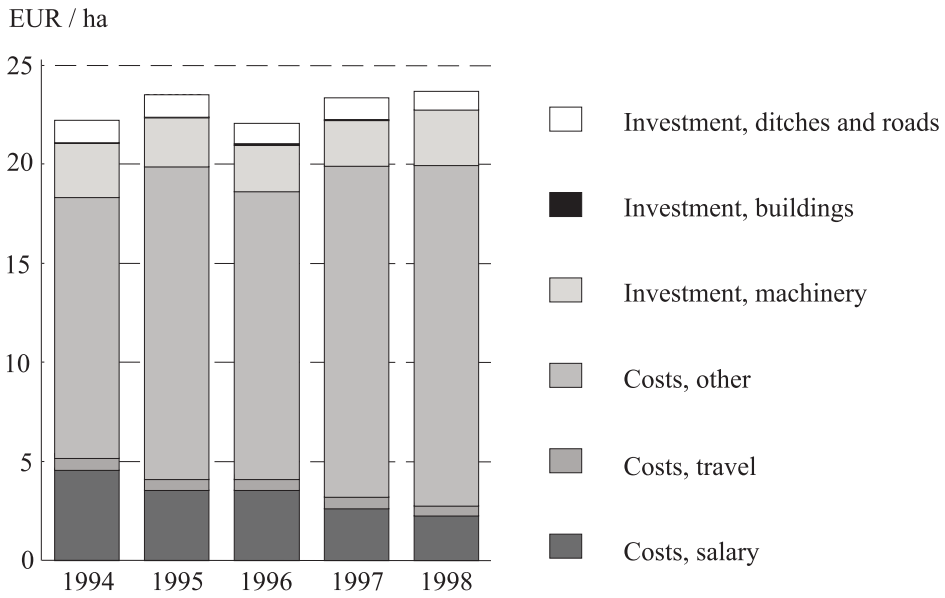


**Figure 3.** Gross forestry cost of AEIS farm, 1994–1998 (wood sales profit taxation, Southern Finland. State grants and value of owners' work not included.)

activates silviculture generally. In 1998 farm forestry costs for those not receiving timber sales income was 10.8 EUR/ha. Farms which had received stumpage sales income incurred costs twice as high (20.6 EUR/ha), and if the farm had received delivery sales income, this cost was three times higher (30.7 EUR/ha) than the no-timber-sales-income situation. Tax return statements do not include state grants or the value of the forest owner's own work, which have to be noted in drawing comparison with other statistics.

There was a clear shift from salary cost to other costs during the study period (Figure 3). The major reason for this shift was probably that at the beginning of the new entry-based forest taxation the owners also classified external service expenses (such as payments to an entrepreneur) as salaries (payments for labour).

The forestry taxation information is not adequate from a cost accounting viewpoint. Up to 61–75% of all expenses are in the category 'Cost, other' which is usually regarded as 'dumping cost type'. In this case the category includes all material costs (such as seed, plants and fuel), tools acquisition cost (such as cutting equipment) and external service expenses (such as forestry plans and logging using an entrepreneurial service).

## 6. Net forestry income

Net forestry income was on average 100 EUR/ha during the study period. There were expectations that this income would be lower because forest owners in this data pay 29% taxes of wood sales profits. They probably used part of their cutting allowance in advance before opting for the new taxation system in 1993. It seems that in this group of forest owners the boom in forestry and/or the profitability problems in agriculture have kept their timber-selling activity relatively high. At the same time net income for all NIPF owners in Southern

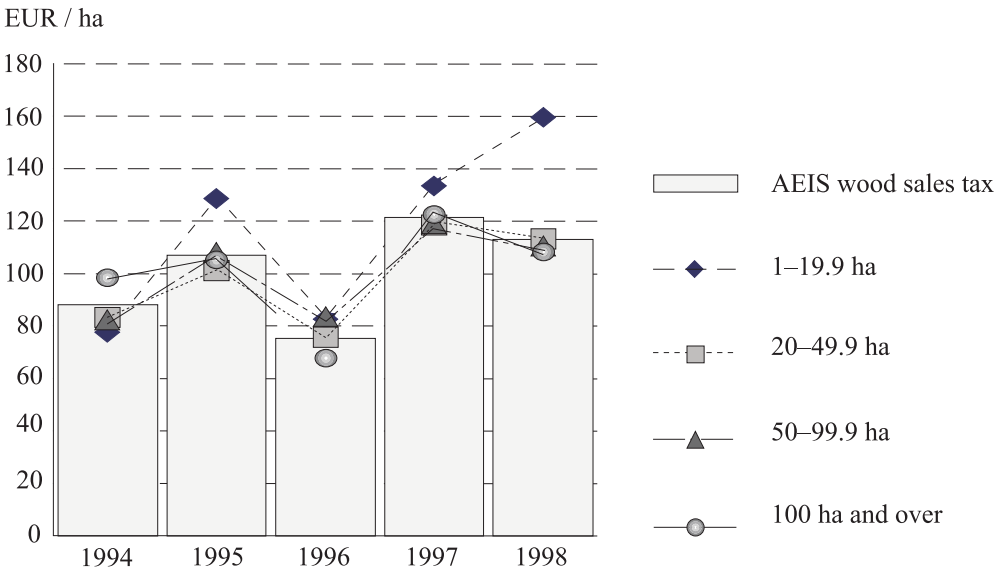


**Figure 4.** Net Forestry income of AEIS farms by forest area category, 1994–1998 (wood sales profit taxation, Southern Finland).

Finland was 113 EUR/ha, which is rather high compared with the long-term average (93 EUR/ha 1989–1998) (Aarnio and Uotila 2000). The forest owners who stayed in the old average area yield based forest taxation sell timber very actively during the transition period (1993–2005), which is one reason for the high forestry income at the moment.

There are no large differences in forestry income per area between forest area categories (Figure 4). Practically the only difference is that the income of the smallest holdings is 10% above average during the study period. This result corroborates the findings that the trend towards smaller units does not necessarily reduce timber supply in Finland (Kuuluvainen and Ovaskainen 1994).

## 7. Forestry and farm economy

During any given year, half the farms received timber sales income (annual average 11 000 EUR) (Figure 5). Of large farms (forest area 100 ha and over) 85% received timber sales income in a given year (annual average 20 000–30 000 EUR). If the forest area was 50–99.9 ha, the timber sales income was close to the average.

In 1998 total taxable farm economy income was on average 23 000–24 000 EUR in this section of AEIS data (Figure 6). Total farm economy income means in this case taxable net agricultural and forestry income. Agricultural income also includes farm-related secondary net income and farming subsidies. Agricultural income was about 10% higher in this section of the data than on average for AEIS data as a whole. Higher income was expected because selecting the wood sales profit tax was more profitable if personal taxable income was high.

The forestry income share of the taxable farm economy income was 20% in Western Finland and 27% in Eastern Finland (Figure 6). In the smallest forest area category, the forestry income share was about 10% and in the largest category over 40% of the income.

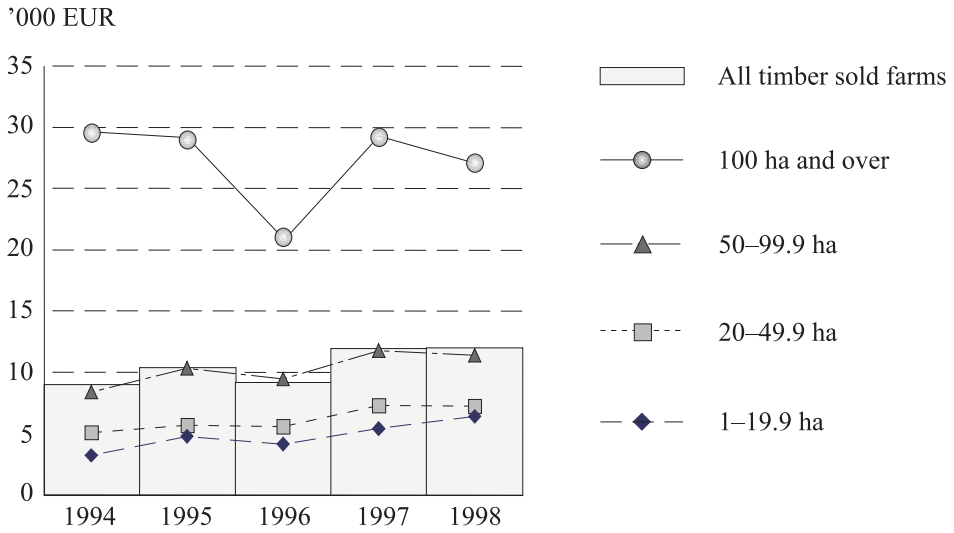


**Figure 5.** Farm timber sales income by forest area category, 1994–1998 (wood sales profit taxation, Southern Finland).

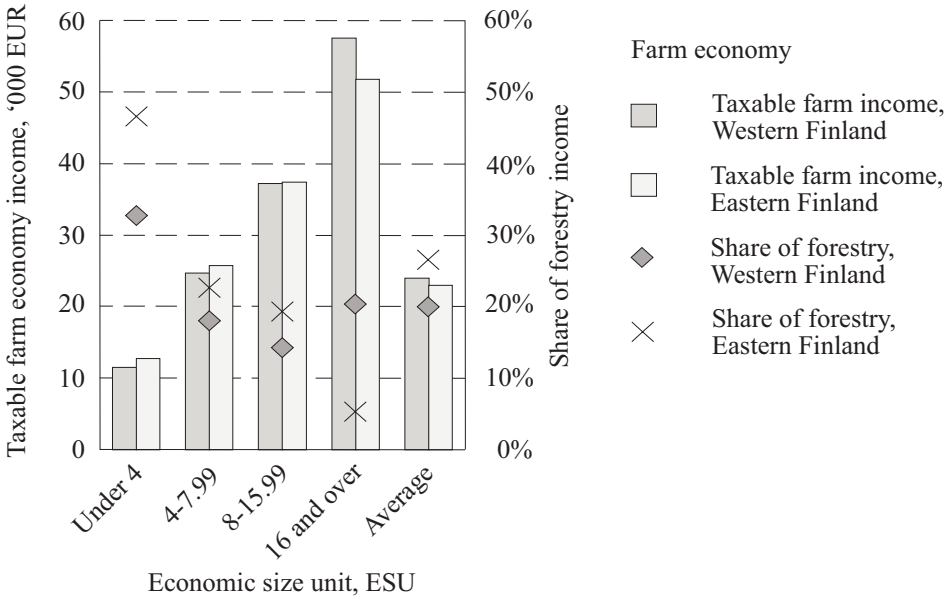


**Figure 6.** Farm economy income and forestry income share by forest area category, 1998 (wood sales profit taxation, Southern Finland).

The farms of the smallest economic size unit (ESU) have the greatest forestry income share; in Eastern Finland almost half of the total income is received from forestry (Table 1). In spite of the large number of observations, there are only 16 farms in Eastern Finland in the category 'ESU 16 and over'. ESU is used as a standard for economic classification of farms in the European Union.

**Table 1.** Income and forest area of farms classified by European Union economic size unit (ESU), 1998 (AEIS data, wood sales profit tax, Southern Finland).

| | Economic size unit (ESU) | | | | |
|---|---|---|---|---|---|
| | Under 4.00 *(very small)* | 4.00–7.99 *(small)* | 8.00–15.99 *(fairly small)* | 16.00 and over *(fairly big, big, very big)* | All |
| Number of observations | | | | | |
| West | 1197 | 861 | 648 | 165 | 2871 |
| East | 445 | 352 | 218 | 16 | 1031 |
| Average forest area, ha | | | | | |
| West | 37 | 52 | 62 | 140 | 53 |
| East | 51 | 61 | 70 | 105 | 59 |
| Taxable farm economy income | | | | | |
| West | 11 500 | 24 700 | 37 200 | 57 600 | 23 900 |
| Est | 12 700 | 25 800 | 37 400 | 51 800 | 23 000 |
| Share of forestry income, % | | | | | |
| West | 33% | 18% | 14% | 20% | 20% |
| East | 47% | 23% | 19% | 5% | 27% |

## 8. Conclusions

In 1993, over 60% of non-industrial private forest owners opted for the new wood sales profit tax system. From the economic follow- up viewpoint, the leap from the old average yield - based tax system was enormous. Now forest owners have to make notes about forestry income and cost and compile the information for the tax form. This creates a new data source for forestry profitability studies.

The Agricultural Enterprise and Income Statistics (AEIS) of Statistics Finland uses tax return form information to evaluate the economic situation of active farms. Statistics include over 4000 farms which have chosen the wood sales profit income tax system. In Southern Finland gross forestry income on average was 123 EUR/ha during the study period of 1994–1998. Stumpage sales were the most important income source. Gross cost at the same time was 23 EUR/ha. Cost includes also delivery sales logging cost but not the value of the forest owner's own work or state silvicultural subsidies. Net income was 100 EUR/ha, which was more than 10% below average. This was expected because of the tax system selection.

Forestry income plays an important role in the Finnish farm economy. On average the share of forestry income was more than 20% of taxable farm economy income. When the farm forest area was over 100 ha, the share was over 40%. On the other hand, if the farm economic size was small (ESU<4), the share of forestry was more than 1.5 times larger than on average in this group of forest owners. The share of forestry income is probably larger among farmers who stayed in the old yield-based forest taxation.

The Agriculture Enterprise and Income Statistics have obvious shortcomings from the forestry profitability study viewpoint. The sample should also cover forest owner categories other than farmers, and the forest tax system transition period will affect the results until 2006. The cost categorisation in forest taxation does not satisfy standards used in normal cost accounting. The data would be much more informative if the cost were split into at least to three cost centres (silviculture, logging and administration/other). The permanent lack in this

agriculture data will be that the demand for statistical generalisation form the forestry viewpoint is difficult to satisfy. One more problem is that, because of the processing of AEIS data, it is always more than one year old.

Allowing for these shortcomings, however, the AEIS data offers a large (and budged) holding database, data especially for farm forestry economic studies.

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# Social Dimension in Small-Scale Forestry

# Future Challenges for Small-Scale Forestry - Examples from the West Coast of Norway

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## Abstract

Through quantitative and qualitative research including interviews with forest owners, it was found that the causes for lack of timbering are complex and connected to the property owners themselves, to economic conditions, but also to a lack of tradition and knowledge of timbering and sale of that type of lumber (Amdam et al. 2000). The focus of this paper is on status and development of knowledge resources, relational resources and mobilisation related to forestry. Because forestry usually is only the third most important income for forest owning households on the West Coast of Norway, a lot of mobilisation activity is needed to increase activity.

*Keywords: local development, forestry, mobilisation*

## 1. Introduction

Can active confidence building and co-operation actually lead to better local and regional use of forest resources? The example in this paper is from the West Coast of Norway, where reasons for low logging activity have been studied, especially in areas where spruce has been planted (Amdam et al. 2000). Because of large amounts of precipitation and favourable growing conditions for spruce in Western Norway, it is possible to achieve yields four times higher for a given area, compared with pine; this is obviously an important motive for such activity. Since spruce does not occur naturally, plants are imported from other parts of Europe and America, which have approximately the same growing conditions as in Western Norway; this gradually causes a natural regeneration.

This process has lead to a development of organisations and work methods which focus on motivating property owners to plant spruces in appropriate areas. Today spruce that was

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planted before and just after World War II is beginning to become mature and must be harvested. The problem is that such logging is not happening to the extent necessary to avoid 'old age' and reduced economic value. What are the causes of this and what should be done in order to stimulate sustainable logging from the local economic point of view?

## 2. Forest ownership

There were large differences in forest activity between local communities and farms with approximately the same natural conditions (Amdam et al. 2000). Understanding the situation and adaptation of households that own forests is decisive for understanding the causes for lack of logging and for being able to increase the level of logging. Through personal interviews with over 90 forest owners in seven municipalities in Møre og Romsdal and Sogn og Fjordane, it was found that operators and households can be divided into four main groups (Amdam 1999b):

1. *The commercially active*. This includes households and farms where income from logging of forests makes up a significant proportion of the total household income; the household is actively interested in the forest, pursues active conservation and active logging, and makes sales in general through the forest owners' association. The intensity of forest use is often quite high, while less intensive farming (livestock for slaughter) is often pursued, and often in combination with income from outside the farm – however this varies among regions and local communities. In areas with few possibilities for work outside of farming, there is a more common combination of active livestock raising and forestry. Even if forestry is typically 'male-dominated' in most areas, women with active interest in the forest were also found in 'forest-active peripheral areas' such as the Tingvoll municipality. The forests in the commercially active households are often large compared with forests of other farms in the same area.
2. *Forest-active*. These are farmers and households which are actively interested in their forests, active with both conservation and with harvesting some of the forest – but mostly for their own use and for 'friends' and acquaintances. They are often active users of local sawmills, but not very 'commercially active' through the usual system of sales. Their forests are often not among the largest. They often have a medium-sized milk production and the household often has an annual income from outside the farm. The income adaptation and the size of the forest are such that use of the forest will only yield a secondary income and a way to make use of 'empty time' by exploiting resources that the household uses itself or which are sold to friends 'grey' (outside the vat system). Many of these can become commercially active in connection with spruce forests gradually becoming or being ready for harvesting. But spruce is also sometimes understood as a 'problem' because the old forest must be logged or it will loose its economic value – it is not 'money at the bottom of the sack' like pine can be and which can be taken out 'when appropriate' or 'when needed'.
3. *The passive with potential*. This is a large group comprising active farmers with often more than one work-year of milk production and with medium-sized (or larger) forests. Younger households also often have income from outside the farm in the amount of at least one half work-year. What distinguishes this group from the first two is that they do not have an active attitude toward the forest. They are seldom in the forest and find it difficult to carry out forest operations 'between farm chores' even though they own usable machines and forest equipment. As one responded 'If I have to choose between drinking a cup of coffee with the wife and driving into the forest and cutting down a tree or two

before the next chore time or what has to be done on the farm, it's usually coffee'. The threshold for these individuals becoming commercially active foresters is far higher than for the first two groups, both connected to attitudes, knowledge and the possibilities associated with available time. However, one should not ignore that collaboration with other operators both on the side of livestock and forestry operations can bring about change.

4. *The passive with little personal potential*. This is the largest group that was studied in terms of the number of households in the rural communities and is also a strongly variable group. One sub-group is the early-retired, often older bachelors on small and medium-sized farms who produce some meat or milk on a small scale (enough to obtain sufficient income to 'get by'). It also includes households that own a small farm with little forest and get most of their income from outside the farm – the farm is a residence and they have little knowledge and take little active action with respect to their own forests – they hardly even know 'where it is'. They themselves consider it unlikely that they will buy machines, equipment and competent help to operate the forest – because, for example, the forest is too small for that or it is too dangerous to work there – that is, apart from removing wood for personal use. Forest owners from outside of the community belong to this group. In order to set in motion activity in the forests belonging to this group, it must be done in other ways than by helping the group itself to become active.

## 3. The situation and challenges on the West Coast

The results of a quantitative study based on a questionnaire to 15% of all forest owners on the West Coast who have sold timber the last 20 years are summarised in Table 1 (see Amdam et al. 2000). There was a response rate of 52%. The group 'Forest active' is divided into two because some of them are involved in timber sales. This grouping of forest owners is based on answers to two questions: 'I have great interest in forestry'; and 'Do you expect (plan) to log timber for sale in the coming season?' (scale from 1=no to 6=yes). The criteria for being 'commercially active' are high interest in forestry and plans for logging (answer 5 or 6 to both questions), while the 'forest active' have a high interest in forestry (5 or 6), but a low probability for logging in the coming season (1–3). The 'forest active with sale' group answered that logging was probable (4–6), but they were not highly interested in forestry (3 or 4). The 'passive with potential' group is interested in forestry to some extent (3 or 4), but have no plans for logging for sale (1–3). The 'passive with little personal potential' group is not interested in forestry (1 or 2). As expected the active forest owners have bigger forests

**Table 1.** Forest ownership on the West Coast of Norway.

| Type of forest ownership | % of respondents | % of forest area | Average forest area (ha) per forest owner |
|---|---|---|---|
| Passive with little personal potential | 12 | 8 | 26.3 |
| Passive with potential | 30 | 24 | 33.3 |
| Forest active | 23 | 23 | 43.1 |
| Forest active, sale | 7 | 9 | 51.3 |
| Commercially active | 16 | 26 | 64.6 |
| No answer | 12 | 10 | 35.9 |
| Total | 100 (N=975) | 100 | 41.4 |

**Table 2.** Activity in agriculture amongst forest owners on the West Coast of Norway.

| | Agriculture as: | | No agriculture income | Sum forest owners | |
|---|---|---|---|---|---|
| | Main house hold income | Part household income | | | |
| Commercial active | 63% | 23% | 14% | 100% | 164 |
| Forest active, sale | 58% | 19% | 22% | 100% | 72 |
| Forest active | 49% | 26% | 25% | 100% | 224 |
| Passive with potential | 43% | 30% | 27% | 100% | 327 |
| Passive without potential | 39% | 23% | 38% | 100% | 145 |
| Total | 49% | 26% | 25% | 100% | 932 |

then the passive owners. The passive group with little personal potential and the other passive groups may be under-represented because these groups may not have been interested enough to answer the questionnaire (see Amdam et al. 2000).

Most of the forest on the West Coast of Norway is owned by people living in the local community (more than 90% of respondents). As shown in Table 2, activity in forestry is closely connected to activity in agriculture and the majority of foresters selling timber commercially are also active in agriculture. However, very few have forestry as a major income.

Only 3% of all forest owners on the West Coast earned more then 20% of household income from forestry, 7% of owners earned between 11 and 20% of income from forestry, and 12% of owners earned between 6 and 10% of income from forestry. Some 78% earned less than 5% of household income from forestry (see Table 3). Of all the respondents, 48% had agriculture and forestry as main income, 20% manufacturing industries, 22% services and 10% other main incomes (pensions, etc.).

In general the division into five groups, as in Tables 2 and 3, also functioned as an indication of activity with regard to the following factors (with the commercially active forest owner having the highest activity, and the passive without potential having the lowest activity): own forest work; plan for forest use and activity; quipment for forestry; planting and cultivation; sale of timber and wood; public support for forest activities such as road building and participation in local forest owner organisations.

**Table 3.** Income from forestry.

| Forestry income % of total | Passive without potential | Passive with potential | Forest active | Forest active sale | Commercial active | Total |
|---|---|---|---|---|---|---|
| 0 or not given | 108 | 166 | 91 | 9 | 17 | 391 |
| 1 to 5% | 26 | 114 | 76 | 29 | 42 | 287 |
| 6 to 10% | 5 | 27 | 27 | 25 | 37 | 121 |
| 11 to 15% | | 4 | 4 | 4 | 16 | 28 |
| 16 to 20% | | 3 | 5 | 4 | 29 | 41 |
| More then 20% | 2 | 1 | 8 | 2 | 16 | 29 |
| Total number of respondents | 141 | 315 | 211 | 73 | 157 | 897 |

## 4. Institutional capacity-building

These challenges regarding development of forestry on the West Coast of Norway can be compared with the concept of institutional capacity building (Healey et al. 1999:4):

> *The notion of 'capacity-building' and 'institutional capacity building' are not new concepts. They have been used to highlight the need to build up individual capabilities (e.g. labour force skills, or entrepreneurial capacity), and those of public administrations. In the former case, the focus is on the institutions which help to develop such capabilities. In the latter case, the emphasis has been on the capacity of particular organisations. The new thinking about institutional capacity focuses on the webs of relations involved in urban governance, which interlink government organisations, those in private sector and voluntary organisations and those who in any way get involved in governance, that is, in collective action. The term 'institution' is given a sociological meaning as an 'enduring feature' of social life giving 'solidity across time and space' (Giddens 1984 p. 24), that is, it extends beyond formal organisations, to encompass cultural patterns (such as kinship relations, religious life, other 'moral communities' and informal civic associations of all kinds).*

To avoid the currently confused and broad use of the term 'social capital', Healey et al. (1999) use the term 'institutional capital' (see Figure 1) which include knowledge resources (K), relational resources (R) and mobilisation capacity (M); the two first leading to the third. This model describes in a structured way the challenges (discussed above) facing local planning and development processes that tries both to develop local confidence and also to find local solutions to planning and development problems. In this paper some of the results are presented from when this model was used to analyse challenges facing forestry on the West Coast of Norway (Amdam et al. 2000). Perspectives from confidence building, local planning and institutional capacity building were also used to develop strategies for change (Amdam 1992, 1995, 2000).

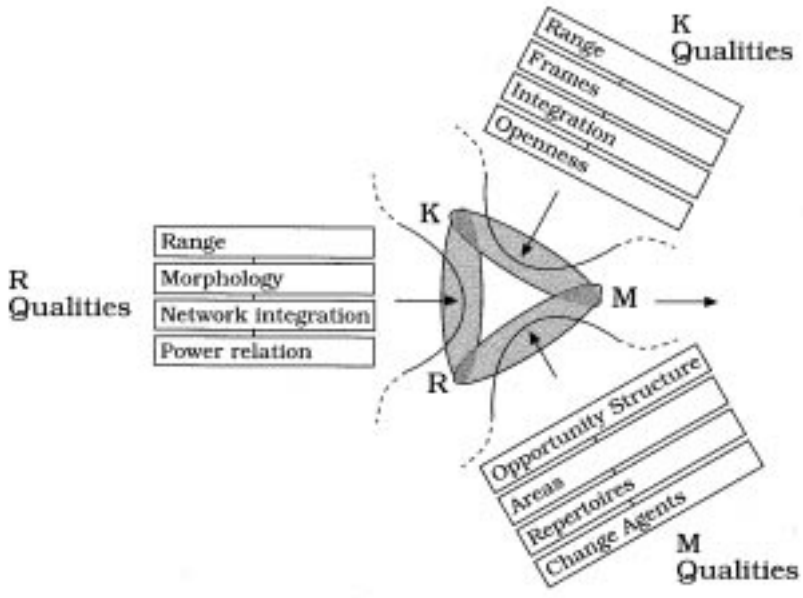


**Figure 1.** Specific qualities of the dimensions of institutional capital (Healey et al. 1999).

## 5. Knowledge resources

Healey et al. (1999) divides knowledge resources into four criteria to enable identification of the qualities of knowledge being deployed in partnership initiative, and specifically that which relates to conceptions of place, of process and of how to make change happen (see Figure 1):

- Range – that is, scientific/analytical, technical, craft-based (including the craft-skills of policy work), common-sense, and as far as can be observed, as manifest in formal presentations and justifications, in formal events, in reflections by participants, and in routine practices.
- Frames – that is, the underlying conceptions which shape the meanings and interpretations given to the flow of information and the 'policy theories' which are deployed.
- Integration – this links to the criteria below with respect to relational resources. This refers to the extent to which the range and frames are seen and used as inter-linked or disparate, and whether deliberate attempts are made to translate types of knowledge and frames of reference from one discussion arena or practice to another.
- Openness and learning – this relates to the capacity to absorb new ideas, to mesh these with local 'traditions', to search for new ways of understanding and acting, and to access new sources of information and inspiration. This should indicate the permeability of the frames of reference to new stimuli and opportunities.

As shown in Table 4, only 42% of responding forest owners are of the opinion that they have enough knowledge needed for active forestry; this figure was highest (74%) amongst the commercially active group, and lowest (13%) amongst the passive without potential group. Only 3% of forest owners have a formal education in forestry, 9% have formal agriculture education and training. Between 74% (commercially active) and 96% (passive without potential) have no agriculture or forestry education at all! Some 54% of respondents answered that they would like more advice about forestry (Table 5).

The results of the study indicated that the commercially active forest owners had a higher degree of formal and tacit knowledge related to forestry than the other groups, and this knowledge was closely connected to the classification as shown in Table 4. Knowledge resources are, of course, related to formal education, but on the West Coast formal education related to forestry is unusual. Tacit knowledge (learned from parents, from self-learning activity and traditions, etc.) were a lot more important. The active groups, and especially the commercially active group 'talk' forestry with other active forest owners, they are interested in local production based on timber, and they are interested in a cultivated forest. On the other hand, there is high variation in response regarding collective activities, such as local traditions for forestry, organisational activities, co-operation, etc. The reason given for this was often 'Community X and/or farm Y have a strong forestry tradition'.

In general, the study showed that the knowledge resource related to forestry was very low among forest owners. Forestry is an activity for the highly motivated few. Most communities have low range, integration and openness regarding forestry – the forest is often not regarded as a proper income activity – it is not included in their frame. Information is not meaningful and does not lead to comprehension of possibilities. To increase activity fundamentally the mentality (i.e. the knowledge resources) of all forest owners must be changed to become more pro-active in attitude. On the other hand forestry is a marginal activity. The few forestry based knowledge resources – mostly tacit – are challenged by higher formal education level outside forestry and agriculture in the communities, and the number of forest owners that are active in agriculture are steadily reduced as more and more find work in manufacturing industries and services. The possibility for increased knowledge resources in forestry is highest in communities and regions where forest resources are high, with long and strong forestry traditions, and few job alternatives outside agriculture.

**Table 4.** Question: I have enough knowledge to be active in forestry.

| Scale (1 to 6) Disagree/Agree | Passive without potential | Passive with potential | Forest active | Forest active sale | Commercially active | Total West Coast |
|---|---|---|---|---|---|---|
| Disagree (1,2) | 48% | 23% | 7% | 9% | 4% | 18% |
| (3,4) | 40% | 45% | 40% | 50% | 23% | 39% |
| Agree (5,6) | 13% | 33% | 53% | 41% | 74% | 42% |
| Total | 100% | 100% | 100% | 100% | 100% | 100% |

**Table 5.** Question: I have no need for advice in forestry.

| Scale (1 to 6) Disagree/Agree | Passive without potential | Passive with potential | Forest active | Forest active sale | Commercially active | Total West Coast |
|---|---|---|---|---|---|---|
| Disagree (1,2) | 37% | 53% | 58% | 62% | 57% | 54% |
| (3,4) | 40% | 35% | 31% | 34% | 31% | 34% |
| Agree (3,4) | 23% | 12% | 11% | 4% | 12% | 13% |
| Total | 100% | 100% | 100% | 100% | 100% | 100% |

## 6. Relational resources

Healey et al. (1999) are exploring the following four criteria to identify the qualities of the relational resources being deployed and developed in our initiative, and the way these shape attitudes to place, process and change:

- Range – who are the key players active in and around the partnership, how do they relate to all those with a potential 'stake' in what is going on (the place, the process), what networks are important to them, and to the other stakeholders, what bonding values hold them together, what divisions and boundaries do people refer to, how do these link to wider dimensions of cultural identity?
- Morphology – this refers to the 'architecture' of networks and the linkages between them.
- Network integration – this refers to the extent to which the relational webs which transect a locality are integrated with each other.
- Power relations – this refers on the one hand to the way the relations are held together and the active work required to maintain network relations and to the way access to the relations are managed (open, welcoming, sincere and trust-generating versus closed, discouraging and deliberately mystifying).

Our findings are that the relational capital of the West Coast Forestry is very low (Amdam et al. 2000). There are active networks between the commercially active forest owners, public forest advisers and forest owner organisations but these networks are not integrated into other local networks – they are regional or national 'clubs of special interests'. Since most of active foresters also are active in agriculture production, one should expect an integration of these networks, but this is very seldom the situation. The public organisations and institutions regarding forestry were mostly imported from the eastern part of Norway where forestry is important and where properties are rather big. Activities (such as advice, education, agriculture and forest planning) are not integrated and are separated on almost all

levels. Agriculture is seldom spoken about in forest networks, and forestry is seldom spoken about in agriculture networks, in spite of being made up largely of the same owners.

In local public planning, agriculture is a lot more important than forestry. When forestry is on the agenda, it is mostly as an activity that is in conflict with environment and leisure interests. As shown in Table 6, very few speak about forestry in local communities. Forest owners that had high income from forestry seldom spoke about their experience, while 'amateurs' with bad experiences from sales, etc., often talked freely about their bad experiences, and these stories 'spread like wildfire'.

In most communities, co-operation is not usual in forestry (see Table 7) and over 75% of owners were of the opinion that the level of co-operation is too low – but they do very little to change the situation.

The few forest-based networks are also under strong pressure. Factors such as, a wide choice of alternative work, public rationalisation that reduce the numbers of forest advisers, reduction of numbers of active farmers, increasing age of forest owners, etc., all reduce the possibility of increasing activity in existing networks. To change this situation other networks must be activated – forestry must try to 'occupy' and mobilise existing networks, and establish new networks that can mobilise new groups. Why not see forestry also as a sport or leisure activity – anything that increases the focus on forestry can be of value in this situation. To talk about forestry, and especially about the positive results from forestry, is maybe the single most important activity (Storper 1997).

## 7. Mobilisation capability

Healey et al. (1999) are exploring the following four criteria for identifying the qualities of the mobilisation effort being deployed in our initiative and how far it is building up capabilities for future mobilisation.

- Opportunity structure – what perceptions of the desirability, opportunities and constraints on institutional change are held by the various stakeholders, and what issues are selected to mobilise around.
- Arenas – what institutional loci are the targets of mobilisational efforts? What institutional 'spaces' are being developed by stakeholders to take advantage of opportunities? How are stakeholders considering access to them (i.e. what are the 'routes' to power)? Is there agreement on both the arenas and the routes to reach them?
- Repertoires – what is the array of techniques of mobilisation which are considered or are in the experience of the stakeholders?
- Change agents – which people are critical to the mobilisation effort? How far is there agreement on who they are and the qualities they should have (network 'brokers' who link networks together, core agents who maintain the cores of particular webs, etc.)?

Low knowledge and relational capital leads to a situation where mobilisation capability is low – or rather that the energy needed for mobilisation to a certain level is high. Only 40% of forest owners know that there are change agents locally that try to increase forest activity – public agents included (and all communes have employees working to increase forest activities). On the other hand, qualitative studies have shown that activities can increase considerably if active forest owners work pro-actively to motivate other interested, but inactive forest owners and if the public advice system can co-ordinate and give support to forest activities like forest road building, stimulate co-operation of logging between owners, etc.

**Table 6.** Statement: Forestry is often spoken about in the local community.

| | Passive without potential | Passive with potential | Forest active | Forest active sale | Commercially active | Total West Coast |
|---|---|---|---|---|---|---|
| Disagree strongly (1) | 48% | 21% | 18% | 10% | 10% | 21% |
| 2 | 19% | 33% | 22% | 31% | 17% | 25% |
| 3 | 14% | 25% | 23% | 25% | 24% | 23% |
| 4 | 12% | 16% | 20% | 25% | 31% | 20% |
| 5 | 4% | 5% | 12% | 8% | 14% | 8% |
| Agree strongly (6) | 3% | 1% | 6% | 1% | 3% | 3% |
| | 100% | 100% | 100% | 100% | 100% | 100% |

**Table 7.** Question: Is it usual to co-operate in forestry where you live?

| | Passive without potential | Passive with potential | Forest active | Forest active sale | Commercially active | Total West Coast |
|---|---|---|---|---|---|---|
| Yes | 12% | 19% | 23% | 27% | 30% | 21% |
| No | 62% | 65% | 67% | 63% | 64% | 65% |
| Don’t know | 26% | 16% | 10% | 11% | 6% | 14% |
| | 100% | 100% | 100% | 100% | 100% | 100% |

Our recommendations to increase forest activities are to give maximum support to active forest owners and to pro-active public employees and give them the role of change agents (Healey 1997, Stöhr 1990). But mobilisation activities must build on these facts:

1. Mobilisation activities must acknowledge that most forest owners on the West Coast are 'hobby forest owners' – forestry is not an important part of family income and can only be an important source of income for very few. On the other hand there are still, in most communities, forest owners that are genuinely interested in their forest; they want the forest to be cultivated and could be motivated to become active in forestry as a leisure activity.
2. Mobilisation activities must be accepted and respected as a natural and important part of activities in public and other forest organisations. Change agents must be respected and stimulated, and forest organisations must recruit persons that have the personal abilities and interests needed to be change agents.

## 8. Conclusion and strategies

Small-scale forestry on the West Coast of Norway is a symbiotic activity to agriculture. Most of the land owners who are active foresters are also active farmers. However, income from other activity than land use is often more important than income from forestry, especially in regions where there are a lot of work opportunities in manufacturing and service industries. Forest active, small-scale households are active in forestry more for reasons of tradition or personal interests, than for economic reasons. In regions with few opportunities outside the farm and with long forest traditions, forest activity is usually high.

Among the challenges facing small-scale forestry in Norway is:

- Reduction and concentration in agriculture, to reduce subsidies the political aim is to get fewer and bigger farms by selling or renting land. This process does not include forestland, which means that there is a growing proportion of forest owners who are not active in agriculture. Typically also, active and large-scale milk producing households are not active in forestry. As shown in Table 8, the farm work activities have been reduced by 60% over the last 30 years in Norway, and the proportion engaged in forestry has been reduced by even more (from approximately 6% to 4% of work on the property).
- New work opportunities can also lead to reduction in small-scale forestry as has been seen in numerous local communities and regions. This can be due to changes in communications or labour markets changes (e.g. in the oil industry). Work outside the farm has not been reduced by more then 21% the last 30 years in Norway, and not reduced at all in the last 15 years. In 1998/1999 farmers and their spouse worked 114 800 hours on the farm (4600 hours in forestry) and 95 500 hours outside the farm; the outside activity is 'winning'.
- Changes in education and attitudes regarding work expectations. Future generations are well educated and often with expectations that do not include forestry or agriculture. Most of the passive small-scale forest owners do not sell their land – to own land (and not use it) seems to be a value in itself in this affluent society.

On the other hand, future changes also create new possibilities. In the oil industry most are working two weeks and have four weeks free. Can this be a new opportunity to activate them in forestry? Can forest owners working in the service industry be activated in forestry as a 'hobby' and a lifestyle instead of going to 'fitness centres'? Can deer hunting lead to new interests in keeping forests in good shape? Or should a kind of co-operative organisation take over the land use with professional help? What changes in social capital are needed to get such developments, which are very difficult to introduce by traditional economic means.

The challenge for small-scale forestry can be summed up in the question: What can be done to increase activities in forestry and to mobilise forest owners? Our discussion of confidence building, participation, concentric solidarity, co-operation and mobilisation (Amdam et al. 2000) lead to a description of a local, continuous process called a strategic and mobilising planning process (Amdam and Amdam 2000). This process has approximately the same stages as a strategic planning process, but instead of viewing this process as a line or a diagram with a finite start and end, the planning or development process is drawn as an infinite spiral with an increasing ‘radius’ but with a finite start (see Figure 2).

This figure is, of course, a simplification of what might happen in the real world. Processes like this may start with enthusiasm, lose energy and slow down for a while, start up again or are laid aside. A continuous mobilisation on broad issues is almost impossible. The mobilisation process might have a specific start or initiative, but also a history and a context, which are important for further development. Successful processes most often start with small ambitions and, as participants learn to trust each other, more ambitious goals are formulated and new participants are engaged in the process. Over time the process might go through many 'loops', but with stages in between each 'loop' that are more 'slow-moving', and which maybe concentrate more on finding technical solutions or compromises for specific problems, than on participation and mobilisation on broad issues. We all know that processes like this can take on problems that are too big or too full of conflict, so that the process is destroyed or reaches a stage where most participants are satisfied with what has been achieved and pull out of the process.

Active and successful participation and mobilisation in planning processes like this can lead to new activities and ambitions and to 'parallel' processes that are co-ordinated, but also

**Table 8.** Farm work activity in Norway, hours of work per year. Source: Statistical yearbook, Norway 2000 (http://www.ssb.no/english/yearbook/).

| | On the property | | | | | | |
|---|---|---|---|---|---|---|---|
| | | In agriculture | | | In forestry | In other occupations | |
| | In all | In all | Done by the farmer and spouse | Done by others | | | Outside the farm for farmer and spouse |
| | *'000 hours* | *Per cent* | | | | | *'000 hours* |
| 1968/69 | 402 866 | 95 | 74 | 21 | 5 | .. | 121 300 |
| 1979/80 | 261 629 | 94 | 75 | 18 | 6 | .. | 106 100 |
| 1982/83 | 244 933 | 94 | 74 | 20 | 6 | .. | 99 300 |
| 1983/84 | 230 464 | 95 | 72 | 23 | 5 | .. | 108 905 |
| 1989/90 | 195 161 | 95 | 74 | 21 | 6 | .. | 112 976 |
| 1992/93 | 180 633 | 95 | 73 | 23 | 5 | .. | 112 200 |
| 1994/95 | 179 106 | 95 | 73 | 22 | 5 | .. | 107 204 |
| 1998/99 | 164 200 | 90 | 70 | 20 | 4 | 6 | 95 500 |
| 1998/99. Regions | | | | | | | |
| Akershus and Oslo | 5 900 | 88 | 68 | 22 | 5 | 7 | 6 300 |
| Hedmark and Oppland | 28 700 | 91 | 70 | 21 | 4 | 6 | 17 700 |
| Sør-Østlandet | 23 800 | 83 | 60 | 24 | 7 | 10 | 19 800 |
| Agder and Rogaland | 24 800 | 92 | 71 | 21 | 4 | 5 | 10 900 |
| Vestlandet (West Coast) | 37 100 | 92 | 75 | 18 | 3 | 5 | 22 500 |
| Trøndelag | 26 900 | 91 | 70 | 21 | 4 | 5 | 11 400 |
| Nord-Norge (North-N.) | 17 000 | 94 | 76 | 17 | 2 | 4 | 6 800 |

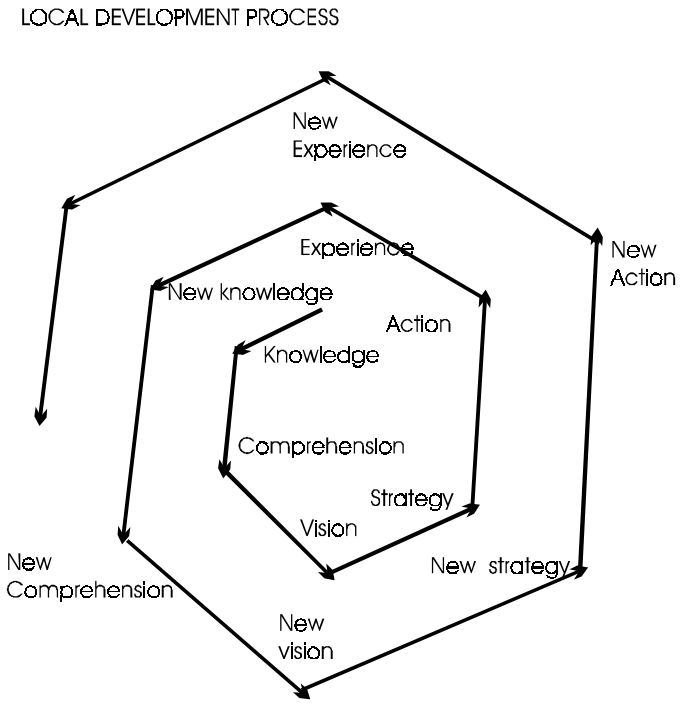


**Figure 2.** The development process as a learning spiral.

to competing processes in the local community as regards public engagement, participation, resources, etc. If Figure 2 is considered, what kind of practical advice can be developed from the theoretical presentation and the situation for forestry on the West Coast of Norway with regards to stage in the mobilising planning process?

*a)* *Mobilisation presupposes knowledge.* Spread knowledge about conditions, with a special emphasis on today's faults, strengths, opportunities and threats. In particular, threats can have a very uniting force, if these are felt to threaten the existence of the community or the organisations, as they are known today. If information is produced which shows that if the present changes are allowed to continue, they will result in depopulation, a gradual reduction of the community and its organisations, etc., this will lay the foundations for a common understanding that something must be done. For example, a dramatic decline in the numbers of farmers, fishermen, industrial enterprises, young people and the working population will threaten everyone who is dependent on a vigorous community. Businesses, municipal activities, voluntary organisations etc. will be diminished instead of developing, if they cannot co-operate to reverse the trend or manage in co-operation to develop new tasks and find new areas of activity. Forests and timber are, for most communities, new resources that can give new local activity and income.

*b)* *Mobilisation requires acceptance of the facts.* Knowledge alone is not enough. The facts must be accepted and comprehended, it must be recognised that this concerns every individual. While the development of knowledge can be done analytically, such an acceptance of the facts must be created through active processes where all the participants themselves discover that this applies to them. There is, for example, little understanding of any crisis in many communities today, in spite of considerable unemployment or underemployment, because this affects school-leavers and weak groups like those without

much formal education. These groups do not have the know-how and are not organised for mobilisation. Acceptance involves getting as many as possible to understand that the crisis will also affect him or her, and that no one can escape it. This again makes it necessary to run an extensive education program to convey information about the *crisis* and its effects, combined with active processes where the participants together and, preferably integrated with those from other co-operating organisations, learn to accept the consequences for themselves and their organisation. Only when such an acceptance has been built, have the foundations been laid for a participation or mobilisation strategy in the development process. In our development work related to local planning, we have very positive experience with well-organised mass meetings. Facts are first presented; afterwards the participants, in integrated groups with representatives from different organisations and interests, discuss faults, strengths, opportunities and threats, before finally recommending a course of action (Amdam and Amdam 2000; Amdam 1992, 1995). The areas of priority are the large and important areas in which action must be taken in order to effect great changes. Such changes may be to direct negative trends in a more positive direction or to change a community's methods, and co-operate in working towards objectives other than those previously identified.

c) *Mobilisation requires common/joint visions.* Knowledge and acceptance are not enough; the path ahead must also be mapped out. When the facts have been accepted, it is important to work on describing what conditions ought to be like and what the future should be like. In private industry this is known as a business idea. In public planning long-term guidelines or objectives are referred to. I prefer to call such uniting pictures of the future a *vision.* A common vision must be developed together in specific networks and between networks in the community. The ideal is if all the members 'discover' the vision themselves, that the vision is built up from the areas of priority that the members themselves have identified (see point b). What is primarily required is that everyone becomes conscious of this common vision. Ideally it must be imprinted in everyone's consciousness, as many as possible must believe in it and spontaneously act so as to fulfil it. If forestry cannot be included in the visions of all members of a community, it must at least be a part of the vision of active and potentially active forest owners – and forest-based organisations and networks.

d) *Mobilisation requires strategies.* The next step is to translate the vision into plans of action or strategies. What is necessary in order to make the vision a reality? This will be part-plans for each of the co-operating organisations or communities, part-plans that integrate/cut across all interested parties. The first group of strategies should be left to the appropriate organisation/community itself after having arrived together at what must be done and what responsibility this particular organisation/community has towards the common cause/fellowship. If necessary, guidelines for these partial processes concerning possible products can be jointly established, should a co-ordinated strategic plan be desirable. Great emphasis must be placed on the challenges that are inter-organisational, and which break down the barriers between organisations. After such areas of priority have been identified, mandates for the work must be agreed upon and great effort should be put into the makeup of the inter-organisational working groups. These not only have to find solutions; they must also provide opportunities where the learning in the organisations or communities is to take place. Similarly it must be stressed that such working groups must work openly and present their interim results in hearings, etc., so that the results 'belong' to everyone. The worst things that can happen is that these groups 'dig themselves in' with their work and attach prestige to the solutions they arrive at. The use of creative methods is of vital importance in this sort of processes. The basic knowledge, acceptance of the facts, the vision and the main strategies must be combined

in a *long-term development program* that clearly shows what one is heading for and how the responsibility is shared between the parties in a fair and honest way. Such development programs can be prepared for an organisation, a local community, for the commune as a community and an organisation, for regional co-operation, etc. These programs must be revised systematically on the basis of new knowledge, new goals, new strategies, new partners, etc. On the West Coast an example of an important barrier to break down is the institutional division between forestry and agriculture.

*e)* *Mobilisation requires common priorities and/or sharing of labour in the implementation of action.* In such an active process of involvement with these strategies, a whole host of ideas and courses of action will be suggested. It is not possible to put all of these into effect. They must therefore be sorted on the basis of criteria such as: demands made on resources – available resources, consequences, responsibility, enthusiasts, bottlenecks, priority in time and agreements between participants. On the question of joint projects and the need for financing from several sources, agreement must be reached on the contribution of each partner, where relative benefit should be an important criterion for the size of the contribution. If regulations prevent the participation of some of the parties who would benefit from doing so, then 'larger' agreements should be established where this is compensated for in other areas, so that all the parties involved find it acceptable. In all project work there is a great danger of misunderstandings that can cause unnecessary conflicts. Agreements should be drawn up between the parties, which make it clear what is to be done, by whom and when, how and why. It should be noted where there is agreement, and also where disagreements exist and how agreement is to be reached. For most projects there exist obstacles to success that are outside the local communities/ organisations themselves and also obstacles that are within them. These bottlenecks should be identified as early as possible and ways of removing them should be identified. If possible, special 'action groups' or 'guerrilla groups' should be formed with enthusiasts to get rid of such bottlenecks. The strategies and projects that have been given priority must be jointly described in a plan of action that clearly shows what is going to happen where, when, how and why, and where the responsibility for planning and carrying out the program is defined. The responsibility for the implementation of action is given to certain partners who are made responsible through contracts and agreements.

*f)* *Experience – reporting and evaluation.* All the co-operating organisations/communities ought to present an annual report on the work for change, in which they discuss their area of responsibility in relation to the long-term plans and the plan of action. This annual report must describe what has been achieved in relation to the program and in addition to the program, what has been partially completed and why, and what has not been done and why. Likewise, the combined project must present a similar report. Separate communicative processes to discuss the content must be associated with this evaluation of the results. The plans of action should be revised frequently to incorporate new knowledge, remove what has already been accomplished and add new projects/activities.

The evaluation process is an important activity for producing new knowledge and new goals for further planning and action, a new 'loop', see Figure 2. If strategies and action plans function properly, the implementation process will function as a series of co-ordinated implementation 'loops'. Changes in challenges and situation, evaluations that show the strategies and actions that are not working properly as far as visions and goals are concerned, will eventually lead to the necessity for a new strategic 'loop' with high participation and communication where existing beliefs are challenged.

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# Lowland Crofting and Urban Sprawl: New Aspects to Sustainable Forest Management in Local and Rural Development

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## Abstract

In this paper a recently started Norwegian project is described that looks into the controversies associated with combining forest management (and also in a wider sense 'Landscape management') to what the author labels as 'alternative housing strategies'. The first part of the paper describes some of the background factors making such strategies interesting, and linking the project to studies in the UK and the USA. The Urban Sprawl – housing that is spreading outwards from the more densely populated areas – has been a topic of concern for many years. The challenges it poses for rural areas are well documented, but the discussion is getting more diverse nowadays, also taking into account the positive aspects of Sprawl. Likewise the author refers to the Lowland Crofting project in Scotland where a mixture of specific forest management and housing is in many aspects reported to be quite successful. A proposal for a European project on how to promote local development in rural and peri-urban areas through the use of alternative possibilities for establishing housing-properties will also be outlined. The basic question will be if, through utilising these possibilities, one can overcome some of the trends faced, such as to make sure that areas that fall out of agricultural or forestry production can be maintained to keep an attractive countryside and secure areas for recreational and/or tourism use both close to the larger towns and cities as well as in the more scarcely populated rural areas.

*Keywords: rural development, forestry, sustainable management, lowland crofting, urban sprawl*

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## 1. Introduction

In most developed countries, it can be observed that rural areas are facing several challenges: The forest resource is growing, and at the same time there are several conflicts/disputes as to how this growing forest resource is to be managed. Also due to the large-scale production needed to be economically efficient, smaller holdings may fall out of use. Forthcoming changes in agricultural and rural policies might also increase the challenges for small-scale forest owners to use their forest resource to add to their household income.

Simultaneously in rural societies there are other problems: depopulation; skewed age and gender structure; unemployment; restructuring of employment from primary to tertiary sectors of industry.

The social aspects are also changing. New social structures are challenging the traditional rural life – in short, it can be described as adoption of more urban ways of life.

While on the urban side an increase can be observed in the demand for property (housing, production activities, communications, leisure and recreation), all resulting in both higher prices, but also in higher stress and the emergence of a demand for a more secluded, 'back to nature' lifestyle.

In the news, one often encounters cases of people raising the topic of acquiring relatively large sites (for building their own house), or wanting to buy smaller holdings (abandoned farms) for residential use. In most countries this is considered to be 'a nuisance' to the system, as such solutions mostly requires non-standardised solutions as well as often being more expensive as there will be fewer units per hectare. For example, in Norway, the building of houses is strictly regulated through the Building and Planning Act, and through a system of physical planning. This is intended to ensure a wide range of conditions to be taken into account, such as environmental issues, pollution, technical suitability, social aspects, etc.

## 2. The Scottish initiative

'Lowland Crofting' is the name given to an initiative to subdivide uneconomic farms into smallholdings, and use the profits to achieve landscape improvements, in particular extensive tree planting. Traditionally it has been difficult to get land for new establishment in these areas, so by doing this a small supply of smallholdings was created, which are available for those who either want to engage in small-scale activities – or just want to have more space around them. Only being obliged to plant trees on one-third of the total area.

> *The objective of the exercise is to change the landscape of some of the bleaker, degraded parts of the area by planting large numbers of trees. People are being allowed to build houses in the open countryside on condition that they undertake structural planting (Scottish Office 1998, Chapter 3).*

Thus one seeks to combine the increasing demand for alternative housing and small holdings in rural areas with the need to maintain and further develop the cultural landscape. It also might seem this initiative has filled an excising demand:

> *Interestingly the number of speculative, and controversial, applications made to the Council for single houses in the countryside in other parts of the area apparently has declined since the crofting project started. It seems that a latent demand has been recognised and is partly being satisfied (Scottish Office 1998, Chapter 3).*

## 3. Urbanised rural regions

'Urban Sprawl' has been around for a time. It is the uncontrolled encroachment of urban areas into rural areas. Common opinion has been that 'Sprawl is bad', as it is normally expensive (both to individuals/households and to local communities), it has potential environmental hazards, need s to be relatively close to already developed areas and it normally will be known to spoil the landscape. In recent years there have been some efforts to show this is not always the case (Lemmon 2000), and that Urban Sprawl may play a part in rural development.

From the 1990s onwards there have been several international examples of strong growth in industries and population in former 'backwaterish' agricultural regions. Jan Evert Nilsson (1998) has looked into this in the book ‘Blomstrande näringsliv’ (Flowering Industries). Regions like East Anglia in England and North Carolina in USA are, in his opinion, characterised by the fact that a strong growth in population has caused a growth in Industries. He implies that an 18% increase in population in East Anglia from 1975 to 1995 is the cause of a 20% increase in employment, and that this mainly happened because of families moving from larger cities to the countryside. Whilst the youth move into the larger cities, it has also been possible to observe a migration of the 'established young' in the opposite direction. Important factors explaining this are:

- Increased income and the reduced problems of distances (read: cars and computers);
- Changed preferences for housing and living. Certain groups prioritise a rural life of leisure to the life in cities;
- The relatively short distance from East Anglia to London. The Cambridge area with its historical buildings, green areas and cultural and intellectual milieu will seem extremely attractive to academics, researchers and entrepreneurs in knowledge based production. Such persons are highly mobile and set hard demands on the social and physical environment where they want to live. In Nilsson’s study, 80% of interviewed High-Tec enterprises in the area deemed the social and physical environment for the managers and employees to be the most important factor for localisation;
- North Carolina lies a bit further off from the larger cities in the USA. Here it was pointed out that countryside living, access to 'horse and stable' and the golf course, lower cost of living and relatively low criminality were the important factors.

The expansion of industries in certain agricultural regions thus can be seen as a result of these regions representing appealing environments attracting people from other regions. These people in turn have contributed to bettering the conditions for economic development in the region, either through establishing their own enterprises, or through providing a highly skilled workforce for other enterprises.

This change not only consists of a change in preferences of young families. The dynamic in such processes can also be due to old-age pensioners moving to these regions and thus creating a demand for housing, services, care, etc.

Thus the key question to understand this growth seems to lie not in the residential preferences of the 'very young'. Instead the young, educated and established households ('YEEH') and the old age pensioners who are looking for alternative environments to the cities. What kind of areas do these groups find attractive? Why do they find them attractive? What can be done to stimulate such migration (push)? And what can be done to make specific areas more attractive (pull)?

East Anglia has Cambridge. What do we find in the Norwegian case –Hedmark, and in the northwest, Nord-Trøndelag? Again – to look at Nilsson’s study: in North Carolina the attractive areas are marked by being relatively small and socially 'close' with a high degree of social

control, the possibility to acquire larger estates and easy access to leisure-activities such as golf. With respect to many rural areas in Norway as well as in many other developed countries, this mostly is the case. Further the technological level (communications networks, high-speed/large capacity datalines) is often well suited to make living in the countryside possible.

Nilsson also focuses on mentality, attitude, etc. as important factors in rural development. As an example the wage-earner culture in traditional industrial regions can often be an effective hindrance to engaging in new enterprises and entrepreneurship; this can take generations to undo. Likewise Nilsson points to the fact that much of the dynamics in growing regions is created by in-migrants (and re-migrants) who are not to the same extent tied up in old conventions, traditions, norms, etc. as the people living there permanently. In-migration thus can be considered a condition for development. This has been confirmed also in other studies like Stöhr (1990), and Hansen and Selstad (1999).

Further, the same kind of tendencies are found in the USA, where there is an increasing demand for properties outside cities – but within a reasonable travel (commuting) distance and that are large enough to supply the households with a wider range of services.

## 4. The Norwegian situation

In the USA, which in many ways could be described as a society where planning has a much lower impact than it does, for example, in the Nordic countries, this development (as represented by the term 'Urban Sprawl'), in many ways, is seen as a threat. The Norwegian situation is different. We still do not have the hard stress on our cultural landscape that is caused by urbanisation. And agricultural land becoming obsolete is not due to a demand for urban structures. Still we have agricultural land (farmland, pastures and forestland) being neglected, but this is mostly due to rural depopulation and a change in job structure from primary to urban (tertiary level) production. We also, on a national scale, have only smaller problems concerning erosion, pollution, etc. However, we do experience the depopulation and the degeneration of social structures/social life in rural areas. Both in the extreme rural areas, but also in areas relatively close to the towns and cities. And we have pressure in the central and urbanised areas resulting in high costs of living and a lack of space.

A side effect of this is that we, being a 'planned society', have a more or less identical planning system for the whole country. In this respect this results in the same set of rules being used for planning a housing area in a rural settlement as in an urban regions. Normally this results in a standardised area with relatively small properties (750 $m^2$ is the rule). This is a 'must' in urban areas – perhaps not that necessary in the rural areas?

So, we experience an increasing demand for alternative solutions. As shown by Nilsson, we also experience households demanding more space, more freedom to decide their own solutions, and a will to have something more than what the urban housing areas can supply. This can be seen in regional and local newspapers, where there are often discussions on this: *"Why should I consider moving from the city to a rural area if what I am offered there is not essentially better than what I had?"* This is experienced by local and regional planning authorities who receive applications which often are difficult to permit within the standard planning regulations.

We have seen some scattered examples where local authorities have tried to do something. There is a Lowland Crofting-like attempt in the municipality of Fyresdal, but due to local natural conditions this, in itself, has not been a success. However, it still created interest, and people came to see the area and several have chosen other available properties in the same

remote municipality. There also are several attempts to register all available properties in rural areas to be able to supply potential seekers.

## 5. Aims of the Norwegian project

In this project, the primary aim is to identify problems and challenges in connection with using various housing strategies as strategies for rural development (Teigen 1982; Aasbrenn 1991; Bukve 1994; Selstad and Hansen 1999). What is being done? What kind of challenges are the municipalities facing? And what is the potential for this type of strategy in the 'development picture'?

- In relation to the plan- and law-based regulations that are faced (in Norway: what are the challenges from the Planning and Building Act, the Allodial Act, the Agriculture and Forestry legislation?);
- In connection to local and regional planning systems and to the administration's attitude and actions towards applications that deviate from the standardised solutions;
- Through analyses of attitudes to and actual treatment of such applications and attempts to make areas suitable for alternative establishing;
- Through describing challenges concerning the use of alternative methods to solve, for example, environmental effects of a more scattered housing pattern;
- Through attempts to better the conditions for a more sustainable consumption in the households;
- By utilising strategies for using such attempts in improving the cultural landscape (a link to Lowland Crofting and the tree planting obligation – in Norway this will have to be broadened to include various landscape types such as the recreation of old pastures);
- Studies of what affects the households preferences, for example, over a life cycle period;
- Studies as to how changing conditions for the households (as regarding composition, economy and lifestyle);
- Studies of the social milieu, 'the life between the houses', 'residence area as a place to live or a place to sleep'.

We are presently in the process of establishing this project. This means we are having discussions with a wide range of persons and institutions as to what the project will do.

First we are establishing a consortium of Norwegian research institutions to get an optimal mix in the research skills:

- The Norwegian Centre for Rural Research – rural consequences from Modern Society;
- Telemark Research – evaluation of current attempts for alternative solutions;
- Norwegian Agricultural University – natural science, physical solutions. Sustainable technology;
- Møre Research – challenges for planning system, laws and authorities.

Then we are having discussions with regional authorities to establish case studies and local projects in selected areas. We are now having discussions with six of the nineteen Norwegian Counties (Figure 1), representing all parts of the country except the north. Currently we are working towards the regional development departments, the agricultural and forestry departments as well as towards the department of culture. Fields of interests include:

- mapping of available resources (e.g. houses not in use in towns and villages);
- studies on out-migrated young people from the various counties (e.g. what kind of demands will have to be met for them to move back);
- studies of what are the relevant strategies; in which fields and what geographical areas will the various strategies be best suited.

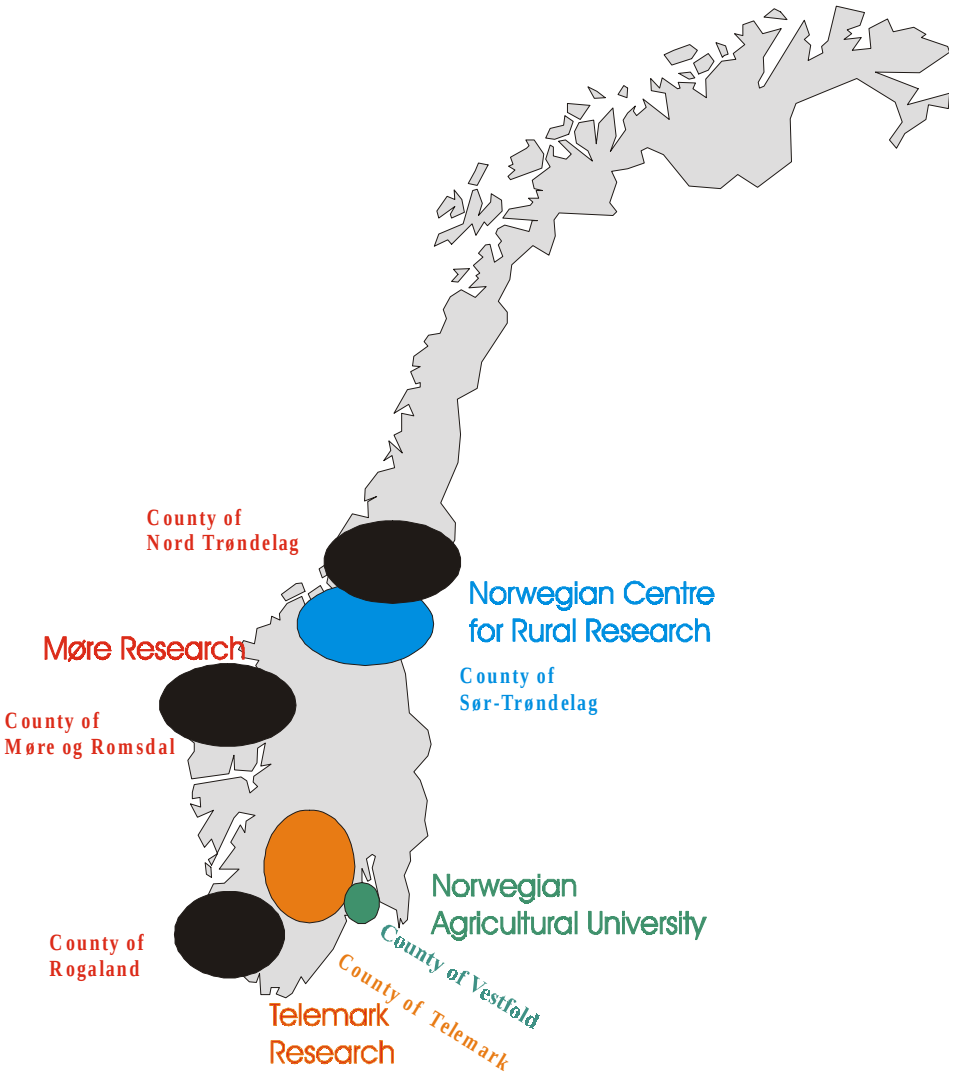


**Figure 1.** The Norwegian Project. Map showing the localisation of research institutions and the involved Counties.

## 6. Attempting to establish an international project

The third leg of this project is to work for the establishment of an international project (e.g. application to the Framework programme) on new strategies for rural development.

In the Norwegian case we have pointed to some factors that can be observed in Norway:

- a migration of younger, educated, established households (YEEH) from cities to rural and peri-urban areas;
- a demand for a different level and type of goods and services (larger properties, healthy social environments, etc.);
- experienced problems in meeting these demands;
- a need to investigate the planning laws and systems to make them suited to this kind of situation;
- a need to look into how sustainable solutions can be utilised;
- a need to study attitudes both for in-migrants as well as people already living there;
- a need to develop multiple and flexible strategies where one seeks to meet this demand for alternative housing while also trying to achieve goals for rural development, establishment of new enterprises, strategies to protect and develop the cultural landscape.

It is our belief that these problems/challenges are not only confined to the Norwegian setting, but can be found in many countries in Europe and the rest of the world. With reference to Nilsson's book, this has been established as a situation both in the UK and the USA. We know of the Lowland Crofting initiative in Scotland. Discussions with colleagues in various countries indicate that this is a kind of 'reaction' to the establishment that can be experienced all over.

The crucial point for a possible project will be if anything can come out of this – more than a scientific report that (unfortunately) only a handful of people read.

Thus the aim of a project must be to assist in strategy-development both locally, as well as on a national and international level. There is a research area in FP5, Quality of Life called 'New Tools and Methods for Rural Development'. To my opinion this is the best place to direct a project, and to aim at being a significant contributor in strategy development by trying to combine this 'lust for green' with the needs to accomplish sustainable and mobilising activities in rural and peri-urban areas.

One example can be if one could use this kind of framing for a strategy to protect and develop forested areas close to cities. These produce a variety of services, mostly non-commercial and consisting of making the forests available for city dwellers as places for recreation and leisure. There are costs connected to this, which will have to be met somehow. Could a possible strategy be to link this to some kind of large housing properties solutions?

If so, how could this be done? Will the excising property structure be a hindrance? Will the present owners agree to sell out? Will the price they demand have to be met by the buyers, or will the public have to intervene to make possible this kind of property exchange?

In the more rural areas, can it be possible to promote small-scale forestry this way? And can this be a possibility for creating small-scale enterprises based on forest products? Again referring to Nilsson, and the fact that development often needs an external push (in-migrants to start enterprises). If the regions are made more attractive through supplying in-migrants with the possibility to get 'more' than in the cities, can this result in an influx of people who are more interested in establishing enterprises, and can this result in increased demand for various products and services that might better the conditions for locally-based production (e.g. the use of local wood in traditional designs in buildings, furniture, etc.)?

There is also room for studies on the social aspect: how will the interface between the 'old' and 'new' inhabitants be established? Conflicts might arise, co-operation might be difficult, alienation might be the result. This calls for efforts on the societal dimensions as well as on

the economic and environmental/biological. So, there lies a genuine possibility to establish a true inter-sectoral research project where socio-economic and socio-cultural aspects can be truly incorporated into a common project aiming for 'new tools and methods for rural development'.

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# Programme

*International IUFRO 3.08.00 Symposium*

20–26 March 2001
Joensuu, Finland

**Tuesday 20 March 2001**

17.30–19.30 Registration
20.00–22.00 Icebreaker

**Wednesday 21 March 2001**

Session 1: Opening of the symposium, Chair: Anssi Niskanen

08.00–09.00 Registration
09.00–09.20 Opening of the Symposium
Aarne Reunala, Ministry of Forestry and Agriculture, Finland
09.20–09.30 Welcoming words
Pentti Hyttinen, Co-ordinator of IUFRO 3.08.00

Session 2: Panel discussion on the economic sustainability of small-scale forestry around the world, Chair: Aarne Reunala

10.00–12.00 Prospects for small-scale forestry in Australia
John Herbohn, University of Queensland, Australia
Prospects for small-scale forestry in Europe
Pentti Hyttinen, European Commission
Economic situation of small-scale forestry in Japan
Ikuo Ota, Kyoto University, Japan
Small-scale forestry in Canada
Paul Mitchell-Banks, Central Coast Consulting, Canada

Anssi Niskanen and Johanna Väyrynen (eds.)
Economic Sustainability of Small-Scale Forestry
EFI Proceedings No. 36, 2001

Session 3: Current problems for small-scale forestry development in Central and Eastern European Countries (CEECs), Chair: Ilpo Tikkanen

13.30–13.50 Preparedness of private owners for the management of forests in the Slovak Republic
Ján Ilavský, Forest Research Institute, Slovak Republic
13.50–14.10 Current state and conflicts of small-scale forestry in Hungary
László Jáger, University of West Hungary, Hungary
14.10–14.30 Economic and social role of small-scale (private) forest holdings in Poland
Stanislaw Zajac, Forest Research Institute, Poland
14.30–14.50 International financing possibilities for small-scale forestry development schemes
Pekka Alhojärvi, Finland
14.50–15.00 Discussion on the current problems for small-scale development in CEECs

Session 4: SMALLFORE – Small-scale wood harvesting technology in European forestry and its contribution to rural development, Chair: Andrea Moser

15.30–15.50 Introduction of the SMALLFORE project
Auvo Kaivola, TTS Institute, Finland
15.50–16.10 Challenges in small-scale forestry in Austria
Karl Stampfer, University of Agricultural Sciences Vienna, Austria
16.10–16.30 Self-employment and working methods in delivery sales of NIPF landowners
Arto Kettunen, TTS Institute, Finland
16.30–16.50 Discussion on the small-scale wood harvesting in Europe

Session 5: Poster exhibition.

17.00–18.00 Poster session

19.00–21.00 Introduction of European Forest Institute in City Hall (Rantakatu 20)

## Thursday 22 March 2001

Session 6: Policy measures and forestry extension to encourage small-scale forestry, Chair: Anders Lunnan

08.30–09.00 Forest management association – a major tool to promote economic sustainability of family forestry
Martin Lillandt, Central Union of Agric. Prod. and Forest Owners, Finland
09.00–09.30 Policy measures and forestry extension, education and training to encourage small scale forestry
Joakim Hermelin, Hermelin-Silva Ltd., Canada

09.30–09.50 Greener forests in Sweden: extension services and training for sustainable forest management
Göran Silfverling, National Board of Forestry, Sweden
09.50–10.10 Forest tenant farming as tested in Canada by the BAS-Saint-Laurent Model Forest: is it socio-economically viable?
Sylvain Masse, Canadian Forest Service, Canada
10.10–10.30 The introduction of sustainable forest management programmes to farm forestry co-operatives in Ireland
Ray Gallagher, Western Forestry Co-operative Society, Ireland

Session 7: Field-Trip: The role of small-scale forest farms in forestry-wood chain, Anssi Niskanen and Johanna Väyrynen

11.00–12.00 Travel to Enocell Ltd., Uimaharju
12.00–13.00 Lunch
13.00–15.00 Resources and facilities for modern forest management planning, implementation and guidance
Kyösti Hassinen, Forestry Centre of North Karelia, Finland
Wood demand and non-industrial private forests
Ahti Ullgren, Storaenso, Finland (Enocell Ltd. - Large international pulp mill)
15.15–16.45 Travel to Tuupovaara
17.00–20.30 Financial goals, environmental demands and practical forestry
Heikki Karhunen, Metsäliitto Ltd, Finland
Forest owners points of view on the ecological demands for sustainable forestry
Jarkko Huovinen, Finland
Demonstrations of practical forestry operations
Supper in the forest
20.45–22.00 Travel to Joensuu

## Friday 23 March 2001

Session 8: Environmental and economic research issues in small-scale forestry, Chair: John Herbohn

08.30–09.00 Research approaches to environmental-economic issues in small-scale forestry
Steve Harrison, University of Queensland, Australia
09.00–09.20 The new NIPF forest owner – a challenge for forest planning and forest policy
Anders Lunnan, Norwegian Forest Research Institute, Norway
09.20–09.40 Forestry investment in New Zealand
Ross Bawden, Bawden Associates Ltd., New Zealand
09.40–10.00 The contribution of edible mushroom harvesting to local rural development
Petra Vergunst, Swedish University of Agricultural Sciences, Sweden

Session 9: Objectives, factors and monitoring of non-industrial private forestry, Chair: Lennart Eriksson

10.30–10.50 Factors affecting NIPF owners reforestation behaviour: evidence from Finland
Ville Ovaskainen, University of Helsinki, Finland
10.50–11.10 Factors affecting the economic sustainability of the non-industrial private forest enterprise: a comparison of stakeholder perceptions
Melanie Hobbs, University of New Brunswick, Canada
11.10–11.30 Objectives and motivations of NIPF owners as assessed by professional foresters
Fredrik Ingemarson, Swedish University of Agricultural Sciences, Sweden
11.30–11.50 Co-operative and common-property forms of forest management regimes. – Economies of scale for small scale forestry – an assessment of different models in Europe
Andreas Ottitsch, European Forest Institute

Session 10: Small-scale forestry problems in different countries I, Chair: Ikuo Ota

10.30–10.50 Sustainable forest management: with or without privately owned forests? A Romanian case survey
Laura Bouriaud, ENGREF, France
10.50–11.10 Current situation of the forest development in the small properties in Nicaragua: Limitations, potentialities and challenges
Sergio Sánchez Segovia, Instituto Nacional Forestal, Nicaragua
11.10–11.30 Phases of reforestation abandonment in Hokkaido, Japan
Miho Yamamoto, Hokkaido University, Japan
11.30–11.50 The present state of introducing woody bioenergy in Hokkaido, Japan
Kazushige Yamaki, Forestry and Forest Products Research Institute, Japan

Session 11: Research contribution to support sustainable small-scale forestry, Chair: Johan Barstad

13.00–13.30 Environmental, economic and social aspects in Finnish private forestry
Olli Saastamoinen, University of Joensuu, Finland
13.30–13.50 Interactive knowledge system for family enterprise forestry
Maria Iwarsson, Forestry Research Institute of Sweden, Sweden
13.50–14.10 A model indicating effects of multipurpose use of forestry on stand level
Lennart Eriksson, Swedish University of Agricultural Sciences, Sweden
14.10–14.30 Supporting selection between individual and joint ownership in private forestry: a planning example in a death estate
Jouni Pykäläinen, University of Joensuu, Finland

Session 12: Monitoring the economics of small-scale forestry, Chair: Timo Kallio

15.00–15.20 Analysis of profitability of small-scale farm forestry by means of a forest accountancy data network – Austrian experiences and results
Walter Sekot, University of Agricultural Sciences, Austria
15.20–15.40 Timber harvesting under variable price, cost and interest conditions: implications for forest management planning
Markku Penttinen, Finnish Forest Research Institute, Finland
15.40–16.00 Measuring the public financial assistance in small-scale forestry bookkeeping
Jussi Leppänen, Finnish Forest Research Institute, Finland

Session 13: Small-scale forestry problems in different countries II, Chair: Laszlo Jager

15.00–15.20 Timber marketing information and NIPF owners: Preponderance of evidence
Bekir Kayacan, I.U. Orman Fakultesi, Turkey
15.20–15.40 Conception for consulting and education of private forest owners in Bulgaria
Nickola Stoyanov, University of Forestry, Bulgaria
15.40–16.00 Tertiary Sector and "Homes Direct from the Forest" for Rural Development in Japan -A Case of Kamitsue Village, Oita Prefecture
Noriko Sato, Kyushu University, Japan

Session 14: Modern approaches for forest management strategies in Finland, Chair: Jussi Leppänen

16.10–16.30 Applying A'WOT to choose a management strategy for the forest holding owned by private pertnership
Mauno Pesonen, Pohjois-Savo Polytechnic, Finland
16.30–16.50 Assessing forest strategies by applying a value–focused continuous strategy process model in a rural enterprise
Miika Kajanus, Pohjois-Savo Polytechnic, Finland
16.50–17.10 Monitoring farm forestry in Finland using taxation information
Esa Uotila, Finnish Forest Research Institute, Finland

## Saturday 24 March 2001

Session 15: Future challenges for small-scale forestry, Chair: Andreas Ottitsch

08.30–09.00 Future challenges for small-scale forestry: examples from the West Coast of Norway
Jorgen Amdam, Volda University College, Norway
09.00–09.20 Lowland crofting and urban sprawl: new aspects to sustainable forest management in local and rural development
Johan Barstad, More Research Volda, Norway

09.20–09.40 Meeting small scale forest sustainability challenges in urban/rural interface: Washinton's backyard forest stewardship/wildfire safety program
David Baumgartner, Washington State University, USA

09.40–10.00 Treading the path to sustainable forestry: new directions in Canada with particular reference to British Columbia
Sen Wang, Canadian Forest Service, Canada

Session 16: Business meeting of IUFRO 3.08.00 Working Unit and closing the symposium, Chair: Pentti Hyttinen

10.40–11.40 Business meeting of IUFRO 3.08.00 Working Unit

11.40–12.00 Closing the symposium

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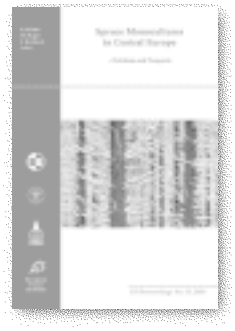

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