COST ACCOUNTANCY IN EUROPEAN FARM FOREST ENTERPRISES

MOSEFA Concerted Action Project (FAIR3 - CT96-1414)

Proceedings of the Workshop A: Methodological Issues of Cost Accountancy in European Farm Forest Enterprises

Zeist, The Netherlands
28 - 31 August 1997

Edited by Pentti Hyttinen and Timo Kallio

EFI Proceedings No. 20, 1998

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FOREWORD

The MOSEFA abbreviation stands for 'Monitoring the Socio-Economic Situation of European Farm Forestry'. The project is conducted as a Concerted Action under the European Union FAIR3 Programme. The project was started at the begining of March 1997 and it will last until the end of August 1999.

MOSEFA has now taken its first concrete steps towards concertation in practise. The first workshop was arranged on 28 - 31 August 1997 at the Woudschoten Conference Centre in Zeist, the Netherlands. The topic of the meeting was 'Methodological issues of cost accountancy in European farm forest enterprises'.

A total of 22 persons from 13 countries participated in the workshop and presented the current state of the art of forestry accountancy in their countries. There were active discussions during the workshop that added to the value of the presentations. The project was really launched and its future looks promising.

We would like to express our sincerest thanks to all participants for their most valuable contribution at the meeting. We would also like to thank the LEI-DLO for taking care of the practical arrangements, and especially Ms. Marijn van Rijswijk and Ms. Laura Eickhoff who took such good care of the participants. Thanks are also due to the EFI publishing team for the swift editing of this report.

The next workshop was agreed to be held in Trento, Italy, in April 1998. The aim of the second workshop will be to examine sampling schemes for socio-economic studies in farm forestry accountancy networks under various conditions.

Joensuu, Finland
February 1998

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MOSEFA PROJECT DESCRIPTION

1. BACKGROUND

A major concern among forest owners is that the profitability of forestry is alarmingly decreasing due to increasing costs, especially labour costs, and diminishing returns from the timber market. On the other hand, forest owners often lack the necessary information on the financial consequences of forestry activities to make realistic decisions.

A great part of private forest land is combined with agricultural areas as farm forests. These mainly small-scale forests are concentrated in rural and mountainous areas which are at a disadvantage compared with industrialized areas. The danger of socio-economical erosion and depopulation is substantial in these rural regions. Income from forests can play an important role in maintaining a good social structure, and forestry can contribute to the overall economy of rural areas. Areas of concern include not only traditional questions such as the continuing viability of individual farms, to which the production of timber and other products can contribute, but also more recent questions such as the contribution that the landscape value of attractive woodlands can make to the rural economy through tourism.

Regarding agricultural overproduction and the reform of the EU's Common Agricultural Policy, a major concern has been to which extent 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. As a result, large-scale afforestation of agricultural lands is expected. However, profitability information to determine the relevant level of public support is in most cases insufficient. Again, profitability – particularly the *relative* profitability of different land uses – is central.

The contribution that forests can make to the environment in diverse areas such as water catchment protection, habitat creation and conservation, and recreation (to name but a few) is now widely recognised. Increasingly, forest owners are either required by statute or influenced by financial incentives to alter their management practices with the objective of increasing these environmental benefits, and in some cases decreasing environmental damages. Here, while profitability in the usual sense may be of less importance than the concept of non-market benefits to society in general, the financial implications for owners cannot be ignored.

To summarise, recent economic and political developments suggest a more comprehensive analysis on the profitability of non-industrial private forestry. The economic performance of farm forests and other small-scale forests is therefore of some importance to each of the various areas described above. However, the availability of the basic data required to assess economic performance varies widely from country to

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country within Europe. There are, indeed, several reasons for developing a better, countrywise and regionwise, information base on the costs and revenues of forestry. Regardless of obvious needs, however, an in-depth analysis of the development has been carried out only for few countries so far.

The concept of farm forestry also causes complications. In many countries, strictly speaking, farm forestry includes only forests owned by farmers, excludes remotely owned forests, and emphasises the role of forests as a source of livelihood in rural areas. However, in cases where statistical data is lacking, some workers apply a size limit thus identifying farm forestry with the notion of small scale forestry. For example, where a single owner or family is involved in both forestry and agricultural enterprises a number of problems arise.

2. OBJECTIVES

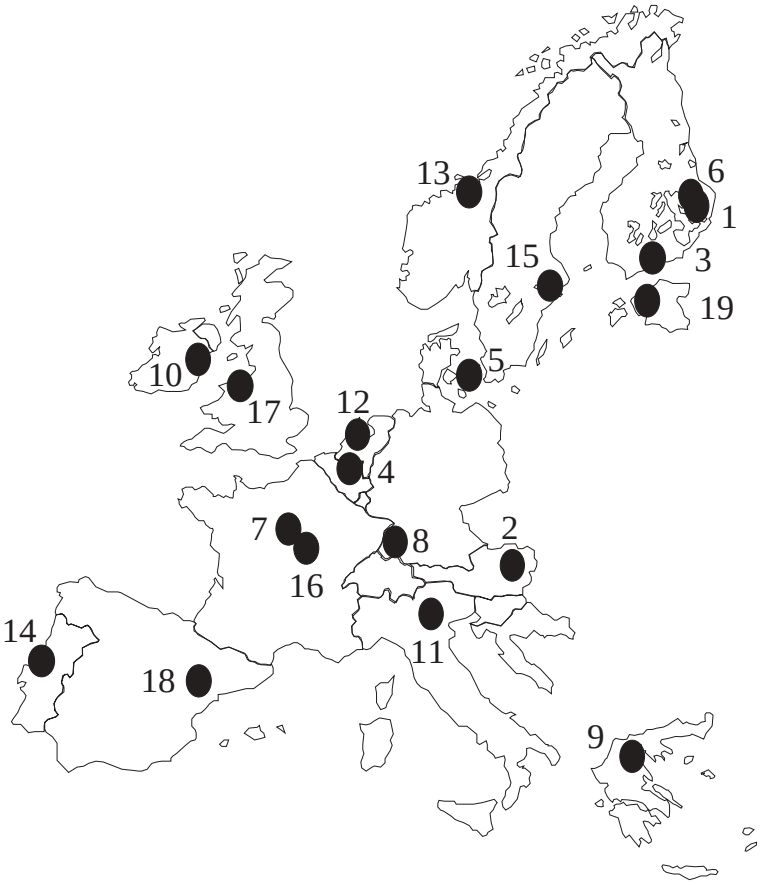
Forest policy issues imply a rising demand for information on socio-economic effects of farm forestry enterprise. Along with the ongoing attempts to modernize the existing forest accountancy networks or establish new ones in various countries, there is an urgent need for a synoptical analysis.

To address these needs, EFI has launched a two and a half-year project (1 March 1997 - 31 August 1999) entitled MOSEFA – Monitoring the Socio-Economic Situation of European Farm Forestry. The project is a Concerted Action under the EU's FAIR-programme. It will be carried out by 17 participating research institutes from 14 European countries (see map on next page), with EFI as the coordinator.

The main objectives of the Concerted Action are

1. To make the existing experiences and expertise on farm forestry accountancy data networks generally available.
2. To outline approaches for an international socio-economic scheme of statistics on farm forestry taking into consideration the heterogeneity of enterprises as well as the diversity of the underlying legal, social and economical framework and the respective national goals in forest policy.
3. To develop a common methodological framework/guidelines for collecting socio-economic data of farm forestry enterprises adaptable to different purposes and various conditions.
4. To identify the most essential research needs and prepare further research activities at the Community level on this subject.

The first workshop aimed at fulfilling the first objective. The information on current national farm forestry accountancy data networks was presented at the workshop. The accurate bookkeeping records of farm forestry are not available in most countries, because only few of them have a long tradition on forest accountancy. However, an encouraging example of these "expert" countries will provide a sound basis for developing comprehensive accounting systems in this action.



1. European Forest Institute
2. Universität für Bodenkultur, Austria
3. Finnish Forest Research Institute, Finland
4. University of Ghent, Belgium
5. Royal Veterinary and Agricultural University, Denmark
6. University of Joensuu, Finland
7. Association Foret - Cellulose (AFOCEL), France
8. Forstliche Versuchs- und Forschungsanstalt Baden-Württemberg, Germany
9. Aristotle University of Thessaloniki, Greece
10. Coillte Teoranta, The Irish Foresty Board, Ireland
11. Istituto Nazionale di Economia Agraria, Italy
12. DLO Agricultural Economics Research Institute, The Netherlands
13. Norwegian Agricultural Economics Research Institute, Norway
14. Escola Superior Agrária de Coimbra, Portugal
15. Skogsägarnas Riksförbund, Sweden
16. Institut pour le Développement Forestier, France
17. University of Wales, United KingdomExternal participants

External Participants:

18. Consorci Forestal De Catalunya, Spain
19. Estonian Forestry Development Programme, Estonia

3. MILESTONES

Because of the nature of the Concerted Action -project, most of the work will be done individually at each participating institute. This work is coordinated by the European Forest Institute, and the results will be presented in the workshop meetings.

The following four meetings have been planned, from which the first one has already taken place at Woudschoten Conference Centre in Zeist, the Netherlands. Each meeting has its own problem area, which approximately equals to one of the main objectives of the whole Concerted Action:

1. Methodological issues of cost accountancy in European farm forest enterprises
2. Sampling schemes for socio-economic studies in farm forestry
3. Prospects of international statistics on socio-economic situation of farm forestry
4. Presenting the final results and agreeing on the future cooperation

After each meeting a report based on the articles presented at the seminar will be published. The final product of the Concerted Action is the “Guidelines for establishing accountancy networks”, which should give tools to the European Commission to be utilized in decision making of agricultural policy in the context of forestry issues. The guidelines also aim at helping different countries in their intentions to find and develop accountancy networks on socio-economics of farm forestry.

COUNTRY REPORTS: METHODOLOGICAL ISSUES OF COST ACCOUNTANCY IN FARM FOREST ENTERPRISES

AUSTRIA

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ABSTRACT

In Austria, small scale forestry as well as farm forestry are of great significance. Almost a quarter of a century ago, a network of farm forests has been established for monitoring the economic performance of this category of forest enterprises. The system of cost accounting used along with this network is in many respects but not fully compatible to the one recommended by the IUFRO working party dealing with small scale forestry. The big share of imputed costs implies problems of valuation, especially as regards the pricing of the forest owner's own labour input.

Keywords: *farm forestry, forest accountancy data network, cost accountancy, imputed costs*

1. ACCOUNTANCY DATA NETWORKS IN AUSTRIAN FARM FORESTRY

1.1 Importance of farm forestry

In Austria, private small scale forestry prevails. Almost half of the forest area (about 1.5 million ha) belongs to private holdings with less than 200 ha. In average, those small forest enterprises contribute some 48.6% to the annual cut, which corresponds to an amount of about 6.3 million m^3 (Bundesministerium für Land- und Forstwirtschaft 1996a). Only 0.7% of all forest enterprises manage more than 200 ha of woodland (Österreichisches Statistisches Zentralamt 1993).

Out of the 278,000 agricultural and forestry enterprises, 71% manage agricultural as well as forestry land. In total, some 268,869 holdings are considered as farms, managing altogether some 2.120,000 ha of woodland (Bundesministerium für Land- und Forstwirtschaft 1996b). This gives an average size of the woodlot of 7.9 ha as compared

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to 9.4 ha of agricultural land. Thus, farm forestry is an important issue in Austria, not only as regards the number of enterprises but also in terms of forest landbase and share of forestry production (Gschwandtl 1995).

1.2 Monitoring of economic results

For the purpose of the agricultural annual report to parliament, the so-called 'green report', there exists an accountancy network comprising some 2,400 farms (Bundesministerium für Land- und Forstwirtschaft 1996b). Those farms are selected by quota-sampling. The classification scheme is given by type of farm, site difficulty, production region and size in terms of total standard net return (Binder and Pfingstner 1988). However, all forest enterprises comprising more than 200 ha of woodland as well as the smallest holdings with a standard net return of less than 90,000 ATS and the big ones exceeding a standard net return of 1.5 Million ATS, are not reflected in this investigation. Thus, the sampling frame excludes some 38% of the forest area adhering to farm forests. Furthermore, this accountancy network provides only the forestry revenues, whereas the forestry costs are not reported separately. Therefore, the agricultural accountancy network is not sufficient so as to satisfy the purposes of economic evaluation of farm forestry. Consequently, only few forestry results can be derived at, relying on the statistically rather sound basis of this network. For instance, there are remarkable differences as to the contribution of forest products to total farm revenues, the alpine regions (I, II and III) showing significantly higher levels of about 10 percent (see Figure 1).

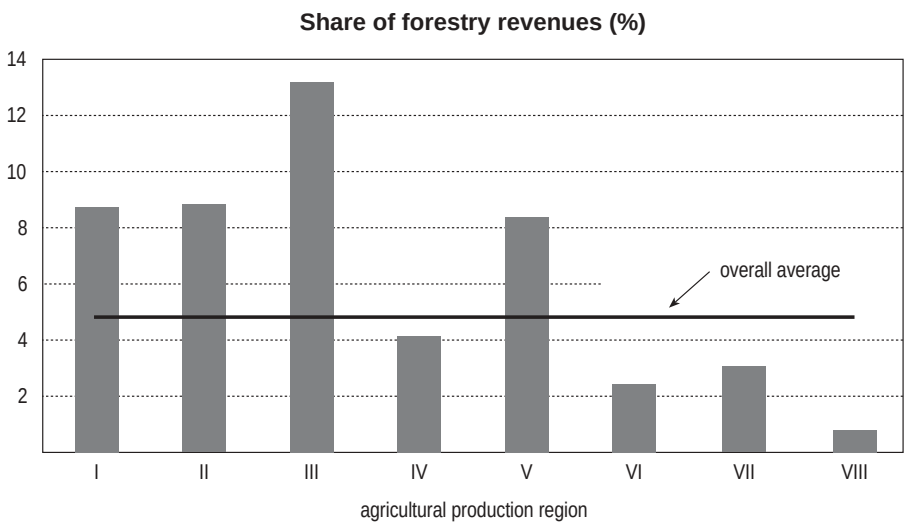

Figure 1. Forestry contribution to farm revenues in 1995 according to the representative agricultural network. (Alpine regions: I, II and III).

With their beginnings dating back to the Sixties, the economic situation of Austrian forest enterprises is being monitored by means of specific forest accountancy data networks (see e.g. Frauendorfer 1978, 1984; Sekot 1990, 1991, 1993, 1994, 1996a; Hyttinen et al. 1997; Bürg and Sekot 1997). One of the four networks is devoted to farm forestry (see Table 1.). This network was established in 1973. In fact, it is a sub-sample of the agricultural network. Although it is composed of farms where forestry is of higher significance, it comprises just 0.23 percent of the total forest area represented by the network. It is run by a trustee's association which is also in charge of the agricultural affairs. The network currently consists of 114 arbitrarily selected farms belonging to just four out of a total of eight production regions. Due to the small sampling ratio and the participating farms being by no means evenly distributed, the results are of minor statistical significance and must not be generalised. Nevertheless, this investigation provides an indication as to the significance of forestry in mixed agricultural and forestry enterprises (see e.g. Hackl 1982, Mösenbacher 1982, Wöhry 1983, Jansenberger 1985, Sekot 1996b).

A similar extension of the agricultural network has been installed by the forestry department of the Tyrolean chamber of agriculture some 5 years ago. This regional initiative comprises 20 farm forests distributed within the province evenly according to region and size class. The data have not been evaluated yet. In the future, this sample could be fully integrated into the network of farm forests.

From 1986 till 1990 there existed an additional sub-sample of the agricultural network comprising some 50 units within one production region and adhering to the size-class from 2 to 5 ha of forest land. This limited investigation was to give some insight as to the management of those small units which otherwise is not documented at all. The results stressed the prevailing importance of domestic needs for fuelwood, other woody products and income. On the other hand, time effectiveness in forestry operations is generally very poor in this stratum.

Table 1. Profile of the Austrian network of farm forest enterprises for 1995 (see Bürg and Sekot 1997: 184)

kind of enterprises	sample farms of the agricultural network with between 5 and 200 ha of forest land
organisation in charge	agricultural trustee's organisation
represented enterprises	268,870
represented forest area	2.210,000 ha
sampled enterprises	114
allowable cut of sampled enterprises	21,900 m^3
average yearly cut of sampled enterprises	17,700 m^3
forest area of sampled enterprises	4,900 ha
sampling ratio (enterprises)	0,04 %
sampling ratio (forest area)	0,23 %
costs for running the network	630,000 ATS
costs per enterprise sampled	5,500 ATS
costs per hectare sampled	128 ATS
costs per m^3 of allowable cut sampled	29 ATS

2. THE SYSTEM OF COST ACCOUNTANCY APPLIED TO THE SAMPLED FARM FOREST ENTERPRISES

2.1 Database and master balance sheet

The original database for forest cost accountancy comprises detailed monetary as well as non-monetary records which are primarily underlying the agricultural network and which are kept by the farmers. However, the farms participating in the supplementary forestry investigation adopted their accounting system to the specific needs, providing separate records for forestry costs and documenting forestry revenues in more detail. A special supplement to the agricultural accounting scheme is the exact record of working hours spent with forestry affairs. According to the rules of cost accountancy, those working hours are evaluated as labour costs in calculating the profit. Thus, the farmer's total income from forestry is separated into an imputed earned income on the one hand and to owner's profit on the other hand (see Figure 2).

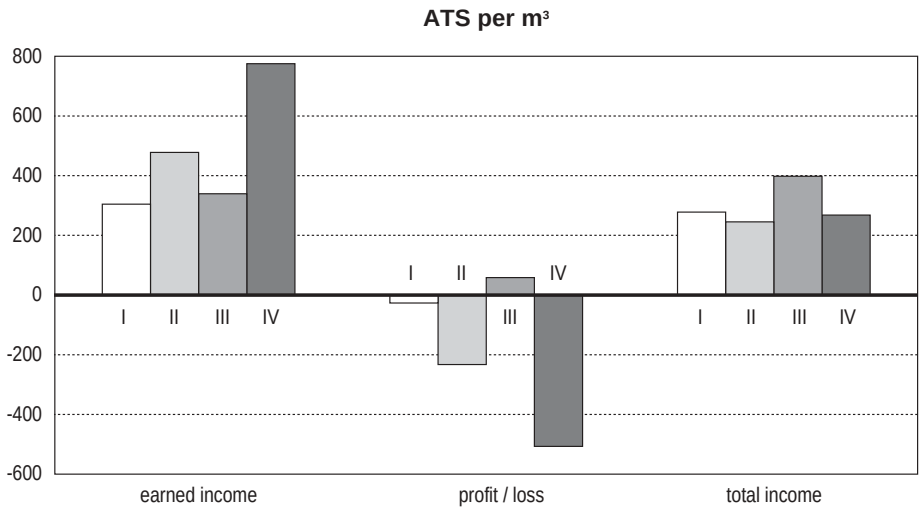

Figure 2. Composition of farm income from forestry in 1995 as documented by the network of farm forests. (Alpine regions: I, II and III).

In general, the concept of cost accounting applied with the farm forests corresponds to the one which has been developed for the network of bigger forest enterprises, providing information on the full costs and the operating results (Forstliche Bundesversuchsanstalt; see also Jöbstl 1981, 1982; Bürg and Sekot 1997). However, the structure of the master balance sheet is less detailed and there do exist some minor deviations as regards the allocation of certain sub-types of costs (e.g. fees, energy).

There are only three cost centres considered: harvesting, silviculture and overheads including costs for forest roads and buildings. Hunting is regarded as a separate business. The main types of costs are wages, calculated earned income (owner's own work), material, contractors, taxes and fees, depreciation and other costs (e.g. insurance). Those main types of costs are subdivided into up to three items. For instance, the wages and the respective in kind payments are reported separately.

The master balance sheet provides absolute figures of the various types of costs differentiated according to cost centres as well as a detailed record of forest revenues. Timber revenues are not only documented in monetary terms but the respective physical measures are also reported there. Standard ratio analysis is restricted to costs, revenues and results given per hectare of forest land, per cubic metre of cutting as well as per cubic metre of allowable cut. Not only the total costs are considered in this ratio analysis but also each type of cost and each cost centre individually. However, no other cost determining items than the three measures mentioned (landbase, cutting volume, allowable cut) are reported.

2.2 Specific regulations for determining costs and revenues

The wage rate applied for valuing the owner's own work is derived from the respective rates of the forestry labour agreements. The recorded working hours are valued by the time rates for skilled forest workers. A mixed rate is applied only as regards the working hours spent with harvesting. This rate is derived by taking 20 percent of the time rate and 80 percent of the average hourly income of piece work earned by the workers of the national forests. The non-wage benefits are accounted for by adding a lump sum of 50 % of the calculated wages. As compared to the non-wage benefits of employed workers, which amount to about 100% of the wages, this low percentage is meant to reflect the special conditions of forestry work performed by farmers acting as contractors. Up to certain limits, the social insurance for farmers working in forestry is already covered by their agricultural contributions.

Depreciation is calculated according to standardised depreciation rates for the different types of assets. The costs of the own (agricultural) tractor are not differentiated into the original types of costs such as depreciation, maintenance or fuel, but defined as an individual type of cost. The calculation of those costs is based on a record of working hours. The rate per hour is derived from a general calculation scheme which specifies the cost prices of the different power classes and which is being updated yearly. Thus, the cost of a tractor is another imputed item of the accounting scheme not directly derived from the expenditures recorded in the books. The costs for the use of the private car in forestry, too, are imputed referring to a record of kilometres driven, on the one hand, and a standard price per kilometre on the other hand. In total, the cost structure is clearly dominated by those imputed costs as shown in Figure 3. In the alpine regions, the imputed costs contribute about two thirds, in region IV even some 80% to the total costs. Such a dominance of imputations might be regarded as a general drawback of any such investigation, the rules for pricing the respective input being more or less arbitrarily set standards.

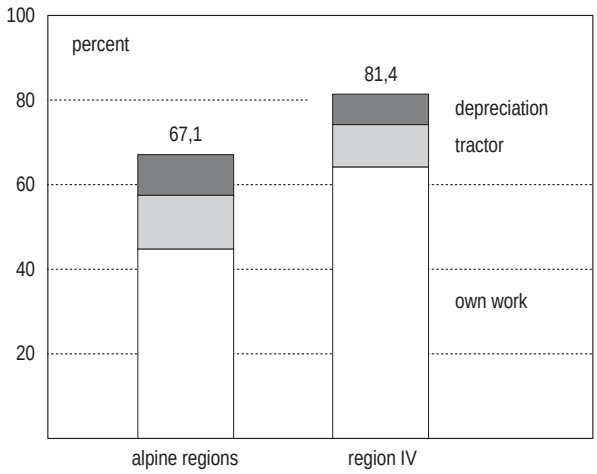

Figure 3. Share and composition of imputed costs in 1995.

In contrast to the network of bigger forest enterprises, interest for the capital invested in forest land and stands is not taken into account in calculating the forestry result. In fact, this interest remains part of the agricultural overheads and is not allocated to forestry. (The interest is calculated at a rate of four percent, the stands being valued by a simplified system of age constants and the value of the forest land being derived from the standard value of forest property.) As the political interest concentrates on the earned income stemming from the different lines of farm production, this bias in favour of the forestry result is taken as negligible. On the other hand, leaving out the interest on capital is in line with the guidelines for the presentation of data on the profitability of private forestry specified by IUFRO project group P 3.04.00 ‘small scale forestry’ (see Hyttinen et al. 1997:79-83). However, interest charges paid are considered as ‘other costs’ and thus included into the income account. This is neither corresponding to the scheme of cost accounting followed with the bigger forest enterprises, nor does it comply with the recommendations of IUFRO.

As regards value added tax, the system of cost accountancy in farm forest enterprises differs from the agricultural scheme, too. In the representative agricultural network value added tax is recorded as part of the expenditures as well as the receipts, according to the guidelines of the EU-FADN (Farm Accountancy Data Network). In this context it has to be mentioned that the specific rules for the commutation of value added tax apply to almost all of the sampled enterprises. This means that the farmers are practically allowed to keep the difference between the taxes paid for purchased input and the ones earned along with the receipts for their products. Thus, such taxes may, in fact, contribute to the agricultural income. On the contrary, forestry costs and revenues are given net of value added tax in the forestry calculations corresponding to the rules for the network of bigger forest enterprises.

Revenues from sales of raw wood are differentiated according to assortment (sawlogs, pulpwood, fuelwood) and timber species. Self consumed timber is recorded separately and priced at market prices. In 1995 the share of those imputed timber

revenues was 9% in the alpine regions and some 32% in region IV. In terms of volume the shares are 14% and 43% respectively, the consumption being concentrated on less valuable fuelwood. Income from other forest products is recorded separately.

3. METHODOLOGICAL OUTLOOK

A weak point in the system of cost accounting is the valuation of the labour. The current scheme as well as the IUFRO recommendations are based on the pricing of recorded working hours referring to the actual wages of state forest workers. This rule implies that any hour spent with forestry operations is of the same value in all farms, irrespective of the specific performance or output. In practice, however, the performance varies considerably as shown in Figure 4. An alternative approach would be to value the unit of output instead of the input, as proposed by Penttinen and Hakkarainen (1997) (see also Bürg and Sekot 1997:174). However, such an approach is hardly practicable as it would necessitate a comprehensive documentation of all operations including cost effective characteristics for further differentiation of unit costs. Ultimately, it has to be kept in mind that this question affects primarily the subdivision of the income into earned income and net income.

On the whole, the current scheme of cost accounting complies only partly with the recommendations specified by the IUFRO project group ‘small scale forestry’ (see Table 2). In the future the integration into the agricultural investigation, as well as the fact that compatibility with the other Austrian forest accountancy data networks has to be maintained will not allow to adapt to the referred guidelines in all respects. However, the common bookkeeping system of the sample farms being currently renewed, more flexibility as regards data management and cost classification will be achieved.

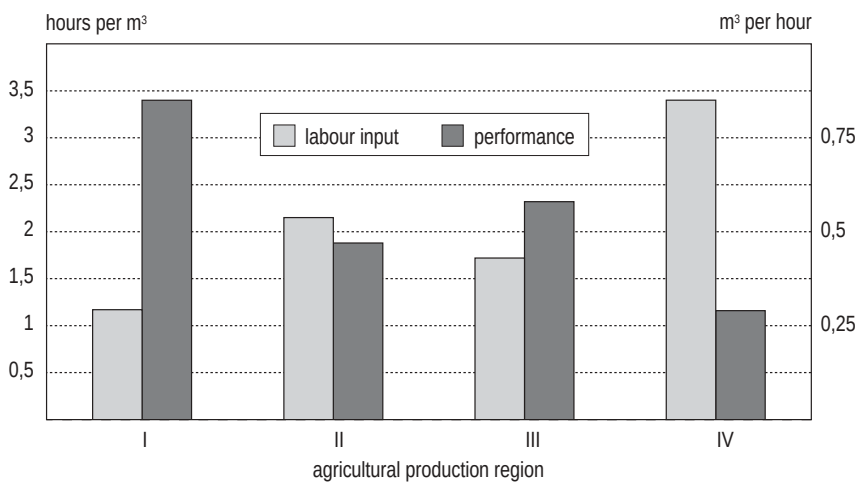

Figure 4. Labour input and performance along with harvesting operations in 1995.

Table 2. Compliance of the Austrian accounting scheme with IUFRO recommendations.

item	IUFRO-rule	compliance	remarks
size classes	limits: 5, 20, 50, 100 and 200 ha	no	to become possible with the new system
own labour	pricing according to the wages of state forest workers	yes	special rate for harvesting
own consumption	pricing at market prices	yes	
other products	record income separately	yes	
interest on capital	to be left out	yes	part of agricultural overheads
interest charges	to be left out	no	part of 'other costs'
subsidies	to be indicated separately	yes	
value added tax	to be included	no	tax exemption
ratios	per ha, per m^3 cutting volume, per m^3 allowable cut	yes	

One of the most severe deficiencies of all Austrian networks is the lack of auxiliary, non-monetary data such as quantitative measures for input and output as well as cost determining factors. For the time being it does not seem that such additional items will be provided in the near future. Moreover, even the measure of allowable cut might not be available in the long run. Hitherto, the allowable cut was determined in the course of elaboration of a forest management plan for individual farm forests. Since 1995, the Federal Forest Research Institute will no longer provide those management plans, so that there is even a slowly increasing lack of actual data in this respect.

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BELGIUM

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ABSTRACT

In Belgium typical farm forests hardly occur, although 52% of the forests belong to the private sector. Only a small number of farmers have a limited forest area, mainly planted with poplars, Norway spruce and Scots pine. Thus it is understandable that no bookkeeping systems exist. Nevertheless, it is generally accepted that on many sites profitability is negative. Positive results only occur with populiculture and spruce stands.

As it is the objective of the Forestry Service to stimulate the afforestation of agricultural land in the framework of the EU regulation 2080/92, some studies have been done on the profitability of poplar plantations under various conditions. Therefore, a model of a plantation with the cv. Beaupré was tested. A cost-benefit analysis has been executed, taking into account three parameters: the grant level, the site and the stem quality. As a result, tables which indicate maximal annuity, the best suitable rotation, the distribution of costs and benefits and the internal interest rate are presented.

It is concluded that from a pure financial point of view, afforestation of agricultural land is only of interest under two conditions:

- the land price should not be higher than 300,000 to 400,000 BF/ha (7,500 to 10,000 ECU);
- the site should be favourable to very favourable.

This means that afforestation of agricultural lands under the current granting conditions both in agriculture as in forestry is barely attractive.

Some questions, however, are still open, first the question of the methodology of profitability computation. With which land price and external interest rate should this be reckoned? What annuity gives satisfying results? Should a replacement income be taken into account? And what about disturbances and secondary forest products and services?

Although profitability results are disputable, they provide useful information. An exact knowledge of the profitability of agriculture and farm forestry can contribute to the afforestation of agricultural land.

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1. BACKGROUND

Belgium is covered with some 620,000 ha of forest, which means an afforestation density of 21%. The southern part of the country, Wallonia, covers an area of 1684,000 ha, of which 58% is occupied by agriculture and 30% by forest. The northern part, Flanders, covers an area of 1.352,000 ha, of which 59% is occupied by agriculture and 9% by forest. The overall share of private forests amounts to 52%. The forest fragmentation is very high. There are approximately 103,000 private forest owners, with an average forest area of 3 ha. 70% of the owners have a forest area which is smaller than 1 ha, whereas only 8% of the owners have a forest that is bigger than 5 ha, which is the minimal area in Flanders where a management plan is compulsory. In spite of the high degree of forest fragmentation and neglect, almost no forest groups exist.

A specific feature of the private forest is that farm forests hardly exist. About this (reliable) figures are not known. Generally speaking it can be said that farm forests are insignificant in Belgium. Therefore there can be no mention of Farm Forest Enterprises. The private forest owners are not farmers, who possess a patch of forest for various reasons, and financial objectives are often of minor importance. A small number of farmers own some limited forest area as part of their farm, but this has hardly real value for their income or their activities. It is mostly restricted to a small area of marginal land, unsuitable as agricultural land. The most often occurring species in these forest areas are poplar, Norway spruce and Scots pine.

As there is almost no farm forest and as such forests have only very limited importance, it is understandable that no book-keeping exists for these forest types. Furthermore, systematic accountancy data on the private forest hardly exist in Belgium. This also means that there is no clear insight into the financial results of the private forest. It is generally accepted, however, that the profitability of private forest is very variable, mainly in function of the site, the species and the nature of the owner. On many sites the profitability is indisputably negative. Positive financial results, however, normally appear with populiculture and spruce stands.

A structural analysis of the Flemish agriculture shows the following features (Lust 1991; Gorissen and Schepens 1997).

- The farm enterprises are normally small enterprises (mean area = 14 ha), characterised by capital and labour intensive methods. There is a net tendency towards an increase in the enterprise area.
- As the population density is very high (an average of 420 inhabitants per km²), the available agricultural area is restricted to 15 acres per person. This is the lowest proportion within the EU.
- Almost 70% of the agricultural area is exploited on tenancy. The tenancy code strongly protects the farmers. In order to afforestate agricultural land in tenancy an agreement between the landowner and the tenant is needed. This means that in practice afforestation of agricultural land in tenancy is very difficult.
- The farm succession is not assured. About 60% of the farms are run by an operator who is older than 50. It is estimated that the succession of these farms is guaranteed for only some 25%.

- About 60% of the agricultural land is covered by arable land, 37% by pasture lands and 3% by orchards.
- Arable farming is mostly combined with horticulture or cattle breeding, of which cultures with a high gross profit are a current event.
- Every year, a considerable surface is withdrawn from the agricultural area for all kind of objectives. Less than 5% of this area is estimated to be afforestated.
- Subsidies from the European Agricultural Policy form a substantial part of the agricultural income, namely up to 30%.
- The average selling price of the agricultural land in Flanders is high, namely some 700,000 BF/ha or 18,000 ECU (1 ECU = 40 BF), whereas in Wallonia this value only amounts to 290,000 BF or 7,600 ECU.
- The strengthened environment regulation (a.o. manure regulation and nature protection measures) has not lead towards a decrease of the land price. On the contrary, the competition for land has still increased, so that the very high land prices are maintained.
- Farmers do not have a forest tradition, on the contrary, they are hostile towards forests, the forest being considered a threat to agriculture.
- The landowners consider afforestation of agricultural land as "economical nonsense", as it leads to a devaluation of value of the lands in the order of 50 to 70% (M.T.1988).
- On the part of nature conservation there exists a strong pressure not to afforestate certain areas, which are at first sight very suitable for afforestation. Because of this, the Forestry Service in Flanders is faced with two pressing questions, that is, the afforestation of valley lands and the ecological value of poplar plantations (Buysse 1991).

Agricultural area, in general, is protected by the legislation on rural planning and by the tenancy code. The regional plans have to be respected, which means that afforestation within the agrarian zone is strictly limited and subject of several licenses, a.o. from the communal authorities and from the agricultural administration.

The above mentioned data lead to the conclusion that, on the one hand, part of these characteristics encourage afforestation (very low forest area; uncertainty of farm succession, pressure by society), but, on the other hand, a lot of features can be considered to be drawbacks (very high population density; small agricultural area/capita; considerable land prices; high pressure on land use; large share of tenants).

2. AFFORESTATION OF AGRICULTURAL LAND STIMULATED BY THE EUROPEAN FOREST POLICY

Notwithstanding the fact that the forest area in Europe is very important and that even farm forest cannot be neglected (in the EU some 16% of the forest area belonged to farm enterprises) there still does not exist an official European forest policy, although efforts have been made since 1985 to afforestate agricultural land (regulation 797/85). In many countries, however, the results were not so encouraging. Almost no agricultural

land was afforested in Belgium in the framework of set-aside. In order to reach the general objectives of the EU, more than 50,000 ha of agricultural land should be afforested.

To stimulate the afforestation of agricultural land, the European regulation 2080/92 was issued. There was strong resistance in Belgium on the part of the agricultural lobby so it was not until the end of 1994, 1995 and 1996 before this regulation was implemented both on the federal and regional levels, by, on the one hand, the ministry of agriculture, and on the other hand by the regional ministries competent in forest matters.

In summary, the grant regulation 2080/92 for Flanders can be presented as follows (S.A. 1996). A distinction has to be made according to the nature of the owner, that is, on the one hand the farmer in his main occupation, and, on the other hand, other persons.

a) Afforestation costs. Depending upon the tree species, the amount ranges from 35,000 BF to 150,000 BF (875 until 3,750 ECU). The lowest amount is reserved for poplar plantations without understorey, whereas the highest amount is reserved for indigenous oak. In some cases a supplement is foreseen:

- for the establishment of an understorey: 20,000 BF/ha (500 ECU);
- for afforestation of marginal agricultural land: 10,000 BF/ha (250 ECU).

Moreover, farmers in their main profession can still get the following additional grants:

- planting of the borders with shrubs on marginal agricultural land: 4,500 BF (112 ECU) pro 100 current meter;
- supplement for afforestation of 3 ha or more of agricultural land: from 2,000 BF (50 ECU) for 3 ha up to 12,000 BF (300 ECU) for 30 ha.

b) Maintenance costs. This amount, spread over 5 years, equals 35,000 BF/ha (875 ECU) for conifers, 44,000 BF/ha (1,100 ECU) for poplars and 70,000 BF/ha (1,750 ECU) for hardwoods.

c) Premium as compensation for income loss. Contrary to the other incentives, which are allowed by the regional government (in other words by the Flemish Forest Service), this premium is allowed by the federal ministry of agriculture. Although the European regulation provides the possibility to give a premium to an amount of 725 ECU/year for a period of 20 years, in Belgium this premium was limited to 5 years and to an amount of 25,000 BF/ha (625 ECU).

d) Measures in order to improve existing forests. This is hardly a question to be considered in Flanders.

Moreover, it is of great importance that afforestation of agricultural land is submitted to a great number of licenses. Depending upon the location and the statute of the plots up to 7 advices are required. However, the forest administration fills in the request for most of the advices.

In comparison with the grant regulation for the private forests in Flanders, this regulation is much more favourable. It is clearly the objective of the Forest Service to stimulate the afforestation of agricultural land. It is, e.g., also foreseen in the Spatial

Structure Plan of Flanders, that 10,000 ha of agricultural land should be afforested within the next 10 years. On the contrary, in Wallonia no distinction was made between the granting of the normal private forest and the afforestation of agricultural land. The grant for conifers and poplars is mainly restricted to 10,000 BF/ha (250 ECU). The premium for income loss is obviously the same as in Flanders.

A serious problem in Flanders, just as in other densely populated areas, is formed by the rural planning. Where is afforestation permitted? Can it be carried out freely in each region, or should it be aimed at concentration, depending on other functional values?

In Europe an amount of 1.3 billion ECU is available for this afforestation measure during the period between 1993-1997. In Flanders already an amount of 247 million BF (6.175 million ECU) was reserved in 1996, whereas for 1998 an amount of 378 million BF (9.450 million ECU) is foreseen. It appears, however, that these amounts are highly over-estimated.

On the European level, 98% of these afforestations are carried out by the private sector. The average size pro application equals 6.4 ha. 60 % consist of hardwoods or mixed forests and 40% of conifers. The afforestations are mainly carried out on pastures (61%) and arable land 36% (Steenhoff 1997).

3. PROFITABILITY STUDY OF POPLARS IN FLANDERS

With the implementaion of the regulation 2080/92, a number of fundamental questions can be raised. Two of the most important are:

1. What is an achievable profitability of forestry, starting from the proposed grants?
2. How can the balance between forestry, agriculture and other alternatives be made?

For this purpose, Gorissen and Schepens (1996; 1997) executed a profitability study, where the following concrete questions were raised in relation to the plantation of poplars:

- what is an achievable yearly income?
- what is the best rotation?
- what are the costs and the benefits?

To answer these questions, a cost-benefit analysis was made for a poplar plantation model, viz. a plantation with the cv. Beaupré at a planting distance of 8 m x 8 m. This model was chosen, as it is known by experience that it is presently the most profitable form of plantations for private landowners. Moreover, it can be expected that many farmers might use this model, when deciding to afforestate part of their lands.

According to this model, all costs and benefits were recalculated, using he technique of capitalisation and discounting. Then, with the actualised costs and benefits two indicators are determined as a measure of the profitability of the plantation:

- the annuity, being the fictive amount an investment yearly costs or yields;
- the internal interest rate, being the interest with which the invested amount yields.

During the elaboration the following simplifications were included:

- the management is directed towards maximal financial benefits;
- there is no inflation;
- a constant interest rate is used; 6% was chosen as an external interest rate, as these activities must be considered in an agricultural context and as the long term interest rate varies around this rate;
- wood products are the sole benefits.

In the simulation model, several parameters, both on the benefit and on the cost side, are considered: the grant level, the site and the stem quality. From the benefit side 3 parameters are taken into account:

- the site: the site classes 40 (low), 48 (most common) and 56 (high);
- three grant levels:
  1. without a premium for income loss
  2. with a premium for income loss during 5 years (Flemish situation)
  3. with a premium for income loss during 20 years (optimal possibility, as foreseen by the 2080/92 regulation).
- two wood products: sawnwood and veneer logs.

From the cost side two parameters are elaborated:

- the land prices on a tenancy basis: 3 levels, 5,000 BF/ha, 7,500 BF/ha and 10,000 BF/ha;
- pruning regime: for sawnwood and for veneer logs.

Based on the above situations tables are presented below, which give a picture of the maximal annuity, the rotation at which it is reached, the distribution of the costs and benefits, and also the internal interest rate starting from a determined land price.

Table 1. Maximal annuity (in Belgian franc) of a poplar plantation without a premium for income loss (Gorissen and Schepens 1997)

Land price on tenancy basis	Site index	Sawwood		Veneer	
BF/ha		t	Max. ann.	t	Max. ann.
5000	40	24	3234	24	1775
	48	22	8150	23	7106
	56	21	15120	21	14616
7500	40	24	584	24	-875
	48	22	5500	23	4456
	56	21	12470	21	11966
10000	40	24	2066	24	-3525
	48	22	2850	23	1806
	56	21	9820	21	9316

Table 2. Maximal annuity (in Belgian franc) of a poplar plantation with a premium for income loss during 5 years (Gorissen and Schepens 1997)

Land price on tenancy basis	Site-index	Sawwood		Veneer	
BF/ha		t	Max. ann.	t	Max. ann.
5000	40	24	11625	24	10166
	48	19	17221	21	15891
		20	17210		
	56	19	24346	20	23651
		20	24281		
7500	40	24	8975	24	7516
	48	19	14571	21	13241
		20	14560		
	56	19	21696	20	21001
		20	21631		
10000	40	24	6325	24	4866
	48	19	11921	21	10591
		20	11910		
	56	19	19046	17	18409
		20	18981	20	18283

Table 3. Maximal annuity (in Belgian franc) of a poplar plantation with a premium for income loss during 20 years (Gorissen and Schepens 1997)

Land price on tenancy basis	Site-index	Sawwood		Veneer	
		t	Max. ann.	t	Max. ann.
5000	40	22	18249	20	16772
	48	19	25283	19	23709
		20	25053	20	23690
	56	18	32501	19	31578
		20	32124	20	31494
7500	40	22	15599	20	14122
	48	19	22633	19	21059
		20	22403	20	21040
	56	18	29851	19	28928
		20	29474	20	28844
10000	40	22	12949	20	11472
	48	19	19983	19	18409
		20	19753	20	18390
	56	18	27201	20	26278
		20	26824		

Table 4. Structural data (in Belgian franc) for a poplar plantation with a site index 48, a land price on tenancy basis of 7,500 BEF/ha for several premium systems concerning income loss (Gorissen and Schepens 1997)

	Without income loss			Income loss for 5 years			loss for 20 years		
	Value	%	Index	Value	%	Index	Value	%	Index
Optimal rotation	22			19			19		
Maximal annuity	5500		38	14571		100	22633		155
Costs									
· land and admin.	105304	62	108	97578	60	100	97578	60	100
· establishment	41720	25	100	41720	26	100	41720	26	100
· pruning	14844	9	100	14844	9	100	14844	9	100
· others	7635	5	100	7635	5	100	7635	5	100
· total	169503	100	105	161777	100	100	161777	100	100
Benefits									
· grants	70385	30	40	175694	54	100	265654	64	151
· wood products	165347	70	111	148665	46	100	148665	36	100
· others	0	0	/	0	0	/	0	0	/
· total	235732	100	73	324359	100	100	414319	100	128

Table 5. Internal interest rate for a poplar plantation with site index 48, a premium for income loss during 5 years, starting from several land prices

Land price (BF/ha)	Internal interest rate
300000	5,14%
400000	4,31%
450000	3,99%
500000	3,72%
600000	3,28%
700000	2,93%

The following important conclusions appear:

1. In the case of no premium for income loss and with the production of veneer logs, the maximal annuity ranges from -3,525 BF/ha (88 ECU) with the lowest site index and the highest land prices, up to 14,616 BF/ha (365 ECU) under the most favourable conditions.

2. With the Flemish situation, the amount ranges from minimal 4,866 BF/ha (122 ECU) up to 23,651 BF/ha (591 ECU).

3. With a long lasting premium for income loss (Tab.3), the maximal annuities rise from 11,472 BF/ha (287 ECU) in the most unfavourable case up to 31,578 BF/ha (789 ECU) in the best situation.

4. From the cost side four posts are distinguished: land prices-and administration costs, establishment costs, pruning costs and others (Tab. 4). The costs for the invested land capital are clearly prevailing, that is, some 60%. Establishment costs appear on the second place, some 25%. The pruning costs are relatively unimportant, that is, some 9%. The income is exclusively from grants and wood products. The relation between both posts is strongly depending upon the grant level. With a small grant, the wood benefits are by far the most important. The reverse is true with a high grant. In the Flemish situation the grant is slightly dominating.

The internal interest rate amounts in the most favourable situation (land price 300,000 BF/ha - 7,500 ECU) up to a value of 5.14, which is still lower than the proposed external interest rate of 6% (Tab.5). Only with a site index of 56 and a land price of 300,000 BF the interest rate reaches more than 6%, that is, 6.77%. From the pure financial point of view afforestation appears only to be of interest under two circumstances:

- the land price should not be higher than 300,000 to 400,000 BF/ha (7,500 to 10,000 ECU);
- the site should be favourable to very favourable.

Such situations do practically not occur in Flanders.

Based on the above results, Gorissen and Schepens (1997) try to make a balance between forestry and other alternatives, both for the landowner-not-farmer and the farmer-landowner.

The landowner who is not a farmer is firstly faced between the choice afforestation or selling. As afforestation is only of financial interest with low land prices of some 300,000 to 400,000 BF/ha and the average price for 1 ha of agricultural land in Flanders varies around 700,000 BF/ha (17,500 ECU), from the pure financial point of view a landowner ought to sell his land instead of afforestation.

Tenancy of lands, though it is still widely spread, is for financial reasons strongly advised against. The low rent covers in no way the real costs and the tenancy code strongly protects the farmers.

The decision for farmer-landowners whether to afforest or not, is more complicated, as one should take into account the total enterprise management, the partial or full switch towards forestry and an eventual replacement income.

From the Flemish point of view, characterised by small enterprises with capital and labour intensive management, a partial switch appears to be of little sense. Indeed, on the one hand, the partial switch towards forestry results in negative scale effects, leading to still greater structural problems and to less efficiency. On the other hand, the losses, due to the setting aside of agricultural lands, which are estimated on an average of 60,000 to 70,000 BF/ha/year (1,625 ECU), are much greater than the eventual benefits of forest plantations (some 24,000 BF/ha/year). Of course the situation is different when a replacement income is taken into account. The authors conclude that only under such circumstances and with marginal agricultural enterprises, a full switch might lead to an overall income improvement.

So it appears that afforestation of agricultural lands under the current granting conditions both in agriculture as in forestry is not very attractive. The motivations for afforestation should therefore be something else by nature, e.g., love for nature (Hugon 1995).

4. INFORMATION NEEDS AND PLANS FOR FUTURE

Generally speaking, the first question is related, as almost always in forestry, to the methodology of the profitability computation. More specifically with the farm forestry, which can be very heterogeneous in several aspects, some questions arise.

- According to which aspect should land price be determined? In the Netherlands, e.g., the capital costs for land are not taken into account (lei-dlo 1997). It is evident that this leads to totally other enterprise results. In Flanders, the land price of agricultural and forest lands is very high. To what extent should this be reckoned with these artificial high prices?
- What annuity or interest rate gives satisfying results? In the above mentioned study of Gorissen and Schepens (1997) it appears disputable to compare the annuity of poplar plantations (600 ECU/ha/y) with an agricultural value of 1,625 ECU, being the sum of the labour income and the fixed costs pro ha. The net income of one hectare of agricultural land is often much lower than 1,625 ECU. And also the statement that the internal interest rate should reach a minimum of 6% seems to be very disputable. Indeed in industry the profit is often not higher than 2 or 3%.
- To what extent should a replacement income be taken into account? Can a partial afforestation lead to a further intensification of the rest of the enterprise? Must the hours, which are less worked due to the afforestation, not be directly converted into a replacement income?
- To what degree should disturbances and secondary yields be considered? Disturbances can have, also with poplars, serious consequences. Secondary yields can exist of material and non material posts. How can the latter be assessed?
- How long will, on the one hand, the tremendous grant regulation in agriculture remain in force and, on the other hand, to what extend is it justified to increase the grant system in forestry? Moreover, the fiscal measures, which are often very advantageous in forestry, should be considered.
- One should look for afforestation techniques with low costs. Spontaneous afforestations or limited plantations, completed with spontaneous regeneration, might strongly decrease the cost price and this way increase the profitability.

The conclusion is evident: profitability computations in agriculture have only a relative value. It appears, however, that in Flanders afforestations of agricultural lands will not immediately take place to a great extent. The main reason, according to some landowners, is that afforestation leads to a devaluation of the land price.

Although profitability computations are disputable, they provide useful information. Further research, however, is still needed for a.o. the following issues:

- factors influencing the benefits and the costs;
- the impact of the size of the forest, e.g. with respect to forest grouping;
- the impact of different forest types and site qualities.

Due to the overproduction of agricultural products, on the one hand, and the great shortness on forests, on the other hand, it is desirable and useful that agricultural lands should be afforestated in Flanders. An exact knowledge in the profitability of both systems can contribute to it.

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DENMARK

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ABSTRACT

Many private properties in Denmark consist of farmland and forest, but it is not obvious how a 'farm forest enterprise' should be defined in the Danish context. Forest owners who are members of the Danish Forestry Society report annual account data on a voluntary basis, and this material is analysed and published by the Society. These surveys are widely used, but it has been demonstrated that the material is deficient from a statistical point of view. The surveys cannot be used for analyses of costs in farm forest enterprises. Such analyses must be based on surveys specifically designed for the purpose, but they are neither easily made, nor can they live up to sound statistical standards.

Keywords: *annual accountancy surveys, statistical problems*

1. BACKGROUND

According to the general forest inventory 1990 (Skov- og Naturstyrelsen and Danmarks Statistik 1993), about 45 per cent of Denmark's forest area is private property. This forest area of 202,102 ha belongs to 19,375 owners. Its distribution to size classes is:

0.5 - 50 ha:	18,892 estates, 96,087 ha
50.0 - 500 ha:	431 estates, 57,400 ha
> 500 ha:	52 estates, 48,615 ha

The majority of the private forest estates is owned and managed in combination with agriculture (Landbrugsministeriet 1994), but no information is available on how many of them could reasonably be considered farm forest enterprises. On most combined estates the forest area falls within the smallest size class above, and the total estate area

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is dealt with under both the Forestry Act and the Agricultural Act. One of the main reasons for this legislative construction is that combined estates should not be separated into forestry and agricultural parts with different owners, because the combination of the two land uses is supposed to have economic advantages. There is no doubt that this was generally the case until the 1960s, but since then this aspect has become less important – as reflected in better opportunities for splitting up combined estates. However, on an unknown number of estates the combination of forestry and agriculture is still important (eg, Landbrugsministeriet 1986). Altogether, farm forest enterprises do exist in Denmark, but no information on the economy of such enterprises is immediately available.

Every year since 1947, the Danish Forestry Society (Dansk Skovforening) has collected, analysed and published a survey of account data reported voluntarily by private forest estates. This long time series of data is presumably rather unique in the international context. The surveys have been the basis for trend studies on private forestry's economic conditions in Denmark (Hermansen 1968; Helles and Larsen 1982) and for the Danish contribution to an analysis of the cost-revenue structure of forestry in different countries in western Europe (Hermansen 1967). Moreover, the surveys were used in an overall analysis of the Danish forestry sector (Helles et al. 1984).

The data refer to forest estates above average size and presumably to the best managed among them. The survey is published annually in two versions, one stating average data for groups of estates according to growth conditions, each group being divided into size classes (cf. sect. 2.1), and another version presenting the individual estate data, but each estate being identified by a number which is known only to the owner and forest manager. The first version is available to everybody and is widely used, e.g. in the Society's policy-making. The studies mentioned above were based on this version. The second version is available only to the contributing estates. During the 1960s, this second version formed the basis for seminars where participants disclosed their identity and thus the data formed the basis for informative discussions.

2. METHODOLOGY OF THE DANISH FORESTRY SOCIETY'S ACCOUNTANCY ANALYSES

In 1990 the data for the surveys 1986-1989 were subjected to a close scrutiny (Meilby 1990). The aim was to expose the characteristics of the data and to investigate how these characteristics influenced the potential of drawing conclusions concerning the general economic situation of private forest estates.

2.1 Sampling

The annual survey is based on data reported voluntarily by some of the Society's members (forest estates). The estates are grouped into: (i) estates in the old forest regions east of the Great Belt, (ii) estates in the old forest regions west of the Belt, and (iii) plantations in the former heathland regions in Jutland. It looks as if this grouping

is based on geographical criteria. In fact, the grouping is based on site classes for Norway spruce and beech, and on the tree species composition reported by the estates. Most estates on former heathland (hereafter referred to as heathland plantations) are almost exclusively composed of coniferous species, but this may also be the case for some estates in the old forest regions in Jutland, implying that erroneous grouping may occur.

Most members of the Danish Forestry Society own a productive forest area > 50 ha. Such estates constitute only 2.5 per cent of the estates in private ownership, but on the other hand they cover 52 per cent of the privately owned forest area (cf. sect. 1).

For the estates in the old forest regions three size classes are applied: (i) 50-500 ha, (ii) 500-1000 ha, and (iii) > 1000 ha. Since 1990, class (i) has been split into two groups: 50-250 ha, and 250-500 ha.

For heathland plantations four size classes are applied: (i) < 50 ha, (ii) 50-100 ha, (iii) 100-500 ha, and (iv) > 500 ha. Many heathland plantations are managed by the Danish Land Development Service (Hedeselskabet). Accordingly, data from a major part of such estates are reported in a common form. All contributing estates not managed by the Service fill in the questionnaire as they find appropriate, i.e. at different levels of detail.

2.2 Survey material

In the period 1986-1989, the total survey material included 220 estates and a productive area of 93,243 ha. Heathland plantations accounted for 112 estates and 25,377 ha, implying that, on average, heathland plantations were smaller than estates in the old forest regions.

For the period in question the participating estates accounted, an average, for approximately 25 per cent of the total forest area in private ownership. If estates < 50 ha were left out, the average was 37 per cent. So, area-wise, the survey appears to be rather well-founded. Unfortunately, however, the representation varied significantly between counties. Two of the 14 counties in Denmark were not represented at all, whereas the representation in three counties averaged 40-70 per cent.

Moreover, the sample exhibited a deviating tree species composition. For most counties the sample share of broadleaves was lower (0-10 per cent) than for all private forests > 50 ha in Denmark. For one county the deviation was as much as 25 per cent. The sample for this particular county mainly included coniferous plantations, even though the county has a considerable share of forests in old forest regions characterised by a heterogeneous species composition and a high percentage of broadleaves.

An ideal sampling strategy, aiming at reliable estimates of average costs and revenues for a given stratum of forests, must assign the same chance of being included in the sample to all units of forest area (hectares) within the stratum. Accordingly, the probability of a specific estate to be included in the sample should be proportional to its size. Moreover, the sample share of the area within a specific size class should increase with the area size. Size-proportional allocation of sampling units may be a sensible way of choosing the elements of the sample, provided that cost variables are not considered to be related to forest area.

Due to the fact that many heathland plantations < 100 ha are managed by the same organisation (cf. above), the share of such small estates participating in the survey is higher for Jutland than for the islands. The sample emphasises estates > 100 ha and Table 1 shows that, as such, the sample may not be far from an optimal composition. However, this sample structure implies that it is almost impossible to calculate proper average figures for estates < 100 ha.

Table 1. Shares of the total privately owned forest area represented in the survey material for various estate size classes on the islands and in Jutland; average values for the period 1986-1989.

Estate size class	The islands	Jutland
0 - 50 ha	0 %	1 %
50 - 100 ha	1 %	11 %
100 - 250 ha	18 %	22 %
250 - 500 ha	44 %	40 %
500 - 1000 ha	44 %	40 %
> 1000 ha	45 %	51 %
Average for all classes	33 %	20 %

As participation is voluntary, the composition of the survey sample changes from year to year. Some estates are very faithful and report their account data every year, whereas others participate more irregulary. The consequence of this is shown in Table 2. In the old forest regions 80-90 per cent of the participants of a specific year are also found among the participants of the year before or the year after, and < 70 per cent of the estates participate in three consecutive years. With regard to the heathland plantations, the existence of a common management organisation implies much better continuity. As much as 90-98 per cent of the participants of a specific year also participate in the year before or the year after.

Table 2. Participant behaviour. Subsequent participation by 1986-participants and preceding participation by 1989-participants (participation including all intervening years).

	Subsequent participation by 1986 -participants [% of 1986-participants]		Preceding participation by 1989 -participants [% of 1989-participants]	
	Establ. forest reg.	Former moor reg.	Establ. forest reg.	Former moor reg.
1986	100 %	100 %	62 %	78 %
1987	89 %	98 %	66 %	86 %
1988	68 %	94 %	77 %	90 %
1989	59 %	81 %	100 %	100 %

2.3 Consequences

In general, no significant differences are observed between the average costs for various estate size classes. However, the variance of costs (and revenues) is found to decrease with an increasing estate area as illustrated for management costs in Figure 1. This is in agreement with the discontinuous character of forestry activity. For instance, thinning operations in a given forest stand occur with an interval of some years. Accordingly, when the number of forest stands and their total productive area increases, average costs (and revenues) will level out.

Unfortunately, the immediate impression of average cost similarity between the estates of varying size may not be reliable. For heathland plantations and for estates in the old forest regions on the eastern islands, a significant correlation was observed between the productive forest area and the reported average site class, and in these regions site class correlated also with costs. Accordingly, falseness as regards size class composition of the survey sample may indeed influence the survey figures.

It has been demonstrated that for the old forest regions there is a rather close correlation between management costs per hectare and the share of greenery stands, i.e. intensively managed estates exhibit a deviating tree species composition. Accordingly, the observed erroneous tree species composition of the sample (cf. sect. 2.2) may also influence the survey figures.

The non-randomness of the survey sample, i.e. the participation being voluntary, presumably influences the calculated figures. Moreover, if participation is stimulated by the opportunity to compare estate key figures with those of other estates (cf. sect. 1), a

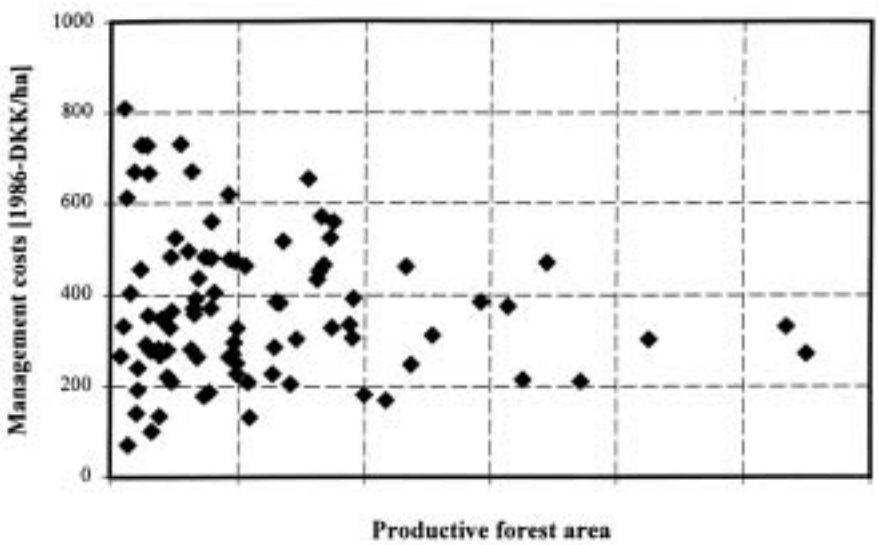

Figure 1. Observed relationship between productive forest area and management costs for heathland plantations, 1986. To ensure the anonymity of participants the area axis has no scale values.

forest owner / manager is presumably reluctant to participate in years where the estate account figures are considered atypical. Such behaviour makes the variance of the sample data lower than that of the population as a whole and, in addition, the survey figures may be biased.

2.4 Conclusion

From a statistical point of view the properties of the survey sample are rather poor. First, it is non-random. Second, it is unstable over time, implying that it is not even possible to point out a well-balanced sub-sample which could be used for comparisons over time.

Generally, the sampling method is problematic. The properties of the calculated survey figures are unknown. In some respects they are presumably biased, but it is not known how and to what extent. On the other hand, no obvious solutions to the problems can be pointed out. Random selection and mandatory participation is not a realistic option for the Danish Forestry Society. But the survey might be improved by presenting the figures more properly, e.g. supplementing the sample averages with approximate confidence intervals – in spite of the fact that the assumption of randomly selected sample units is indeed violated. Another option is to use regression techniques to adjust for deviations as regards tree species composition and site class.

3. INFORMATION NEEDS AND PLANS FOR THE FUTURE

There is an obvious need for operationalising the concept of farm forest enterprise in the Danish context. As the aim is to study cost accountancy, the concept should relate to those combined estates where the forest component forms an integral part of the owner's economy. It seems appropriate to require that the forest be managed on a regular basis, i.e. forest work is not undertaken only at long intervals. Further, emphasis on socio-economic aspects implies that big estates be excluded, i.e. estates where the forest component has only marginal economic importance to the owner. These criteria do not make farm forest enterprise a straightforward concept, but they are sufficient to make it operational.

A reasonable interval for the forest size might be 20-250 ha. This implies a potential maximum population of 1263 estates and 63,684 ha as per the 1990 inventory. However, the project framework does not permit a total screening of this population for the identification of the farm forest enterprises. It might be possible to make a random search on a county-basis relative to the number of estates, but this gives rise to problems, e.g. total number of search population, representation, and access to accounts.

It should be possible to investigate the heathland plantations managed by the Land Development Service (cf. sect. 2.2). In the old forest regions (and to some extent in the heathland regions) a number of Small Woodland Owners' Associations manage forests in the size interval 20-250 ha. It should be possible to include such forests too.

Even if it were possible to include all relevant estates managed by the two organisations, a representation problem would exist because many estates meeting the criteria are not covered. Bias cannot be avoided and its character and magnitude will be unknown. Within the frame of the present project, the only feasible method is to make the foresters of the two organisations suggest estates that meet the criteria. Given the frame of the present project, the number of estates analysed will be small.

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FINLAND (A)

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ABSTRACT

The purpose of this paper is twofold. First, we give a description of a pilot project where profitability data of private forestry in Finland is collected. The project's aims are to collect existing NIPF profitability data, to build up routines for annual data collection and to publish a short report about NIPF profitability. At the starting phase it is important to try to develop the data collection so that it serves as well as possible as material for NIPF profitability follow up. Second, we present a timber management strategy calculation study and suggest that information from it should be linked with accountancy data and follow up systems. The usability and benefits of this suggestion are discussed.

1. INTRODUCTION

The structural changes in society and the membership in the European Union give rise to several changes in Finland, particularly in agriculture. It is expected that forestry incomes will become more important, especially in rural areas where the income from agriculture is decreasing. The growing importance of forest income and turning to more self-financed forestry both underline the need of management calculations for Non-Industrial Private Forest (NIPF) enterprises. These changes also emphasize the need to collect information from regional level to support political decision making. On the other hand, the EU's requirements of recording and planning of farm's activities in order to receive different financial grants create favourable conditions to collect accountancy data. Also new forest taxation systems, realised-income taxation and value added taxation both produce data of costs and revenues from forestry.

The aims of this working paper are 1) to present a study in progress at the Finnish Forest Research Institute (FFRI), in which the collection of existing profitability data of private forestry is developed and 2) to suggest linking timber management strategy

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calculations to the NIPF accountancy monitoring system in order to get information on cutting possibilities, their change and their intended use.

A brief introduction to forestry profitability studies in Finland have recently been presented in Hyttinen et al. (1997).

2. THE PROFITABILITY DATA OF PRIVATE FORESTRY

2.1 Description of the project

In 1992 a cooperative research project was started with an aim, among others, to find out the options to arrange a NIPF accountancy data network in Finland (Hyttinen et al. 1994). During the project it became obvious that it is impossible in practice to set up a data network which fulfills statistical representativity requirements. Another problem was that the maintenance of the network would bind too much scarce resources. On the other hand, changes in forestry and value-added taxation during the project caused changes in statistic data collection which improved the possibilities to follow up the profitability of private forestry by using existing data.

At the moment there are two data sources to evaluate the profitability of farm forestry in Finland. The official profitability survey of agriculture has produced total costs and income information since 1920 and the agricultural enterprise and income statistics after forest taxation reform since 1993. Also jointly owned forests – which are a special case of private forestry – produce bookkeeping information about the profitability of forestry but at the moment no organization uses this potential data source. Besides farm based information there are fairly adequate regional income and cost statistics about NIPF available.

In 1996 a two years pilot project at the FFRI was started aiming to 1) collect already existing NIPF profitability data of different organizations, 2) build up routines for future annual data collection and analyses and 3) publish a short report about NIPF profitability.

2.2 Description of the collected data

The agricultural enterprise and income statistics (AEIS). The agricultural enterprise and income statistics (AEIS) of Statistics Finland is the most important annual data source. The statistics are based on a sample of about 15 000 active farms and the final data includes more than 10 000 observations. One third of the observations changes every year, so a farm is in the statistics for three years. The material includes almost all agriculture and forest tax return information and information from the register of agricultural holdings and an extra inquiry. The latest report of AEIS is Maatilatalouden yritys- ja tulotilasto 1995 (The agricultural enterprise and income statistics 1995, with a summary in English).

The most interesting part of the AEIS from the point of view of forestry, are the farms which have chosen the new realised income taxation system. The data of years 1994 and

1995 contain about 5000 observations of this kind. Among others this data contain information about

- forest area
- owners age
- ownership category
- stumpage sales income
- delivery sales income
- the timber usage for owners' own purposes
- other income
- salary costs
- travelling costs
- other costs
- depreciation and investments (machines, roads and ditches, buildings)

Regrettably it is not possible to separate harvesting costs from salary and other cost. Thus, it is not possible to calculate pure timber sales income from delivery sales. This has to be taken into account when drawing a comparison with other statistics. On the other hand, the timber sales income of the forest owners who have chosen the new realised income taxation are likely to be lower than average incomes during the transitional period of 1993-2005. Other obvious deficiencies in the AEIS data are that no information about stocks nor timber sales volumes are available and that the statistical generalization from a forestry point of view is hard to get.

Aggregate regional data. FFRI and the Development Centre of Forestry Tapio collect regional income and cost information of NIP-forestry. Also stock and timber sales volumes are available. Most of the information is published annually in the Statistical Yearbook of Forestry. The statistics include information on

- forest area
- gross income from timber sales
- silvicultural costs
- forest improvement costs
- state grants and loans
- harvesting volumes of stumpage and delivery sales by timber assortments
- stocks by tree species

It is also possible to use information on average administrative costs from the old yield-based forest tax system.

Other data. In 1996 a research project at FFRI was started which searching voluntary long period NIPF bookkeepings, for testing the profitability and ratio analysis. At the moment there are about 20 bookkeepings for the periods from 10 to 35 years. Data includes also stock information.

The project’s aim is to integrate some forestry information of the official profitability survey of agriculture into the next profitability report (year 1996) in cooperation with

the Agricultural Economic Research Institute. At present, the objects of the official profitability survey of agriculture are the EU's Farm Accounting Data Network (FADN) bookkeeping farms. The data includes besides FADN information fairly detailed forest income and cost bookkeeping since 1995. Before that only total incomes and costs of forestry were registered. In the future, the purpose is to add the jointly owned forest bookkeepings to the profitability data of private forestry.

2.3 Usability and planned use of the data

The main contribution of the project is to organize annual data collection of the existing data; new data will be collected in separate case studies if necessary. The report will include income and cost information (FIM/ha, FIM/farm). It shows the differences in profitability between woodlot size classes, regions and years and serves as a background material for decision makers and researchers. Actual profitability research will be done in other research projects. The annually growing database will create better possibilities for research in the future. It is, for example, possible to make regional background studies as a reference material to other research projects concerning NIPF.

Now, in the beginning of data collection the important task is to find out the deficiencies in the material and try to influence the original data collection so that the data will better serve as material to NIPF profitability follow up, too.

3. TIMBER MANAGEMENT STRATEGIES AND POTENTIAL ALLOWABLE CUT

For strategic decision making in forest management, NIPF landowners lack information about the decision alternatives and their consequences (Kangas et al. 1992). A strategic component in NIPF management planning would help landowners to specify their tactical and operational management goals concerning the use of their forests.Therefore, the forest owners should be given a more active role in planning by letting them choose between the various management strategies.

In Pesonen (1995,1996) alternative timber management strategies were produced for the strategic decision making of NIPF landowners. These strategies described the recurrence and intensity of cuttings. The studies of Pesonen proceed according to the following steps:

Step 1: **Sampling.** Systematic stratified sampling of forest owners who had a forest management plan made during the years 1989-1992

Step 2: **First mail inquiry.** Preliminary questions concerning forest owners, their goals and cutting levels. Permission to use forest management plan data to produce strategies.

Step 3: **Calculations**. Forest owners were provided with five alternative timber management strategies covering 20 years divided into four five years planning periods. The main differences between the strategies can be described in terms of intensity and the recurrence of removals. The strategies were computed using the MELA system, an LP based system developed in

Finland for long-term timber management planning. The applied timber management strategies were as follows:

NO CUTTINGS Removals set to zero.

SAVING Removals set to half of removals under condition "SUSTAINABILITY".

SUSTAINABILITY Maximum sustainable even timber flow. Even flow of removals over planning period, even flow of stumpage earnings over planning period, even amount of clearcut areas over planning period, volume of sawtimber equal to, or greater, than at beginning of period and market value of growing stock at end of planning period at least same as at beginning.

FINANCE Intensive cuttings during first two planning period. Even flow of removals during first two planning periods, market value of the growing stock at end of planning period at least same as at beginning.

MAX CUTTINGS Instantly utilising all cutting possibilities, even flow of removals during last three planning periods.

Step 4: **Second mail inquiry.** Choice of preferred strategy alternative based on AHP (Analytic Hierarchy Process) comparisons and calculations. First, the comparisons of the importance of the economic and non-economic benefits of the use of forest holdings were made. Second, pairwise comparisons were made between the management strategies considering the economic and non-economic benefits separately.

Step 5: **Results**. Distribution of strategic choices and factors affecting them. Calculation of potential allowable cut. The goal was also to develop a new regional and national cutting-budget method which is based on the use of preferred timber management strategies. By generalising the strategies over a particular forest area and by taking into account the owners of "non-planned" woodlots and other forest owners the potential allowable cut represented by NIPF woodlots can be derived from timber management strategies.

Step 6: **Monitoring** of implementation of strategic choices made by forest owners and **updating** of strategies. This step is now in progress at FFRI.

This newly developed cutting budget can be taken into consideration in regional policy making or planning future investments for forest industries, for example. It describes landowners' cutting intentions in the long run. Regional and national cutting budgets of NIPF landowners' woodlots have usually been calculated without taking notice of the decision makers' various strategic goals in relation to their woodlot.

4. INTEGRATING TIMBER MANAGEMENT STRATEGIES INTO FARM FORESTRY ACCOUNTANCY SYSTEM

4.1 Need for new information

Management accounting relates to the provision of appropriate information for the people within the organization in order to help them make better decisions (Drury 1992). In forestry enterprises, in addition to silvicultural costs and cutting incomes the

value of the growing stock and unrealized cutting possibilities are of crucial importance. It is also important to know about the efficiency of the use of capital in forestry. Methods to include the value of growing stock and cutting possibilities into final accounts have been studied (e.g. Hakkarainen et al. 1995). Principally, these methods can be divided into a) methods that use only the values of growing stock and b) methods that use information on growing stock and also on allowable cut. They both have some shortcomings. The former does not include the change in cutting possibilities and in the latter, the felling plan is subjectively determined leading to a possible distortion in the calculations of economic result.

In addition to the cost accounting information, NIPF owners need to know the cutting possibilities and economic results of different cutting intensities in their own forests to help both short and long run planning. In forestry, the owner faces investment and disinvestment decisions. In the short run, the question of liquity, i.e. the immediate cutting possibilities or the value of the whole forest holding are important. In the long run, even and sustainable cutting level and constant income level are interesting. The long maturation time of forest investments emphasizes the forest owner's need to know the effects of different silvicultural intensities and operations. Management alternatives can provide answers and recommendations to both forest owners and forest policy.

Characteristic of the present day NIPF landowners' is the variability of goals. In practise, the intensity of cuttings and their occurrence varies. Cutting intensity and occurrence can be based on producing regular incomes to the forest owner or it can be a irregular source of income when making bigger purchases or investments. It is possible to produce felling plans derived from NIPF owners' own goals. Growing stock, intended use of cutting possibilities and their under or overutilisation should also have a connection to the management accounting framework.

4.2 Possibilities for utilisation of timber management strategies

Strategic alternatives give support to the goal formulation and decision analysis from the forest management point of view. In addition, they could have clear implications in economic calculations and in management accounting systems of farm forest enterprises. Instead of one value of growing stock or allowable cut, described in a forest management plan, decision makers would have a wide range of alternatives and numerical values connected to them.

Various policy issues imply a rising demand for information on the socio-economic situation of farm forestry in different parts of Europe. At least following groups of information should be covered: cost accounting (costs and revenues), changes in property values (growing stock and cutting possibilities), plans and intentions of utilisation of forests (timber management strategies) and information concerning forest owner, his goals and operational environment. In addition to historical information the management system for future scenarios needs information from all these groups. Presented method gives possibilities to collect information about production possibilities of forests and their intended utilisation. It could be connected to cost accountancy data and its collection. This information would contribute to a farm level

analysis as well as regional calculations. This kind of extensive and linked information provides preconditions to produce competent scenarios for farm forestry (Fig 1).

One possibility to utilise collected data further could be to develop ratios that utilise outcomes of strategy alternatives. In forestry, the definition of a ratio is somewhat broader than generally. Ratios contain information such as the change in the value of standing timber, which does not belong to accounting information in the very essence of the word. A ratio developed on the basis of “max cuttings” strategy would describe liquity. Or ratio based on “sustainability” could describe the financial solidity.

Significant amounts of capital are tied up in forests and growing stock in areas around Europe. In future, the efficiency of the use of this capital will be crucial considering the development of these areas and specially of farm forests of these areas. From this point of view, the use of EVA™ (Economic Value Added) (Stewart III 1994) could be a tool to support the more effective use of forestry capital, requiring that special characteristics of forestry can be taken into account. EVA™ is a gauge or an integrated management system measuring financial performance, indicating a company’s net operational profit after taxes and after deducting the cost of capital (borrowed and equity). In principle, it makes all capital commensurate and thus, from this point of view, allows possibilities to investigate whether enterprise's operation is producing economic value added and wealth to shareholders. It offers means to analyse the assets already tied up in the business, additional investments to increase the capital and also if capital should be disinvested and many others. In forestry, analysis would concern capital of forestry, e.g. growing stock and reasonable silvicultural investments to increase its production efficiency compared to other investment possibilities. The use of EVA™ is under consideration in a research project dealing with strategic planning of rural enterprises (Kajanus et al. 1997).

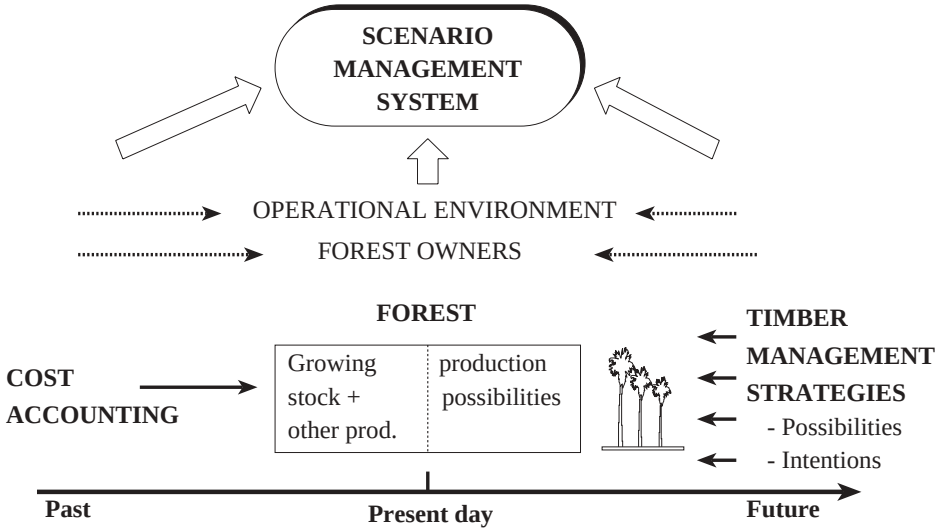

Figure 1. Main information sources for the farm forestry scenario management system.

4. CONCLUSIONS AND SUGGESTION FOR THE FUTURE PLAN

By presenting the calculation system of strategic alternatives we do not want to say that we offer a complete system to be included into management accounting systems. Rather, we want to suggest that possibilities to include them into the farm forestry monitoring system and advantages arising from this should be studied. The suggested monitoring system includes a sample of forest owners and follow up of their cutting behaviour. Updated timber management strategies would be presented regularly to the forest owner and their strategic choices would be monitored. Also realized cuttings in relation to choices would be clarified.

Also the results and benefits identified in MOSEFA project give support to the inclusion of strategy alternatives in the management account framework. Firstly, they give information regarding farm viability, both in the short and long run. Secondly, their support to forest management practices is evident. On the forest owners' level they give information concerning production possibilities of forest holding. At the regional level a new kind of cutting budget can be calculated. The potential allowable cut illustrates long run cutting intentions of forest owners. Finally, results of presenting strategic alternatives to forest owners' indicate that their forestry activity will increase. This would have positive effects on rural development.

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ABSTRACT

The recent economic and political developments suggest a more comprehensive analysis on the profitability of farm forestry is needed. The measurements of financial statement analysis are also practicable when evaluating the forestry and the farm forestry business. The measurements facilitate comparisons between forestry and other businesses. However, up until now the farm forestry accounting has not been studied sufficiently in Finland.

Realizing the common needs, the methodological challenges and the practical obstacles related to the design and support of economical monitoring systems in farm forestry in Finland are being developed. This kind of monitoring system is in line with the attempts to extend the EU agricultural statistics to forestry as the issue of monitoring forestry costs and revenues is of importance in connection with EU policies regarding afforestation, farm viability, multifunctional forest management and rural development.

Keywords: *accounting, cost management, farm forestry, financial statement*

1. CONTEXT OF FARM FORESTRY IN FINLAND

Three quarters of Finland's land area – 23 million hectares – is considered to be forest. With a population of five million, this makes more than four and half hectares of forest per capita. The productive forest area in Finland is about 20 million hectares, 67 % of which are privately owned. At present, the growing stock on private productive forest land is estimated to be 1.2 billion m^3 (Statistical... 1995). NIPF owners supply about three quarters of the roundwood needs of forest industry in Finland (Statistical... 1995).

Private forest ownership is quite fragmented and small-scale. The total number of farm forest holdings is estimated to be about 140 000 (Statistical... 1995). The average forest holding size of private woodlots of over one hectare is 26 hectare. The farm forest

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owners' holdings were generally larger (37 ha) than other owners and full time farmers' woodlots even larger (44 ha) (Ripatti 1994). Typically, the woodlot ownership transfers through inheritance, and therefore, the number of undivided estates of the deceased is relatively high. In 1994 the total gross stumpage earnings of NIPF owners in Finland were 6 462 million FIM (1 ECU ~ 5.8 FIM).

In 1950s, almost the whole nonindustrial private forestry was linked with farming, but this traditional combination has weakened. This is due to social changes, such as urbanization and depopulation of rural areas. In 1990, 32 % of all woodlots were owned by active farmers, while pensioners owned 36 %, wage and salary earners 27 % and entrepreneurs 5 % (Ripatti 1994). However, active farmers still own 41 % of NIPF area. And despite the decrease of farm forests, in 1990, 59 % of the forest owners still resided in rural areas, while 22 % were living in rural municipal centers and 19 % in urban areas. (Ihalainen 1992). Forest incomes have a clear tendency of equalizing areal differences in income and prosperity and therefore may offer possibilities for sustaining rural vitality.

2. EXISTING STUDIES OF FINANCIAL ACCOUNTING IN FARM FORESTRY IN FINLAND

Until recently, farm forest owners have not needed to report the financial result of their enterprises. One of the most important reason for not setting up a comprehensive accounting system of private forestry or farm forestry has been the forest taxation system. NIPF owners have been taxed annually on the basis of the average net yield of forests in the region. However, the comprehensive reform of forest taxation system has recently been introduced, and since 1993, taxation has been based on actual net revenue (Hyttinen at al. 1994).

A large amount of literature covers financial accounting of forestry generally. A report of the Committee for Corporate Analysis (1995) contains the most commonly used directions for accounting and corporate analysis for Finnish business enterprises. In Finland, researchers such as Saari (1929), Keltikangas (1939), Piha (1941), Einola (1957), Ahonen (1957), Hämäläinen (1973), Hyttinen (1995), Hyttinen et al. (1994), Hakkarainen (1996), Simula (1994), Penttinen (1993) and Penttinen & Kinnunen (1993) have conducted research on the business economics of farm forestry and have presented various applications for the financial statement of forestry.

As comprehensive bookkeeping information on individual woodlots has not been available, most profitability analyses have been carried out using aggregate regional data. Since the 1980's in Finland, profitability analyses have been carried out with aggregate regional figures by the Finnish Farmers' and Forest Owners' Association (Simula & Keltikangas 1990, Kallio-Mannila 1992). Moreover, the 139 jointly owned forests (JOF) in Finland are accountable and they have offered a data base for the income and cost structure calculations of private owned forests. The combinated forest area of JOFs is roughly 500 000 hectares, which account for 3.4 % of all NIP forests. The net profit of JOF were from 158 FIM in northern Finland to 707 FIM in southern Finland during the period 1982 - 1991 (Kinnunen 1995).

Some private forestry related information is received through the Farm Accountancy Data Network (FADN) which is the official profitability survey of agriculture in Finland. The system was started in 1912. The agriculture profitability research is arranged and advised by the Agricultural Economics Research Institute and the Agricultural Advisory Organization. This survey also describes profitability and and cash-flow resulting from forestry on full-time farms. But up until now, only limited and subjective information of forestry has been available on those agricultural bookkeeping farms.

In 1992 a research project called 'Profitability of NIPF' was started aiming at developing an accountancy model for an individual woodlot and submitting a proposal for the arrangement of a NIPF, not only a farm forestry, accountancy data network in Finland (Hyttinen et al. 1997). In the future, the accounting data of farm forestry will be collected from alternative sources such as different case studies, taxation files, FADN data, etc.

In 1995, a research project 'Forestry in the Economic Survey of a Diversified Farm Enterprise' and in 1997, a cooperative research project called 'the Economic Importance of Forestry on Farm Enterprise Level' were started aiming at developing an accountancy model for an individual farm enterprise and for the Farm Accountancy Data Network survey. The aim of the subproject is to study an economic importance of farm forestry in the farms of the official profitability survey of agriculture in Finland. The first results of this project we will get at the end of this year.

3. ACCOUNTING MODEL FOR FARM FORESTRY

Accounting is based on postulates, theoretical concepts and principles (Belkaoui 1985). In the proposed system, accounting is based on general principles and rules applied in business economics to guarantee a solid theoretical basis. Ideally, the forestry entity should be separate and distinct from the owner's other entities, e.g. agriculture. The approach, which constructs implicit accounting models for common use has two subapproaches: (i) The deductive one focuses on differences in wealth between two points of time and (ii) the inductive one emphasizes realized values during the accounting period and the profit and loss account (Hakkarainen et. al. 1995).

An income statement is used to calculate how much profit the business economic activities have made. The income statement indicates how the result of an accounting period has been formed. It is a deduction calculation in which expenses are deducted from income. When the enterprise is analyzed by using methods based on the recommendations of the Committee for Corporate Analysis, the financial statement should be based on the Finnish revenue and expense theory (Committee for Corporate Analysis 1995). An income statement developed for use in private forestry conform with the corporate analysis is presented in Appendix 1.

The balance sheet shows the financial status of the business at the end of an accounting period. A proposed balance sheet format for forestry according to the amended Finnish Accounting Act (1992) and the recommendations of the Committee for Corporate Analysis (1995) is given in Appendix 2.

The difference between the product and capital is problematic in forestry: growing stock is both the product and the capital. The definition of the value of the growing should always be based on an inventory. Paralleling the growing stock with the current assets of forestry, the annual change – i.e. the timber balance – can be entered in the variable expenses column. However, it is reasonable to regard the timber balance as non-realized income or expenses after the results of the accounting period (see Appendix 1).

4. FORESTRY ACCOUNTING IN THE CONTEXT OF FARM ACCOUNTANCY DATA NETWORK IN FINLAND

The official profitability study of agriculture (FADN) in Finland has for decades provided an important information system serving not only policy makers but also farmers themselves. On the farm level the information needed is recorded mostly manually in books prepared for this purpose. They include the list of property, a cash book and a book of working hours. Also some other data, i.e. use of arable land, yields and unpaid transactions are recorded. Some of the farmers are using computers for recording the information. The farmers participating in the network receive annually quite detailed results of their farms and also the average results for comparing (Tiainen 1995). The obvious deficiency in Finnish current system is that there are no special systems for calculating the annual change of growing stock.

The number of farms entering the survey varies from 850 to 1100 annually. The average farm in the Finnish farm accounts network has 33 ha of agriculture land and additionally 67 ha of forest. They represent less than 1 % of all the farms with more than two hectares of land.

During the last 30 years, the net income realized from forestry operations of bookkeeping farms has shown a slightly downward trend. On an average, the farmers' net income was abut 510 FIM/ha annually in constant 1990 terms before taxes during the period 1966-1992. At the same time, the average rate of return of timber growing was 4 to 4.5 %/year before taxes, without taking changes in growing stock into account (Simula 1994). When the changes in growing stock were included in the calculations, the average yield of timber growing increased to about 600 FIM/ha/year and the rate of return was 5 to 5.5 %, respectively.

Figure 1. shows the cashbased net revenue of forestry in the official profitability survey farms of agriculture in Southern and Central Finland between 1920-1994. In 1995, the average net revenue of forestry of FADN farm was 60 513 FIM/farm.

5. CONCLUSIVE REMARKS

The importance of forest incomes is clearly significant to people living in rural areas in Finland. However, the business economics profitability of private and farm forestry has not been taken much into account when the significance of forestry has been

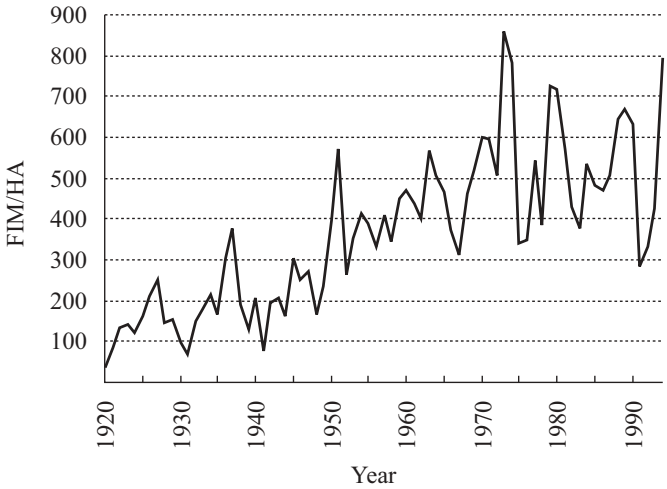

Figure 1. The net revenue of farm forestry in Southern and Central Finland (in 1993 money).

emphasized for the national economy in Finland. Income from farm forests can play an important role in maintaining a good social structure, and forestry can contribute to the overall economy of rural areas. Areas of concern include not only traditional questions such as the continuing viability of individual farms, to which the production of timber and other products can contribute, but also more recent questions such as the contribution that the landscape value of attractive woodlands can make to the rural economy through tourism.

To summarize, the recent economic and political developments suggest a more comprehensive analysis on the profitability of farm forestry. And already, there are many changes to be made to the Finnish current bookkeeping system of farm forestry. Adapting the FADN legislation will make some direct changes to the network but probably the bigger need for change is coming from changes in agricultural policy and the whole agricultural environment in Finland.

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APPENDIX 1

ADJUSTED INCOME STATEMENT

7000 stumpage sales
7001 sales at delivered price
7002 other timber sales
7003 timber for own use
7004 adjustments to timber sales
7005 NET TIMBER SALES
7006 other gross sales
7007 adjustments to other gross sales
7008 NET SALES

VARIABLE COST

7009 costs of harvesting
7010 increase or decrease in timber reserves
7011 PROFIT I
7012 cost of timber selling (selling expenses)
7013 costs of silviculture
7014 change of afforestation reserve
7015 costs of maintenance (of forestroads)
7016 change of other current assets
7017 other variable costs
7018 variable costs together
7019 GROSS PROFIT

FIXED COSTS AND EXPENSES

7020 office expenses
7021 expert expenses
7022 insurance expenses
7023 other fixed costs
7024 fixed costs and expenses together
7025 PROFIT FROM OPERATIONS BEFORE DEPRECIATION
7026 interest expence
7027 interest income
7028 dividends received and share incomes
7029 subsidies
7030 indemnities
7031 direct taxes
7032 silvicultural fee
7033 ordinary other expenses
7034 ordinary other revenues
7035 PROFIT/LOSS BEFORE DEPRECIATIONS

DEPRECIATION AND AMORTIZATION

7036 depreciantion allowances
7037 over- or underdepreciation
7038 NET PROFIT
7039 extraordinary expenses
7040 extraordinary revenues
7041 PROFIT (LOSS) FOR THE PERIOD
7042 change in value of growing stock (timber balance) and forestland
7043 ADJUSTED PROFIT FOR THE PERIOD

APPENDIX 2: ADJUSTED BALANCE SHEET

1 ASSETS

10 - 11 FINANCIAL ASSETS

10 Cash on hand and in banks
- 1000 cash on hand
- 1010 bank giro account 1
- 1020 bank giro account 2

11 Other financial assets
- 1100 stumpage sale receivable
- 1110 sales at delivered price receivable
- 1120 other timber sales receivable
- 1130 other trade receivable
- 1140 advances paid
- 1150 loans receivable
- 1160 prepaid expenses and accrued income
- 1190 other financial assets

12 Current assets
- 1200 timber reserves
- 1210 growing stock
- 1290 other current assets

13 Fixed assets and other capitalized expenditure
- 1300 timber-growing land and water areas
- 1310 buildings and constructions
- 1320 machinery and equipment
- 1330 bonds and shares
- 1340 silvicultural improvements
- 1350 other tangible assets
- 1360 other capitalized expenditure
- 1370 differs from standart reserves

14 1400 other long term investments

15 1500 valuations items

2 LIABILITIES AND CAPITAL

20 Short term liabilities
- 2000 trade payables
- 2010 advances received of stumpage sales
- 2020 advances received of sales at delivered price
- 2030 advances received of other timber sales
- 2040 other advances received
- 2050 accrued liabilities and prepaid income
- 2090 other short term liabilities

21 Long term
- 2100 interest subsidy loans
- 2110 other loans from banking establishments
- 2190 other long term debts

22 2200 valuations items

23 Reserves
- 2300 afforestation reserve

24 Capital
- 2400 capital at the beginning of the accounting period
- 2410 capital investment
- 2420 value of own work
- 2430 profit (loss) for the period
- 2440 capital return
- 2450 private return
- 2460 differs from standart reserves

FRANCE

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1. STRUCTURE OF PRIVATE FORESTS

In 1958, the National Forest Inventory was set up with the task of drawing up an inventory of wooded land in France by monitoring permanent sample forest plots every ten years. Data are divided into three categories of owners: the State, local and private authorities.

Table 1. Private forests belonging both to private individuals as to organisations (forest groups, joint possessions, companies, etc.).

	Surface, mill ha	%
State	1.4	10
Local authorities	2.3	16
Private	10.6	74
Total	14.3	100

Table 2. Farmers' land makes up a significant proportion of private forest land with 2.65 million hectares, or 25% of private forest land.

	%	mill. ha
Legal entities, groups, companies	29	3
Farmers	25	2.65
Retired persons	21	2.22
Salaried staff	7	0.7
Executive staff	7	0.7
Craftsmen	5	0.5
Various	6	0.6
Total	100	10.37

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Table 3. Private forest land is very shattered as 40% of estates are less than 10 hectares.

Category, ha	<4	4 to 10	10 to 25	25 - 100	> 100
% of forest land	25	15	15	20	25
Number	2,487,100	254,000	100,000	42,000	9,000
% of private forest land	18.2	19.4	22	21.3	19.1
Number	314,000	74,000	34,000	11,150	1,848

Forest land belonging to farmers differs slightly from the rest of private forest land as there are more properties of roughly 20 ha with an average of 5 ha, instead of 2.5 for private forest land as a whole.

Forest units of more than 25 ha are subjected to a simple obligatory management plan (P.S.G.) approved by the 17 forestry estate regional centres (CRPF or *Centre Régional de la Propriété Forestière*). There is no further obligation for a management plan.

The area of private forest land increased after WW2 by 2.5 million hectares and it is still growing by 30,000 hectares per annum. It is therefore young forest. Consisting mainly of deciduous trees (8.4 million hectares), or 63% of forest land, tree-planting within the last 50 years has mostly been coniferous. The productive capacity is being developed. As an example, the Douglas fir, which is the most important tree-planting species, has an average age of 19 (De Champs 1995) even though the age of 45 is generally considered to be the optimum age for production.

Macroeconomic point of view

Official organisations such as I.F.N., the central department of statistical surveys, supply technical and economic indicators on the state of forest land and the wood industry every year.

Among these data, indicators emerge on the evolution of wood prices, on the utilisation of woods (paper, board, sawn timber, furniture, export, etc.), on the health of the industry (quantity of wood involved, the % bought and the turnover of round wood and sawn timber, etc.)

Forestry technical data. 66 % of of standing wood stock is in private woodland, comprising 75 % of the annual increase. Only 50 % of the increase is commercialised. French forests capitalise mostly on standing wood and on deciduous varieties.

For the purposes of forest product monitoring, statistics include 34 different products for round wood and 36 types of products for the first transformation.

Economic data, wood price monitoring. 33 types of round wood are monitored annually for their average price and total value. Since 1950s, O.N.F. has been monitoring the prices of 3 species: oak, fir and beech.

Market organisation. Owing to its broken-up structure, owner groups are vital in meeting the industrial demand which is becoming more concentrated. Thus, since the 1980s the co-operatives have become very important, especially with the development of the marketing of felled timber (60%). With 4 million m^3 they commercialise 20% of the private forest market. Group organisations as a whole provide a third of private forest wood marketing.

Contribution of farmers' woodland to the wood industry. Farmers' woodland is specific, according to a 1988 survey, in that it is used mostly for the needs of the farm for building and power requirements. This wood comes from existing stands of trees – small timber – made up of copses or a mixture of copse and forest trees. The percentage of recent tree-planting is low.

Microeconomic point of view

French forest land is characteristically diverse respect to varieties, types of stands of trees, soil-climatic conditions and naturally the management targets of sylviculturists. It is impossible to define one type of sylviculture, or even one type of typology – this would be too limited a view.

To define the conditions of management and especially the costs and receipts of sylviculture, IDF in its function as the Technical Institute for private forest land works on a variety basis, by defining the technico-economic paths by which indicators and ratios specific to management scenarios can be deduced (Productivity, Net present value, Gross margin, Cash flow...).

Currently no data is available in France to define an sylviculturist's average revenue. Too many parameters have to be taken into account to give the data any validity. On the other hand, it is now possible to say that a stand of Douglas firs or chestnuts is capable of providing productivity, gross margins, returns on capital, etc.

What are the management targets of woodland owners? The aims of sylviculturists are difficult to appraise. Development organisations know the sylviculturists who come to them for advice, but this is a very small proportion. The others carry out forest management in their own particular ways. Little is known of the ways this significant proportion of forest land is used.

2. RELATIONSHIP OF FARMERS TO WOODLAND

The attitudes of farmers in relation to woodland

Industrial markets that appeared in the 19th century made their contribution in driving peasant farmers from woodland (Nougarède 1994). This tendency was exacerbated by the intensification of farming which started in the 1950s.

Today, not many farmers talk about their forests; they talk rather about their woodland or woods. The word "forest" is closely linked to large private estates. The

idea of woodland or wood has a significant meaning, because it sugests the use to which farmers put it. Main uses are in the construction of farm buildings, fencing stakes and wood for fuel. This is a case mainly of self-sufficiency. The proportion of " forest and woodland " as part of farm holdings is diminishing. Indeed, woodland is often left to retired members of the family to manage and by thus forest land no longer appears as part of the farm " estate ".

The attitude of farmers with respect to forestry measures taken on farmland and especially with respect to regulation 2080/92 introducing a premium for tree-planting on farmland has not promoted tree-planting. Only 5,000 ha have benefited from the tree-planting premium since 1993. It involves, above all, farmer beneficiaries who are about to retire and have no successors. They wish to keep their land estate intact.

Farmers' multi-activity

Only 3,300 farmers declared in 1988 that they had a second occupation in forestry. This occupation on others' land mainly involves routine upkeep of woodland, its utilisation (cutting, conveyance) and sawing for special uses, an activity which has developed over the last few years.

The development of multi-activity is logically associated with the low level of revenue which farming allows. Forestry is not their trade, and the training of young farmers in the area of forest management is practically non-existent.

Forest working by farmers

IDF has always shown an interest in farmers' activities on forest land, both on their own land and on others' land, especially seen from the tax and labour viewpoints and its compatibility with farmwork. Being on the spot, they possess the facilities to carry out the works themselves; farm machinery they use can be adapted for forest work. Furthermore, they supply a local wood business, called a "short channel ". Forest work can provide work fitting into the farm routine and added revenue. These are known as forest trades, just like farm trades (duck liver fat, milk, cheese, etc.).

Objectives are to highlight the links between forest work, farmwork and domestic work through work flows, cash flows, and to material flows. To identify their thresholds compatible with good integration of forest work in farmwork and with the sustainability of this integration.

Monitoring the method. A dozen farmers who have developed forestry occupations including tree-planting and services rendered to others or wood transformation, have been interviewed on their objectives; how long they have been carrying out the type of occupation, the level of activity and how it fits in with farmwork and the future of the activity.

The information gathered is spread over three pages. The first page enables key items and decision thresholds to emerge.

The second part explains the level of activity through annual flows of worktime and cash, and annual sales, expenses and receipts. This does not involve accounting to certain items but of making up partial dynamic budgets with respect to the trade in question.

The expected results incluce to be able to define the indicators and ratios necessary for greater understanding of forest trades and to disseminate this information among forestry and farm advisors.

The main difficulty with which the farmers are facing is the development of the trade. Should it remain small-scale or should it expand, and when? Legal status, financial incentives, scale economies and hiring labour are key items in decision-making.

3. CONCLUSION

Farmers are unaware of their possibilities of the utilisation of wood and the diversity of occupations that could develop. There is a need to gather the economic information on forestry activities to ensure a common understanding between the farmers and development professionals.

GERMANY

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ABSTRACT

Most of the private forests which are smaller than 200 ha are owned by farmers in Germany. In 1976, a test network on farm forests was established in Baden-Württemberg. This project is an addition to the federal forest monitoring of more than 200 ha and the agricultural monitoring network. The method of collecting information about the costs and revenues of the farm forests is explained. The data of the income of farmers from their forest land can be used for political aims as well as for consultation the farm forest owner by the state forest administration. By knowing the income the use of subsidy programs by the land owners can be studied. The effects of these programs can be estimated by knowing their income effects to the farm forestry enterprise.

Keywords: *accountancy on farm forests, economic monitoring system, family income, costs and revenues, net income*

1. INTRODUCTION

The state of Baden-Württemberg is a densely wooded area in the Federal Republic of Germany, with a total forest cover of 38%. Forest resources are very high (about 500 mill. m^3 in total, 361 m^3/ha), especially those privately owned forests that have a high percentage of conifers.

The distribution of forest ownership is highly dominated by community and private forests with 38%, which is, respectively, 37% of the total forest area. State forests cover 25 %, and about 24% is owned by the federal land of Baden-Württemberg. Only 1% is federal forest and is of minor importance.

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Table 1. Structure of land use in private forests

Private forests > 1000 ha	151.000 ha	29 %
Private forests 200-1000 ha	28.000 ha	5 %
Private forests 5-200 ha	154.000 ha	30 %
Private forests <5 ha	187.000 ha	36 %
Total	520.000 ha	100%
About 85% (130.000 ha) of private forests with 5-200 ha are owned by farmers		

2. THE NETWORK OF FARM FOREST AS AN ECONOMIC MONITORING SYSTEM

The network of small-scale private forests ("Testbetriebsnetz Kleinprivatwald") mostly owned by farmers is developed and organised by the Forest Research Institute of Baden-Württemberg. It is an addition to the federal forest test network monitoring forest enterprises of more than 200 ha and also an addition to the agricultural monitoring network of the German federal government in Bonn. The yearly results form the basic information for the agricultural report of Germany and for agropolitical decisions.

The network of small-scale private forests in Baden-Württemberg started with a three-year preliminary research work from 1976 to 1978. In 1979, the network continued with a very stable number of about 170 forest farms with forests between 5 and 200 hectares. Since then, comparable economic data of farm forest in Baden-Württemberg has been available. The number of forest farms participating has shown little change, the annual change-rate measures only one to three farms.

For Baden-Württemberg, the project is an important addition to the forest and agricultural network of the German government in Bonn. The forest network includes private and community forests with more than 200 ha. The aim of this kind of sampling data is to get information about the economic situation in form of annual results. The better knowledge of economic data of small-scale forestry makes the consultation of the farmers by Federal Forest Service of Baden-Württemberg more effective. Another aim is to have valid figures available, so that subsidies can be justified and pushed through in an economical way by the Ministry of Agriculture. For their co-operation, forest farmers receive the following advantages:

- an annual bonus,
- a free forest management plan every 10 years,
- an annual analysis of their own economic data
- figures of the region and categories to compare their own with

3. METHODOLOGY OF THE YEARLY DATA RECORDING

The data recording of voluntarily cooperating forest farms uses especially developed booking receipts. The owners of the farm forests are visited once a year, for 2-3 hours,

for collecting and controlling data. All information and figures are handled confidentially and the electronic processing is carried out anonymously. During the visit, the first step is to check out the change of structural data (change of the agricultural and forest area, main agricultural crops etc.) and of personal data (important for receiving the bonus: bank code and account). Then the real data recording for the past year can be done.

4. THE ANNUAL DATA RECORDING

The revenues from the forest which is a part of the farm is registered according to the following structure, including own consumption:

- timber crop (amount, assortments, kind of use, kind of utilisation)
- accessory production (Christmas trees, branchwood used for decoration)
- further gross yield (above all hunting leasehold, reimbursement for damage caused by game)
- subsidies and financial support for various measures (investments are divided up into periods)

Costs. The registration of the following expenses is divided into four different cost centres (harvesting, silvicultural-treatment, roads, administration and others). In principle full costs and the full revenues are booked, the VAT is included.

Human labour input and use of tractors in hours

- The work input is registered by hours and cost centres including:
  · owners own work with calculated wages (all family members)
  · workers with contract of employment
  · seasonal workers without a contract
- hours and costs of each tractor working in the own forest

In addition to the detailed registration of hours worked in the forest, total working hours including farming of the farm forest enterprise are also registered. The remaining costs are registered according to the following types of costs, also divided into cost centres:

- material (e.g. plants, spare parts, small tools...)
- costs for contractors
- costs for hired machines
- depreciations and new investments
- variable machine costs
- losses (e.g. caused by theft, damage...)
- costs for administration assigned to the owners' forest (e.g. land tax, farm insurance, accident insurance, costs for the building, charge for individual advice from the state forest administration, contributions to forest cooperatives, costs for the car,...).

The evaluation methodology. The yearly analysis is based on a calculation of the net return from the forest part of the farm. Some costs of the total farm enterprise are calculated within the forest part of the farm. Following limitations are made for the conduct of results:

- there is no assessment of the property of forest stands or soils,
- there is also no interest rate for the invested capital,
- the calculation model is based on a fiction of a farm without leaseholds and debts without any liabilities, just like in the federal agricultural test network.
- interest charges for loan capital or leasehold for forest areas must be paid from the net profit of the farm.

5. RESULTS FROM THE NETWORK OF SMALL-SCALE PRIVATE FORESTS

The results have been published since 1984 as a yearly report. A comparison of the annual accounts is made by the evaluation of the results according to different points of views and different stratification. Some examples:

- the regional evaluation (according to four regions Black Forest, Oberland-Ostalb, Schwäbisch-Fränkischer Wald, Odenwald-Hohenlohe)

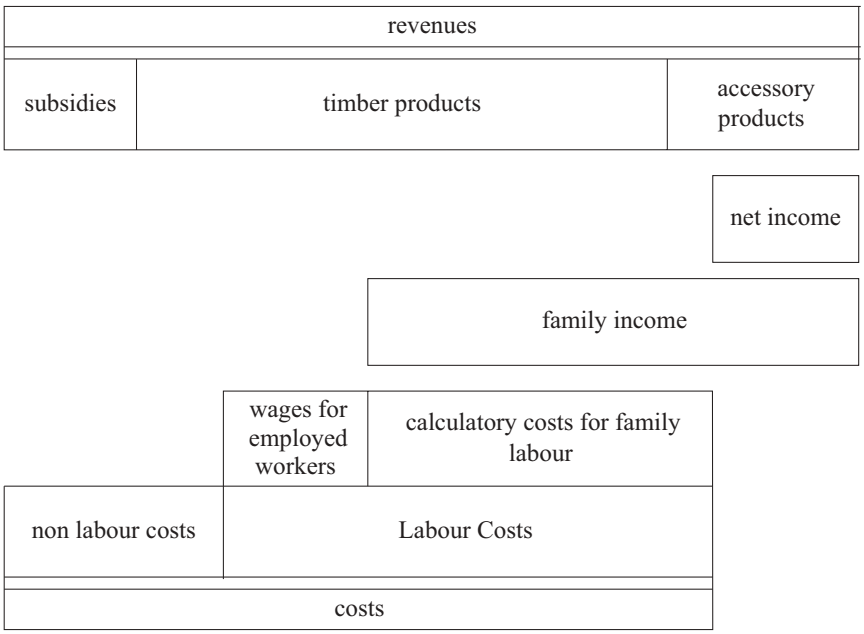

Figure 1. Correlation between costs, revenues and success dimensions such as family income and net income accounted within the network of small-scale forestry in Baden-Württemberg

- an evaluation according to four different size-classes of forest areas (5-10 ha, 10-20 ha, 20-50 ha, > 50 ha - 200 ha)
- evaluation according to main tree species (spruce-fir-Douglas fir, deciduous trees, Scots pine-larch, other trees)
- evaluation according to four different classes of cutting rates or of planned felling volume for the next ten years per ha

The family income is the most important economic result (gross income minus material costs, costs for contractors, wages for employed workers – as to say gross income minus all costs except of calculated wages for owner's own work and work of the family). The family income gives an idea of the available money gained by the forest part of the enterprise.

The net income (family income minus calculated wages for family labour) is used above all for the comparison with other mostly larger forest ownership with paid workers.

The main result achieved over a ten-year period (1987-1996) is as follows: the owner's family is able to earn an income of 622DM per year and hectare (Fig. 2). The main reason is the work of the owner's family which contributes 75 % to the result. The net income from forestry is not very bad with 186DM/year/hectar. Considering that there are subsidies of 141DM/year and hectare, the net income without these subsidies would mot be satisfactory. The costs for material, contractors, depreciation and wages are at 358DM/year/hectar not very high. In the last ten years, the gross income was 980DM/year/ha. The share of timber sales was 792DM/year and hectare, that is, 81 % of the gross income, while the subsidies were about 15 % of the gross income. Only 4% of the gross income does not depend on timber or subsidies.

The yearly changes in the results are shown in Table 2. The main event was the windfall in the year 1990. The high amount of windfall-timber was responsible for the

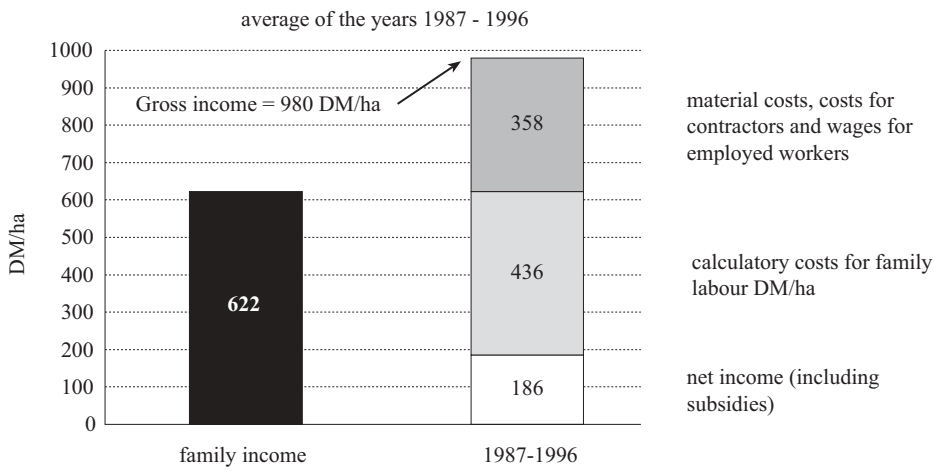

Figure 2. Gross income, family income and net income in the test network of farm forests in Baden-Württemberg

peak of family income in 1990. But the years after that show a deficit for 4 years. The reasons for these deficits were low cutting volume, high costs for replanting and deep market prices for timber.

It is also remarkable that the family earns 26 to 54DM per hour, in the average about 45DM by working in their forest. This is much more than the result for a working hour spent in farming (Fig. 3).

Table 2. Main results of farm forests in the last ten years

Year		1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	87-96
cutting volume	cbm/ha	5,6	5,9	7,2	14,7	4,0	4,6	4,6	6,9	8,5	6,0	6,8
working hours	h /ha	15,9	17,0	17,6	25,3	12,4	13,2	12,4	15,5	16,7	13,4	15,9
part of family working hours	%	86%	88%	87%	83%	88%	89%	88%	89%	89%	91%	87%
gross income	DM/ha	810	810	1081	2178	646	765	647	957	1137	770	980
timber sellings	DM/ha	688	687	949	1932	386	536	422	765	961	590	792
	DM/cbm	123	116	132	131	98	117	92	110	114	98	116
subsidies	DM/ha	75	72	83	198	211	183	182	145	133	131	141
total costs	DM/ha	644	706	770	1104	699	725	724	845	931	790	794
costs of labour	DM/ha	354	404	425	631	357	398	395	560	632	520	468
calculatory costs for family labour	DM/ha	324	375	393	557	337	372	368	532	601	501	436
wages	DM/ha	30	29	32	74	20	26	27	28	31	19	32
non labour costs	DM/ha	290	302	345	473	342	327	329	285	299	269	326
family income	DM/ha	490	479	704	1631	284	412	293	644	807	481	622
family income per working hour	DM/FAkh	36	32	46	78	26	35	27	47	54	40	45
net income	DM/ha	166	104	311	1074	-54	40	-77	112	206	-20	186
net income without subsidies	DM/ha	91	32	228	876	-265	-143	-259	-33	73	-151	45

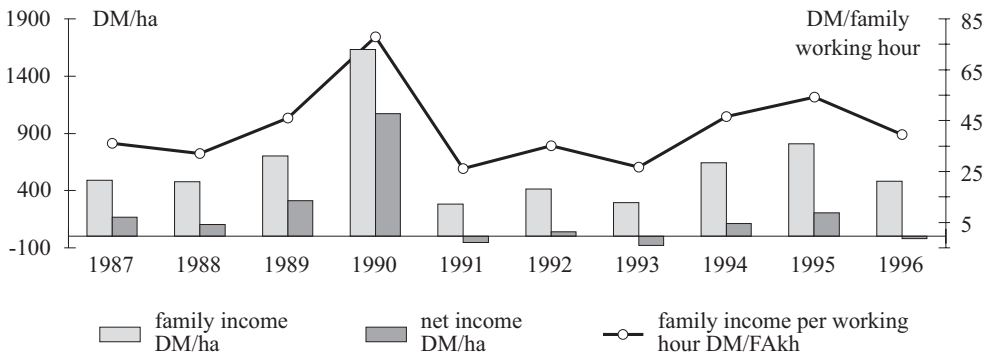

Figure 3. Farm forests in Baden-Württemberg: Family income/ha, net income/ha and family income per family working hour

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GREECE

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ABSTRACT

This paper aims to identify the lands in Greece which are used for farm forestry; it defines the species in these lands in terms of their importance and points out the lack of a cost accountancy method. Furthermore, the usefulness of the application of the Activity Based Costing, already applied at international level in various economic activities, in the field of farm forestry.

Keywords: *cost accountancy, farm forestry, activity based costing, Greece.*

1. INTRODUCTION

The basic characteristics of the Greek forests are shown in Tables 1, 2, 3 and 4. The forests occupy an area of approximately 2.5 million ha (19%). 3.24 million ha (24.6%) are partially forested areas in which the few remaining forests left are degrading and produce little wood due to a inefficient structuring. Majority of forests belong to the state (65.4%) and the non-state sector (34.6%) is characterised by a multitude of owners.

Coniferous forests are highly productive with the dominant forest species of fir (13.1%) and Aleppo pine (11%). The broadleaved forests consist principally of various oak species (29.7%) and beech (8.6%) and they are less productive. The evergreen broadleaved forests are mostly shrubberies of degraded forest lands.

In Greece, the coppice forests dominate and in the composite broadleaved forests coppice prevails. Thus, the ratio of the seedling forests to the coppice ones is 42:58 – a rate which is not very different from that of France (44:56) or Italy (40:60). It is, nevertheless, less than in other developed forestry countries (Dafis 1982). These coppice forests produce only fuelwood and a small amount of construction timber, with the exception of the few coppice chestnut forests. The soil of the coppice forests has already been degraded and is still degrading due to the clearcut fellings which are

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Table 1. Land distribution in Greece.

Types of land use	Area, ha	%
1. Forests	2,512,400	19.0
2. Partially forested areas	3,242,140	24.6
3. Phrygana	277,314	2.1
4. Alpine lands	440,058	3.3
5. Rangelands	1,755,507	13.3
6. Lakes-Rivers-Marshes	272,862	2.1
7. Non-productive lands	734,851	5.6
8. Cultivated areas	3,963,850	30.0
Total	13,198,982	100.0

Source: M. Mavromatopoulos 1986

Table 2. Types of forest ownership.

Ownership status	Area, ha	%
1. Public	1,644,000	65.4
2. Non-public		34.6
2.1. Community	301,000	12.0
2.2. Monasterial	110,000	4.4
2.3. Charitable Institutions	11,000	0.4
2.4. Joint-ownership		
2.4.1. Owned by all community population	117,000	4.7
2.4.2. Owned by more than three community's people	129,000	5.1
2.5. Private owned	200,000	8.0
Total	2,512,000	100.0

Source: Min. of Agriculture 1964 and K. Makris 1978

Table 3. Distribution of forests per size and type of ownership.

Classes of sizes	Public		Community		Private*	
	No.	%	No.	%	No.	%
0-10 ha	35	2.4	10	3.5	12	3.7
10-50 "	140	9.7	50	15.8	62	18.9
50-100 "	120	8.1	40	12.6	45	13.9
100-500 "	520	35.2	100	31.5	109	33.5
500-1,000 "	320	21.7	60	18.9	45	14.1
1,000-2,000 "	195	13.1	40	12.6	35	10.9
2,000-5,000 "	110	8.1	15	4.8	15	4.7
> 5,000 "	23	1.7	1	0.3	1	0.3
Total	1,463	100	316	100	324	100

Source: Ministry of National Economy 1964, Makris 1978
*This category includes the categories 2.2, 2.3, 2.4 & 2.5 of Table 2.

Table 4. Distribution of Greek forests per type of management and ownership.

Type of management	Ownership	Coniferous, ha	Non-Coniferous, ha			Total, ha	%	
			Broadleaved	Evergreen	Total		Forested Lands	Total area of Greece
High Forest (Seedling)	Public	481,086	142,967	11,805	154,772	635,858	25.5	4.80
	Non-public	184,504	43,981	7,970	51,951	236,455	9.5	1.80
	Total	665,590	186,948	19,775	206,723	872,313	35.0	6.60
Composite Forest	Public	110,129	92,049	10,008	102,057	212,186	8.3	1.61
	Non-public	190,681	24,466	5,532	29,998	220,679	8.7	1.67
	Total	300,810	116,515	15,540	132,055	432,865	17.0	3.28
Coppice Forest	Public	-	514,782	281,201	795,983	795,983	31.6	6.03
	Non-public	-	250,055	161,184	411,239	411,239	16.4	3.12
	Total	-	764,837	442,385	1,207,222	1,207,222	48.0	9.15
Total	Public	591,215	749,798	303,014	1,052,812	1,644,027	65.4	12.45
	Non-public	375,185	318,502	174,686	439,188	868,373	34.6	6.58
	Total	966,400	1,068,300	477,700	1,546,000	2,512,400	100.0	19.03

Source: Greek Forests 1989, Goulandris Museum

carried out on short intervals and the removal of small-sized wood. For these reasons one of the most difficult problems in Greek forestry is the conversion of coppice forests into seedling forests. However, the seedling forests are not producing nearly as much timber as the production capacity of the land would allow.

Generally, the rate of Greek forests is low and the condition of most forests, from a viewpoint of structure, volume and quality composition of growing stock is not at a satisfactory level (Dafis 1982).

As to the ownership of forests and their geographical distribution, the following may apply (Katsanos 1981):

- most state forests are in Macedonia and Sterea Ellada. Also, there are many state forests in Thrace and Peloponnese.
- in Crete, state forests are facing serious problems concerning their ownership status
- most community forests are in Central Greece and Crete island
- most monasterial forests are in Halkidiki
- most private-owned forests are in Crete island, Cephallonia island, Attiki , as well as in Epirus and Evia.

2. FARM FORESTRY IN GREECE

The concept of farm forestry is complicated. In many countries, if a strict definition is used, farm forestry includes only forests owned by farmers, excluding remotely owned forests. It also emphasises the role of forests as a source of livelihood in rural areas. However, in cases where statistical data are lacking, some analysts apply an upper size limit, thus identifying farm forestry with the notion of small-scale forestry (Hyttinen et al. 1997). Thus it is not obvious how “farm forestry enterprise” should be defined in the Greek context. This definition will be analysed in more detail below.

Generally, it can be said that the farm forestry in Greece has a short history. Plantations of poplar hybrids were established for the first time in 1933 in the region of Macedonia. Expanded plantations were established after the war in 1947-48. The areas of the forest trees plantations which will be quoted here are not included in Tables 1-4.

The importance of poplar plantations for Greece is emphasised by the fact that the production of private poplar plantations alone ensures an annual wood volume of 350,000 to 400,000 m^3, which is 17-18% of the total production of all Greek self-grown forests (Garifallos 1993). From the production of 400,000 m^3, 21% is fuelwood. The remaining 79% is round timber for sawn timber and veneer sheets, as well as for industrial wood for wooden boxes, panels and pulp. Calculations for 1993 show that the number of poplars in private poplar plantations amounted to over 5 million trees. According to a rough calculation, the total area of the private poplar plantations in Greece is about 7,500-8,000 ha. The larger poplar wood production comes from near-river plantations. The public poplar plantations are estimated to be 5,800 ha with an annual wood production of 140,000 m^3 (Efthymioy 1993).

The European Union, with the regulations 797/85, 1609/89 and 2080/93, encourages the afforestation of agricultural lands, which is of special importance for the land use and improvement of environment, as well as for the decrease of the forest products deficit in the EU and as a complementary measure of Community's policy aiming at the control of agricultural production.

Based on these regulations, about 15,000-20,000 ha of agricultural land were afforestated in Greece by 1996. The following tree species were used: poplar (24%), black pine and Scotch pine (22%), Pseudoacaccia (22%), walnut tree (14%), chestnut tree (12%), fir (5%) and at smaller scale Brutia pine, Aleppo pine and Pseudotsuga. The above-mentioned agricultural lands were afforestated by private farmers and their size ranges from 0.5 to 2 ha.

Concerning the costs of production activity the various private owners, who also own the agricultural lands with the respective plantations, have used, until recently, the prevailing market prices e.g. the market cost of seedlings, planting, maintenance etc. But there is neither any obligation nor a widespread system of recording financial data which will ensure the costs of produced output.

Nevertheless, there are some studies that investigate the financial performance of different types of plantations. The cultivation of marginal and also clearly agricultural lands with certain tree species appears to be more profitable than the cultivation with classical agricultural products. For example, the financial results for a Christmas trees plantation of 1 ha were calculated; the comparison of the results between Christmas trees and hard wheat and potato cultivation unquestionably are in favour of the Christmas trees (Christodoulou et al. 1992). The farm viability is very important in connection with EU policies. Therefore, there has been an attempt to make the best use of the regulations issued by the EU concerning the cultivation of agricultural land with trees in a Greek community named Petrokerasa (Blioumis et al. 1993).

For many farmers, however, whose primary interest is the non-timber values, the increased costs or reduced yields may be quite acceptable – like in the Mediterranean region – in order to ensure that other benefits are provided. Thus, the valuation of non-market benefits from non-industrial private forests (NIPF) is becoming increasingly important.

3. PLANS FOR THE FUTURE

According to the information presented above, it is evident that there is no single clearly defined and common method for production accountancy in farm forestry in Greece. This fact should also be concerned in connection with the general concepts of the cost accountancy in forestry in Europe. Specifically, Group S4.04-02 (Managerial Economics) of IUFRO in its report on "Accounting and Finance in Forestry and Timber Industries" underlines the fact that: "up to now, the attempt was not successful to establish a concept of accountancy, meeting the forest firms needs for a decision-oriented management and controlling tool". The cost accounting may lead or contribute to a more correct decision making by the farm owner.

Therefore, farm forestry as a sector of forestry seems to face a problem in Greece in relation to costing issues. There is a need to investigate the possibilities of applying costing methods in farm forestry and establish a costing system which will allow the best possible production costing.

One of the more up-to-date costing methods, which has been applied in the recent years at international level is the Activity Based Costing (ABC). This costing method was developed at the Harvard Business School (Kaplan 1984). Since 1990 it has been applied frequently in various fields of economic activities. Examples of applying this method in the field of forestry are not known to the authors of this paper. However, we believe that the investigation of the possibilities of applying the ABC method on the farm forestry should be an important part of the MOSEFA project because:

1. The ABC method consists the current state of the art in the field of cost accountancy. Therefore it is particularly interesting to investigate the possibilities of applying a new system (ABC) in farm forestry, specially in cases where no cost accountancy system exists.
2. The application of the ABC method for the cost accounting of other types of production processes has clearly showed the multiple profits by its application, e.g. cost reduction, better organisation of production process, more complete pricing of products, (Innes and Mitchell 1990). It would be within the range of interests of the above-mentioned IUFRO group to propose that the ABC method should be applied in forest firms and forest industries.
3. In fact, the ABC method combines two traditional costing methods; the costing per centre and the costing per bearer; more precisely, it cost accounts per cost bearer but allocates the overheads (indirect costs) into specific activities (in correspondence to the costing per centres)
4. Finally, the ABC method can be applied as much as in the cases of product output as of services. Therefore it has the advantage that it can be adjusted to farm forestry even if we would like to cost account not only the timber products, but other intangible goods or services.

The ABC method is based on the allocation of overheads of a production process. It is common that when we want to cost out the unit of a product by applying a traditional cost accountancy method, the overheads are simply divided either by the total production volume or are allocated proportionally in some cost centres based on the weighting coefficients which are derived from the proportion of direct costs to the respective centres.

However, the ABC method, after it has described the production process at a first stage based on activities, then moves on to the establishment of cost pools which lead to the detection of cost drivers aiming at the allocation of overheads into the product (see Figure 1). The objective of the ABC method is to detect qualitatively and quantitatively the way by which the various activities contribute to the final cost of the product. This fact consists of the basis for the rational control of production cost as well as for taking measures for its decrease.

This brief presentation of ABC method's function model it is clear that the application of a costing system which will be based on this method requires a lot of

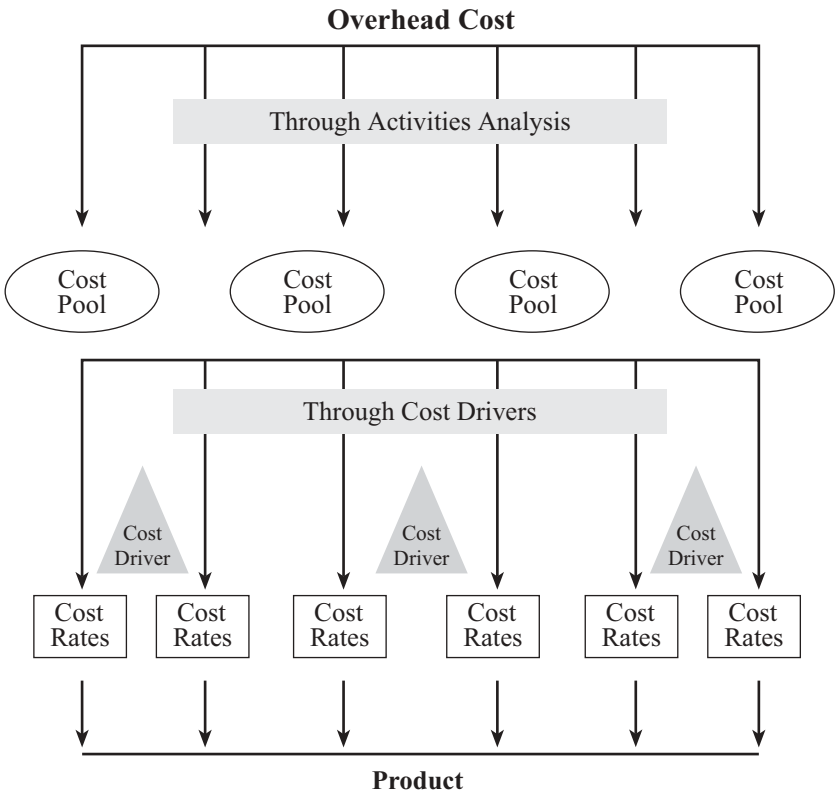

Figure 1. Stages of Activity Based Costing

work. The difficulties encountered are mainly focused on the detection and the creation of suitable cost pools and cost drivers which are the basis for applying the ABC method.

In cases of applying the ABC method, this is placed within a more general frame with three distinctive procedures. In the first stage, the economic process is cost accounted by the ABC method. The results of this costing lead to the re-planning of the management and the creation of an organisational system based on activities which were detected during the ABC method. The result of this re-adjustment is the adoption of an Activity Based Management (ABM) system. At the same time and during the second stage, ways and methodologies for the performance measurement of the economic activity are set out. These methods may include the Benchmarking (Zairi 1994), the Data Envelopment Analysis (Silkan 1986), the Cost-Benefit Analysis (Mishan 1975; Pearce 1973) etc. Concerning Data Envelopment Analysis developed as a set of techniques for measuring the relative efficiency of a set of decision making units (DMU) when the price data for inputs and outputs are either unavailable or unknown (Sengupta 1995).

Therefore it becomes obvious that the costing of farm forestry by the ABC method, besides the above stated profits, may constitute the basis for measuring the economic

performance of farm and small-scale forestry, a fact which also becomes the main target of the MOSEFA project.

Of course the above mentioned methods can be used for the valuation of non-market benefits from non-industrial private forests (NIPF).

4. CONCLUSIONS

In Greece there are significant agricultural lands which are used by private owners for farm forestry. These lands with their production of timber and other products cover an important amount of country's total needs. However, because (1) there is no a costing system of production of the farm forestry firms and (2) the monitoring of socio-economic situation of farm forestry is important in connection with EC policies and especially with Mediterranean region regarding afforestation, farm viability, multifunctional forest management and rural development, it is proposed that the ABC method would be applied in farm forestry jointly with the performance measurement method of Data Envelopment Analysis.

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IRELAND

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ABSTRACT

Coillte Forest owns and manages approximately 70% of the total forest area in Ireland. There has been increased farm forestry in very recent years linked to increased EU grants. The Coillte cost monitoring system forms part of an overall comprehensive computer network system which is utilised at all levels. It allows the programming, recording and tracking of costs and enables the measurement of performance from many different views. Performance assessment in Coillte Forest involves not just focus on costs but also how other aspects of the business are affected by action taken. This "multi-viewed" approach to measurement of performance is structured in the form of a balanced scorecard. The aims are to improve and deliver real and lasting business performance.

1. INTRODUCTION

1.1 Background

Coillte Teoranta (The Irish Forestry Board) was established under the 1988 Forestry Act with a commercial mandate from the government.

Coillte Forest is the part of Coillte Teoranta that deals specifically with the establishment of plantations and the management of the timber resource. Other parts of the company include Coillte Enterprise (which encompasses other related businesses such as private forestry planting, nurseries, Christmas tree farms and others), Subsidiaries and Associated Companies (which include joint venture and consultancy companies) and Headquarters (which contain financial, systems, planning and centralised support roles). Strategy underpinning the company and endorsed by the government involves the company developing as an Irish based international forestry and forest products company.

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1.2 History of forestry in Ireland

Total forest cover in Ireland is approximately 570 000 hectares or 8% of the land area. It has the lowest proportion of forestry in the European Union. However, considering that at the turn of the century the area under forest cover stood at only about 1.5% considerable expansion of the national estate has occurred (Department of Agriculture... 1996).

State forestry began in 1903 with the acquisition of Avondale House, a forestry training centre and with the acquisition of some estates. Acquisition and planting of other land by the state followed over subsequent decades, to the extent that public forests now total about 390 000 hectares, which is over 5% of the land area and almost 70% of all forests in Ireland today.

Afforestation by the private sector remained at a very low level until the end of the 1980s when improved grants became available. Afforestation increased since then to the extent that in 1995 it amounted to 17 300 hectares. Of this figure, 85% was carried out by farmers. A considerable portion of this was planted under contract by Coillte Enterprises (Private Forestry Division).

2. COILLTE FOREST

The Coillte Forest Estate is approximately 430 000 hectares, of which 390 000 hectares are planted with conifer and broadleaf trees. Sitka spruce (*Picea sitchensis*) accounts for 61% of the total area, with Lodgepole Pine (*Pinus contorta*) accounting for 21% and broadleaves 4%.

The estate is fragmented and composed of many small properties. This reflects the pattern of acquisition over the previous fifty years. Acquisitions, with the exception of the blanket peat areas in the western half of the country, were composed of small farms or holdings which in turn were composed of many small fields. It has been attempted to consolidate areas but this drive has been hindered somewhat due to the present competitive and highly priced nature of the land market. The size of the properties has obvious implications for the subsequent management of the estate and for economies of scale.

Another feature of the estate which distinguishes it from other countries is its predisposition to windblow. This arises from a combination of factors including soil types which are wet and difficult to drain, high rainfall and the frequency of high wind speeds.

In simple terms the overall riding objective in the management of the resource is to produce the maximum amount of sawlog from our forest crops subject to some basic considerations which revolve around sustainable yield and economic rotation length. Maximum sawlog production is obtained through a policy of thinning our crops to marginal intensity wherever possible. The crop is managed under a rotation slightly less than the age of maximum mean annual increment.

In Coillte Forest, forest management is at present organised on an area basis. There are 7 Regions (6 since August 6, 1997), 14 Districts, 108 forests. The basic treatment unit within a forest is the subcompartment. The (permanent) management unit is the compartment which is made up of one or more subcompartments.

3. PERFORMANCE MEASUREMENT IN COILLTE FOREST

Under definition, performance measurement is the process of quantifying the efficiency and effectiveness of actions.

Performance measurement and management are an integral part of modern business and are being increasingly used to enhance profitability and returns and to drive real change and continuous improvement across a wide spectrum of companies.

Up to 1994, performance in Coillte Forest was measured mainly using traditional financial criteria and the level of outturn v. plan. While the financial measures are substantive in their own right, good financial performance need not reflect good operational performance; the reverse also possibly being the case. Reacting to this situation, the Region Managers as a group felt that the measurement of performance was too limited and that an attempt should be made to refine the management process and develop further, meaningful measures which would reflect performance more closely.

Operational performance has been measured to date largely through achievement of targets. Operational efficiency has been correlated strongly with unit costs. Silvicultural quality has been measured through randomly based forest audits in addition to yearly forest efficiency reviews. Improvements in operational efficiency have also resulted from a continuous improvement initiative which forms part of the company culture, as well as work manuals and training programmes. However, the need to benchmark current levels of efficiency and to chart future improvements was also evident.

Against this background, a framework was adopted in consultation with the Region Managers which is structured in the form of a Balanced Scorecard (see Figure 1). The scorecard is used extensively and successfully in many companies. It has been developed over time for Coillte Forest in response to perceived management needs. It contains 5 distinct areas. The areas are then subdivided into more detailed measures.

- Financial Performance
- Resource Performance
- Business Achievement
- Business Efficiency
- Customer Perspective

The advantage of the scorecard is that it links performance measures and allows managers to look at the business from five main perspectives and at the same time minimises information overload by limiting the number of measures used. A further advantage of the scorecard is that it facilitates change in response to changing business

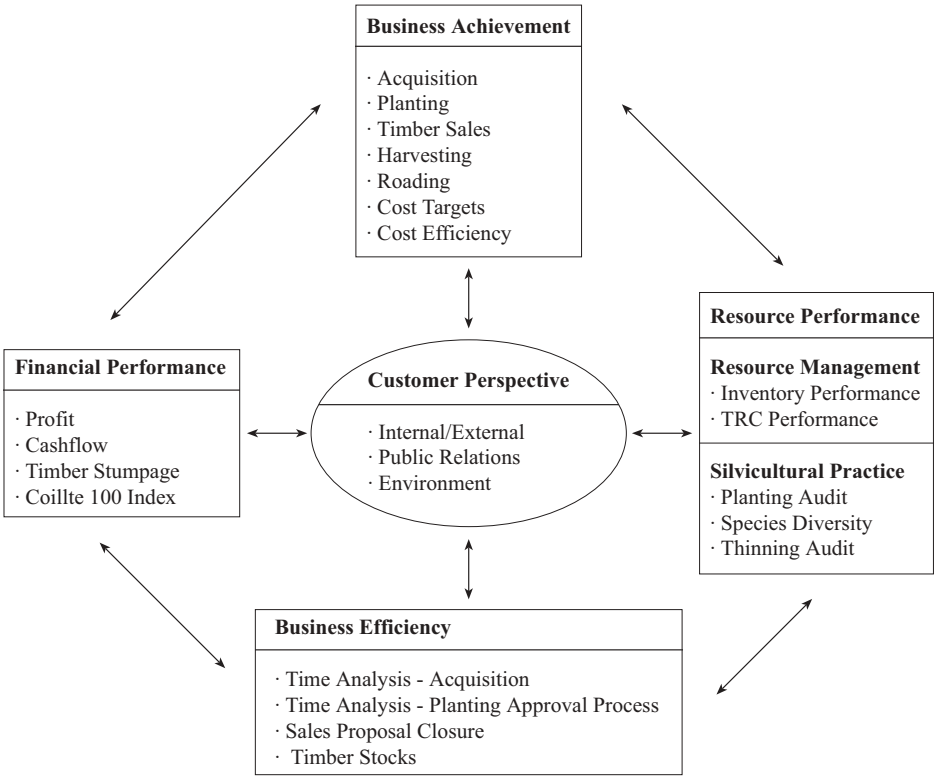

Figure 1. The Balanced Scorecard.

objectives. In other words, measures can be added or subtracted in response to business needs and continuous improvement. The measures currently being used in the Coillte Forest performance measurement reports have been formulated and built upon from an original model devised in consultation with a number of Region Managers. Each is derived almost exclusively from the Coillte Information System.

Practically all the measures are :

- easily generated from the information system – at all levels
- they all impact in one way or another on overall business performance

Their use therefore enables weak and/or poor links in overall operational performance to be identified and corrective action to be taken where possible which, at the end of the day, will secure:

- return on capital
- the creation of added value.

In summary therefore it can be said that performance measurement

- helps an organisation towards its goals by visible linkage with the objectives;
- needs to be incorporated within the culture of the organisation;
- should deliver real and lasting improvement in business performance; and
- is facilitated through benchmarking.

4. COILLTE INFORMATION SYSTEM (VAX COMPUTER SYSTEM)

It is important that the measures are systems-based as the logic of calculation must be clear, results must be verifiable and a record of performance must be available.

The analysis of the reports on the system provides the ability then to source difficult areas of the business and areas where problems are occurring and by doing this enables response to these problems and solutions to be arrived at.

The management information system that exists in Coillte is a comprehensive database which can be employed as useful management tool. A large amount of data is collected at forest level. This requires the utmost diligence and conservatism when inputting the data as errors can lead to useless analysis.

The reports with a direct operational bearing are quite numerous and to respond to the forester's needs, must be so. With over 10 000 compartments and 100 000 subcompartments nationally, the fact that the forest estate is documented so comprehensively means that it can form the basis of information to help planners and managers at all levels in the day to day, and year to year, management of the estate.

Productivity and Cost performance is assessed using a number of different reports on the system. Some examples are given below.

4.1 Workplan

The Workplan is essentially a statement of the resource required by the Forest Manager to complete the work programmed for the year ahead. It is in turn used to formulate the District and Region Business Plans. Two elements exist on the system:

- The INPUT where data is input.
- The OUTPUT which is the workplan reports.

The Output can be used to: analyse unit costs at Forest, District and Regional level, assess production levels, assess planned species diversity, to assess harvesting equipment requirements and roading requirements etc. It is against these plans that performance is measured.

4.2 Work recording

This is where work details by labour type are recorded. Accuracy is critical here.

4.3 Work tracking

This contains reports which provide for the analysis of work completed throughout the year. These reports can give

- Cost analysis
- Afforestation and Reforestation completed
- Filling in completed
- Plants used
- Timber Harvested
- Labour Control by Labour Type Analysis
- Supplemental reports are also available giving Invoice Plan v. Sales, Efficiency of sales contract processing etc.

These reports all give valuable control and performance data. Other reports on the system make possible the analysis of the inventory (age, YC, Thinning and Rotation Regimes), timber sales, stock levels (timber and material), planting efficiency (systems based planting audit), contract efficiency, process completion etc.

5. CONCLUSION

Coillte Forest cost and operational performance measures are concerned not only with financial or absolute criteria but also how efficiently those costs are expended and what are their effects on process and silvicultural practice. Given the nature of the forest industry (and its raw material – a growing crop) a wider view of performance is required in order to enhance overall improvement.

Coillte Forest utilises a comprehensive computer system to programme and monitor work programmes in forestry. Given the scattered nature of the forest and the variability of site conditions this information is invaluable. While aggregated values are used in the measurement of performance the ability is present to “drill down” and analyse at Region, District, Forest and compartment level.

Performance measurement where applied, committed to, and acted upon can deliver real and lasting improvement in business performance.

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ITALY

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1. FOREST AREA AND FOREST OWNERSHIP

The forested area in Italy is, on the basis of official statistics, about 6.7 million hectare, including private properties (farmers and non-farmers), regional and state properties, municipalities and other properties. Forests represent about 27% of the total area of Italian farms (about 25 million hectares).

As shown in Table 1, most of the forests (60%) are located in mountain areas while only 5 % are in the lowlands. It should be noted that only 23.2% of the Italian territory is plains where intensive agricultural production systems and urban land uses are predominant. In the lowlands, the only relevant forest activities are represented by poplar plantations, managed very intensively, with short rotations, fertilisation and pest control. Similar to poplar plantations are other new plantations (mostly broadleaves, generally financed under the EU regulation 2080/92).

The main part of forest land (95%) is located in mountains and hills. Most of these are coppices or maquis, from which the main product is firewood. High forest, both coniferous and broadleaved is around 39% of the total, mostly located in mountain areas. Soil and water conservation is, at the same time, the main objective and constraint of forest management in these areas. Strict regulations (i.e. only light selective fellings and silvicultural regimes based on natural regeneration, prohibition of clearfellings, limitations in forest road construction) are imposed on 92.4% of the forest land (ISAFA 1985).

Around 60% of total forest area is privately owned. The most relevant part of private property is represented by coppices, while only 30% is high forests. The most productive forests are owned by public bodies: state and regional administration, municipalities and others, such as common properties. These properties represent, all together, around 40% of the total forest area. On the basis of the official statistics it is impossible to distinguish farm forestry from other private forests.

According to the 1990 Agricultural Census, state and regional forests have an average size of about 850 ha, communal forests of 150 ha and private farm forests only 3.2 ha. No private industrial forest exists. Hence, woodlands are highly scattered and

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Table 1. Forest area by zones.

	Mountain		Hill		Plain		Total	
Forest Area	59.84%	%	35.19%	%	4.97%	%	100,00%	%
Coniferous	1 171 277	28.88	217 662	9.13	50 811	15.10	1 439 750	21.25
Broadleaved	674 721	16.64	353 614	14.83	129 570	38.51	1 157 905	17.09
Mixed	220 893	5.45	114 819	4.81	15 328	4.56	351 040	5.18
Coppice	1 585 352	39.10	1 154 624	48.41	81 147	24.12	2 821 123	41.63
Coppice with standard	386 188	9.52	361 653	15.16	32 900	9.78	780 741	11.52
Maquis	16 563	0.41	182 543	7.65	26 704	7.94	225 810	3.33
Total	4 054 994	100	2 384 915	100	336 460	100	6 776 369	100

Source: Istat 1995 – Forest Statistics

Table 2. Forest area by type of owners.

	State and Region		Municipalities		Other public bodies		Private	
Forest Area	7.29%	%	27.50%	%	5.26%	%	59.95%	%
Coniferous	110 994	22.47	637 406	34.20	102 963	28.91	588 387	14.48
Broadleaved	89 781	18.17	350 687	18.82	42 185	11.85	675 252	16.62
Mixed forest	79 234	16.04	109 390	5.87	20 417	5.73	141 999	3.50
Coppice	153 927	31.16	573 264	30.76	158 732	44.57	1 935 200	47.64
Coppice with standard	37 013	7.49	159 561	8.56	28 255	7.93	555 912	13.68
Maquis	23 099	4.68	33 334	1.79	3 577	1.00	165 800	4.08
Total	494 048	100	1 863 642	100	356 129	100	4 062 550	100

Source: Istat 1995 – Forest Statistics

wood harvesting is difficult and costly. Timber quality, moreover, does not always respond to the demand. High management costs and reduced wood production per unit of land limit private and even public financial interests in active forest management (Gios and Pollini 1986). Abandonment of forest land, forest fires, pest attacks and other degradation phenomena are common, mainly in the southern regions.

Most of the high forests are located in the alpine regions, particularly in the east (Friuli Venezia Giulia, Veneto and Trentino) and in one region in the South (Calabria). Coppices are mainly located in the North West (Lombardia), and in Central Italy.

2. THE ECONOMIC ROLE OF THE FOREST SECTOR IN ITALY

On the basis of the Italian national accounting system, the Gross National Product (GNP) from forest related activities (wood and non-wood forest products) represents only 1.3% of the primary sector GNP and 0.05 % of total GNP, while the GNP of the

wood-working sector is about 4.5% of total GNP. Wood-related economic sectors operate in a highly disconnected forestry-wood system, whose main features are:

1. a very high (and constantly increasing) internal industrial demand, averaging 15 million m^3/year. Timber consumption mainly flows into two "wood chains" (or *filières)*: on one hand, the timber building/furniture industries *filière*, on the other hand, the timber pulp and paper industry printing industry *filière*. In both cases Italy is as a strong net exporter of some finished products (RESS 1983 and 1988): it is first in the world for exports in the furniture sector, while it holds a well-consolidated leadership on the European and North-American markets for exports of other wood-products (e.g. door and window frames, tissue and coated papers);
2. fragmented and episodic internal supply, due to the above-mentioned economic and environmental constraints; moreover the internal supply is not homogeneously distributed (Table 3). Most of the productive high forests (mainly coniferous) are in the north-east[1] while coppices predominate in the central areas. The only relevant examples of forest plantations are the poplar stands in the Northern plain areas of the Po valley. By contrast with the overall situation of wood productivity in Italy, poplar plantations probably represent the most productive investment in the forest sector in Europe[2] ;
3. a consequent low self-sufficiency rate, i.e. around 35% for semi-finished products, as shown in the last column of Table 3; part of the reason for this, besides the economic and environmental constraints, is the fact that Italy's geographical position and international location is such that imports from neighbouring markets (mainly Austria, Croatia and France) are easier and more rapid than purchases on local markets. For example, in the softwood market the commercial

Table 3. Italian forest products market in 1985, 1990 and 1994 (1000 cubic metres in equivalent volume of rough wood).

	1. Domestic production	2. Import	1.+ 2.	4. Export	5. Apparent consumption	4. -2.	1. / 5.
rough wood							
1985	9 448	5 496	14 944	12	14 932	-5 484	63.3
1990	8 038	7 150	15 188	19	15 169	-7 131	53.0
1994	8 352	7 645	15 997	4	15 993	-7 641	52.2
semi-finished wood products*							
1985	10 222	18 081	28 303	888	27 415	-17 193	37.3
1990	11 931	21 769	33 699	1 120	32 579	-20 684	36.6
1994	12 102	23 138	35 240	1 080	34 160	-22 058	35.4

Sources: 1985 and 1990: FAO, Yearbook of Forest Products, Rome; 1994: ECE/FAO, Timber Bulletin and estimates. (1994: estimates).
*: sawnwood, particle- and fibre-boards, pulpwood, plywood, veneer sheets, sleepers.

1 The north-east of the country is made up of three regions (Veneto, Trentino Alto-Adige and Friuli-Venezia Giulia – Figure 4) of the total of 20 Italian Regions.
2 With NAI of 20-25 m^3/ha, rotation periods of 8-10 years and with the predominant use of the final harvest for high-quality plywood production, poplar plantation investments can reach an Internal Rate of Return of 7-10%, being competitive with maize and soybean crops.

flow between Austria and Italy is, quantity-wise, exceeded only by that between Canada and the USA. Furthermore, due to the size of production, the wood, furniture and pulp and paper industries need continuous, homogeneous and reliable timber provisions, which can only be guaranteed by foreign supply.

Table 4. Wood domestic removals (1000 cm - 1994)

	from forest land	from other land*	total	% of total removals	% of industrial roundwood removals
total removals	8 352	1 107	9 450	100	–
• fuelwood	5 076	398	5 474	57.9	–
• industrial roundwood	3 276	701	3 976	42.1	100
roundwood					
• coniferous	1 273	28	1 301	13.8	32.7
(of which in north-east)	955	4	959	10.1	24.1
• broadleaved	2 003	680	2 682	28.3	67.3
(of which poplar)	929	649	1 578	16.7	39.7

Sources: ECE/FAO, Timber Bulletin; ISTAT, Bollettino Mensile di Statistica and estimates.
*mainly single tress, windbreaks, small wood plots in agricultural areas.

3. COST ACCOUNTANCY IN ITALIAN FARM FORESTRY

3.1. Cost and Revenue studies in the context of forest statistics

The compilation of forest statistics is based on several sources of information, but mainly relies on data collected by the forest services (both regional and federal corps). A quantity of data are collected by means of the application that each forest owner (private or public) must present to the forest corps before felling is done. This information includes forested area, harvested volume for each type of felling, and prices. Other information on forest surface, location, type or owner, species etc. are periodically collected by the agriculture census (every 10 years).

Other sources of information are represented by forest inventories. The first National Forest Inventory (NFI) was completed in 1985 and included all 20 regions. Silvicultural information was collected and processed at national and region level, but no economic analysis was done in the framework of the first inventory. The second National Forest Inventory was started in 1995 with some innovations with respect to the first one:

1. a wide range of natural resources were considered, not only forests, but also Non-Wood Forest Products (NWFP), fauna, grazing activities, and others;
2. a first economic assessment of natural and forest resources was included in the inventory. Growing stock was valued on the basis of discounted value of wood production and included in the assessment;

3. recreation, landscape value and protective functions of forest resources were estimated by means of several methods such as opportunity cost, contingent valuation and travel cost.

Currently NFI has been completed only in one region (Liguria), so the only data available on a national scale are, unfortunately, those of 1985. Comparing these data with the official statistics (ISTAT) some differences can be noted:

1. the forest area on the basis of NFI is 8.6 million hectares, 2 million ha more than the official statistics; this it due to the fact that official statistics are based on the existence of an owner. In this way many small forests that are not cultivated because they are fragmented in very small properties are not considered in the official statistics.
2. A different definition of forest was adopted in the NFI and ISTAT statistics (minimum size of forest, density, basal area, etc).

Other forest inventories are implemented at a regional scale. Since 1985 most northern and central regions adopted a “Regional Forest Inventory”. These inventories are, generally, more detailed than the national one, but data and results are often not comparable among regions.

Finally another important source of information is given by management plans. The formulation of a management plan is mandatory in the case of public forests, and it is strongly recommended also for private forests. Some regions (Trentino and Veneto) are currently establishing a monitoring system based on data from management plans. A wide range of good quality information is available (stocks, increments, cuts, prices, costs of harvesting, and etc.), but again, the comparability of data among regions is impossible.

3.2. Farm forest cost accountancy data networks in Italy

Currently there is no official data network for forest farms. Moreover, there are currently no plans to establish one in the near future.

Forest activities in agricultural farms are, in any case, only partially collected in the Farm Accountancy Data Network (FADN) when they exist within the investigated farm.

The FADN is managed by the National Institute for Agricultural Economics and includes about 18 thousand farms in all Italian Regions (INEA 1997). Actually the sample managed by INEA covers 5000-6000 farms more than that requested by the RICA committee. Unfortunately the FADN network this is not very useful for the purpose of this study for various reasons:

1. the sample is designed to take into account only farms specialised in agriculture;
2. small farms (less than 1 hectare of cultivated land) are not considered in the sample,
3. not only farmers, but also cooperatives, societies and others such as public bodies are included in the sample;

4. growing stock is not considered as part of the capital, the presence of woodlands is only documented in the farm description (crops and surfaces). Forest activities are included in the balance sheet only when a forest product is sold by the farmer (i.e. farm use of fuel-wood is not considered);

For the above reasons any possible extension of FADN to farm forestry needs a revision of the structure of the balance sheet and a re-formulation of the sample.

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NETHERLANDS

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ABSTRACT

In this paper the method, financial results and future developments of the Accountancy Data Network for private forest enterprises in the Netherlands are described. For this network, accountancy data of about 150 privately owned forest holdings is (yearly) gathered in order to keep track of the developments of the financial results and the management costs of the forest holdings, based on commercial micro-economic principles. The current sample is representative for existing forests in private ownership with a surface area of more than 5 hectares in the three most important forest regions in the Netherlands. The longest series of financial results (from 1975 until now) is available for holdings with a surface area greater than 50 hectares. In this paper some of these results are illustrated. Finally, information requirements and future scenarios concerning the Accountancy Data Network are presented.

1. INTRODUCTION

Compared to most other European countries, the total area of forest in the Netherlands is rather modest. The last detailed study (CBS 1985-1991) counted 334,000 hectares. That is less than 10% of the total surface area of the Netherlands. This area has increased since then, but exact figures are not available.

A second source of data is provided by the annual census carried out by the Forests Authority. This only takes into account forest holdings with a surface area larger than 5 hectares, and the forest area registered with the Forests Authority is app. 260,000 ha or 78% of all forest. The information registered with the Forests Authority includes information on legal ownership: 36% of forest is in private ownership (Table 1). Part of this, however, is owned by (large) nature preservation organisations which act more or less as public bodies. Ultimately, almost 60,000 hectares of forest is owned by more than 1,500 private owners, each owning more than 5 hectares of forest. The extent to which these can be classi-

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Table 1. Distribution of ownership of Dutch forest a) according to category of ownership in %

Category of ownership	1975 b)	1989 c)	1991 c)	1993 c)	1995 b)
Privately owned (account-data network)	37.7	25.3	24.3	22.8	22.4
Nature preservation org.	9.1	12.1	12.2	13.4	13.2
Total privately owned forest	46.8	37.4	36.5	36.2	35.6
State Forestry Commission	23.9	31.2	32.4	32.0	32.5
Other state ownership	8.6	9.2	9.3	10.6	10.4
Local authorities	19.5	19.2	18.6	18.1	17.6
Other publicly owned forest	1.2	3.0	3.2	3.1	3.8
Total public ownership	53.2	62.6	63.5	63.8	64.4
Total	100	100	100	100	100

a) Excludes forests smaller than 5 hectares; b) Source: Forests Authority; c) Source: Forests Authority and annual reports of the State Forestry Commission.

fied as forest holdings in the strict sense is not known. A large portion of these forests are found on country estates where agricultural activities also form part of the business activities: an earlier study has shown that the majority (around 60%) of privately owned forest in the Netherlands (for owners with more than 5 hectares of forest) is farmed in combination with agricultural land (Rijk 1992). There is no industrial forestry in the North American sense (Hyttinen et al. 1997) in the Netherlands.

2. HISTORY OF THE ACCOUNTANCY DATA NETWORK FOR PRIVATE FOREST HOLDINGS IN THE NETHERLANDS

In 1968, the first steps were taken to set up a Data Network for *private* forestry in the Netherlands (Veldhuyzen 1975). The impulse for this was given by the constantly weakening economic position of Dutch forest holdings, in part as a result of the closure of coal mines. The Accountancy Data Network was finally up and running in 1975. First of all, a sample of holdings was selected with more than 50 hectares of forest in the three most important forest regions in the Netherlands. The expenditure was subdivided according to type (wages and salaries, third-party work, equipment, raw and auxiliary materials, business premises, land and standing timber, management and supervision, miscellaneous), and the income was subdivided into timber income (standing and felled), other operating income and various subsidies. The income was soon further subdivided, first into thinning and final cutting and later into softwoods and hardwoods. From 1984, the expenditure was further subdivided into forestry management activities: the cost centres. In 1989, sampling was thoroughly revised, meaning an expansion to include holdings with surface areas between 5 and 50 hectares. This took the total number of holdings involved in the sample from 91 to approximately 150. By reallocating certain tasks, this data could still be collected from these holdings by one person.

3. METHODS USED

3.1 Structure of the sample

The current structure of the sample comprises a permanent group of around 150 holdings and is classified according to forest region and surface area category. The group changes from time to time with the departure of a farm from the permanent group, usually after it is sold to a large nature preservation organisation. These businesses are then replaced by other holdings in the same surface area category and region. Because the surface area category is characteristic of the class, businesses can shift to a different class if they expand or reduce the forest area. However, the holdings remained in their original classes up to 1991, when the situation proved unworkable. This now means that situations can occur where a particular class of sample holdings in a certain class is threatened with extinction because the holdings in that class shift up to another class. This would mean that new holdings will have to take their place in the corresponding subclass.

The current sample is representative for existing forests in private ownership with a surface area of more than 5 hectares in the three most important forest regions in the Netherlands. Private forests in the western Netherlands and in the extreme north, totalling almost 4,100 hectares, have been left out of the sample because of the cost. New forests laid under the EC scheme to reduce agricultural surpluses (forest holdings) are not yet eligible for inclusion in the sample for various reasons. The ultimate target population is currently 54,529 hectares in size. The sample is structured according to class, with 5 surface area categories, and 3 regions, making a total of 15 subclasses. The number of holdings was chosen in such a way that the relative standard deviation of the average operating income and expenditure per hectare of the entire sector is never greater than 6%. The standard deviation of these target variables per surface area category and per region actually turned out to be acceptable. The sample covers 11% of the number of holdings and 45% of the total surface area of the target population. However, there are differences per class: in the surface area category up to 25 hectares, the coverage is 3.3%, and of the holdings with a forest area greater than 250 hectares, more than 68% is covered by the sample (Table 2).

Table 2. Sample density per surface area category and per region in 1995

Surface area category/ Region area	Sample size in 1995 (number of holdings)	Sample size as % of population	Sample surface as % of total surface area
5 - 25 hectares	31	3.3	3.8
25 - 50 hectares	28	13.6	15.1
50 - 100 hectares	28	21.9	23.7
100 - 250 hectares	34	56.7	58.8
> 250 hectares	28	68.3	82.4
Northeast	54	9.0	42.9
Centre	53	14.6	46.5
South	42	10.4	46.0
Total	149	10.9	44.9

3.2 Accountancy Data Network

Data on the holdings is gathered in order to keep track of income and expenditure for operating the holdings, based on commercial microeconomic principles. To do this, accounts must be kept per transaction (cost and yield) and not on a cash basis (income and expenditure). Most private forest holdings in the Netherlands, though, are not obliged to keep accounts because income from forestry is exempt from income tax (since 1926). As a result of this (in part at least), only outline accounts are kept by the holdings. There is no compulsion to produce a balance sheet which means that insight into the capital position and the profitability of the business is lacking.

In the historical summary (Section 2), it was already indicated that the costs were subdivided according to cost type and later according to cost centre. These cost types are then further subdivided into cost subtypes (see Figure 1). Similarly, the cost centres are subdivided into main cost centres and cost subcentres (see Figure 2). The divisions could be improved here and there. For example, the management and supervision items are activities which are carried out by the proprietor, his staff or by third parties. In fact, these are cost centres and not cost types. These modifications will be put off until other more important changes have been made, so that the continuity of presentation is not affected.

Costs according to type:

Labour costs (comprising: staff wages, various charged labour)
Third party labour (according to various activities, see also cost centres)
Equipment costs (fuel, maintenance, depreciation, interest, business use of vehicles)
Raw and auxiliary materials (seed and planting stock, fertilisers and pesticide, other)
Forestry buildings (standard amount per m^2 for maintenance, interest, depreciation)
Land and standing timber (ground rates and water rates, Forests Authority levy, forest fire insurance)
Organisation, management and supervision (organisation and management according to person responsible, supervision according to person responsible, management plan, collaboration, other management costs)
Other operating costs (contributions and subscriptions, third party liability insurance, pensions, other)

Yields:

Tree harvest (thinning wood, final cutting and fuel wood sold on the stump; thinning wood, final cutting and fuel wood felled)
Other operating income (hunting fees, Christmas trees, etc., recreation, other)
Incidental earnings
Subsidies and contributions (Performance reward scheme, unprofitable activities, reforestation, Sheltered Employment Act scheme, collaboration projects, other)

Figure 1. Summary of cost types and yields

Infrastructure (comprising roads and paths, watercourses and fencing)
Regeneration (planting in, filling up)
Forest tending (sapling maintenance, unprofitable thinning, pruning and lopping, anti prunus measures, future trees)
Tree harvest (thinning, final cutting)
General costs (organisation and management, marking for felling and measuring, supervision, management plan, other management costs)

Figure 2. Cost centre summary

Another important point is that the current accountancy data system does not include costs of the capital tied up in the ground or in the standing timber. The background to this is that their valuing is very difficult as a result of statutory restrictions imposed by the government (e.g. replanting obligation) and as a result of technical problems in measuring (Slangen 1976). Similarly, increases in value as a result of growth are not taken into account in the operating accounts. Theoretically, this increase in value is expressed in the revaluation reserves on the balance sheet. By referring to the going concern concept in microeconomics as well as to the objective of many forest owners, who are supposedly not out for profit but only want to maintain their forest and look after their personal requirements, not too much weight is generally attached to the fact that the costs associated with the increase in value are not taken into account.

4. RESULTS

The longest series of results is available for holdings with a surface area larger than 50 hectares. Figure 3 shows the development of the operating results for this group from 1975. The graph shows that the results underwent a structural improvement in the transition from the seventies to the eighties. Results seem to be falling somewhat in recent years. Worth noting is that from the beginning of the eighties, the results expressed in nominal and real terms scarcely differ. This has to do with the low level of inflation in recent years. Holdings with a surface area between 5 and 50 hectares generally produce a much lower result (the difference is often more than NLG 100) which is also less stable in the same period.

Figure 4 shows the difference between costs and yields. In the same period that operating results showed a marked improvement (around 1980), there was a reduction in costs, particularly because of a large lay-off of labour. Yet at the same time, the yields remained more or less at the same level. The mechanism was a different one in the nineties. It would seem that there was no more room to further save on labour costs. It is particularly worth noting that the costs for organisation, management and supervision have not fallen, despite the reduction in labour. This would seem to suggest that managers have been loaded with additional duties. In the period investigated in the study, the yields have fallen constantly. Until the end of the eighties, this was mainly

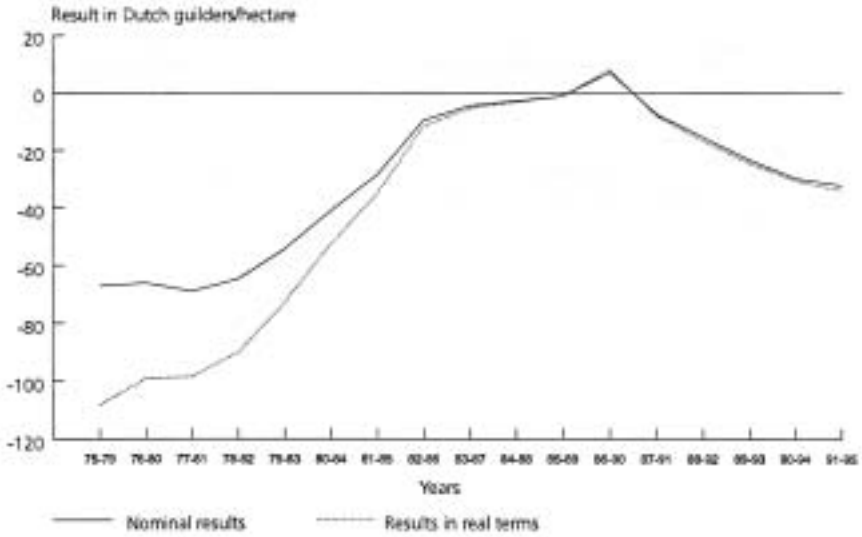

Figure 3. Average operating results private forest farms with a surface area of more than 50 hectares (moving five-year average).

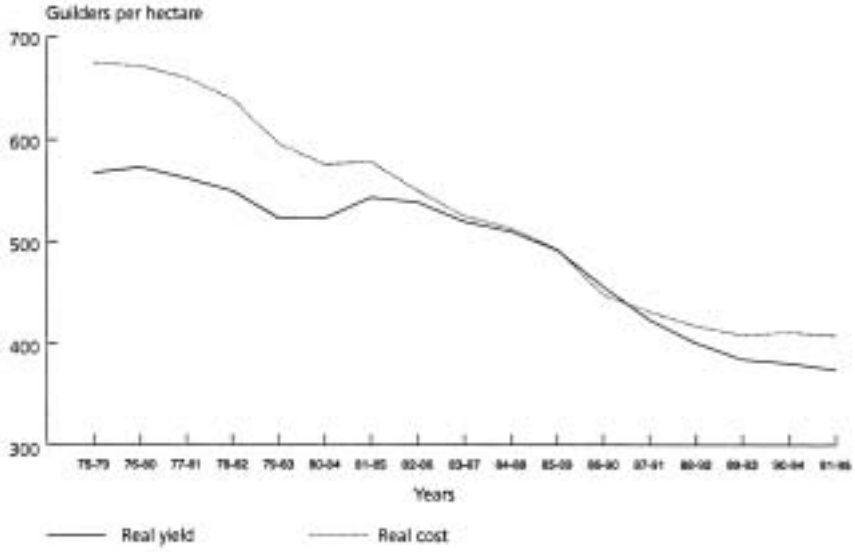

Figure 4. Income and expenditure of private forest holdings with a surface area of more than 50 hectares (moving five-year average).

attributable to a reduction in subsidies, although reduced income from timber sales also played a role. The fall in income from wood seems to be strongly linked to the development of the price per m^3 of thinning wood sold on the stump. In recent years, this has shown a strong downward trend (see Figure 5).

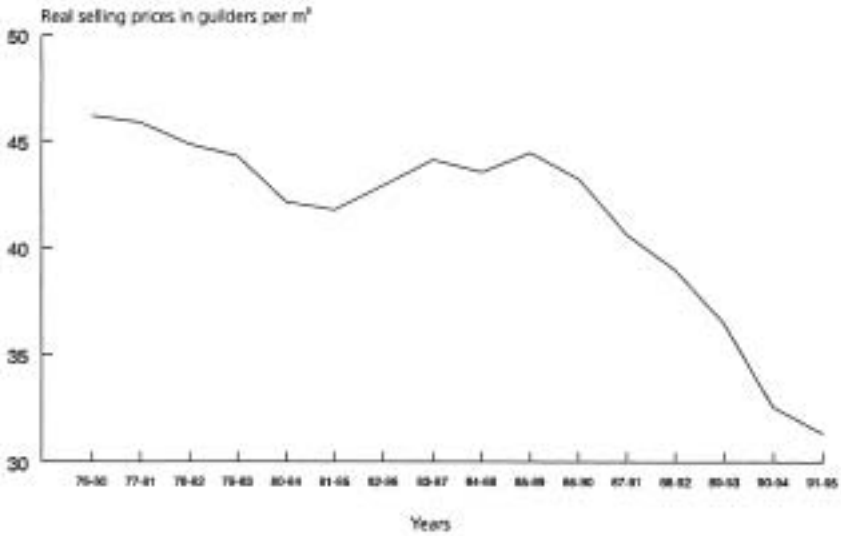

Figure 5. Real selling prices of wood in Dutch guilders per m^3 (moving five-year average).

5. INFORMATION REQUIREMENTS AND FUTURE SCENARIOS

As far as information requirements are concerned, we can make a distinction according to target group. In this report, we will primarily look at the information requirements of the policy making bodies, because this is where the reverberations of social discussion on topical issues in forestry are felt. Apart from this, the policy makers also need economic analyses (Hekhuis 1991, Van den Hoek, 1986, Schrijver & Hillebrand 1997). Finally, the forest holdings themselves also have specific information requirements. These needs are met by a system for making comparisons between businesses and by study groups. The information requirements amongst the policy making organisations are connected with various issues, the most important of these being:

- multifunctional forest management;
- small-scale forest management and natural regeneration;
- sustainability;
- forest expansion.

As far as the question of multifunctional forest management is concerned, there is currently discussion going on in the Netherlands on appropriate remuneration for forest owners who carry out activities which are beneficial to society or the community as a whole (the large majority of privately owned forest is open to the public), for which no direct remuneration is available in the market. In the next report on the operating results of the Dutch private forest industry (Periodic Report 29-96), a further breakdown/ allocation of costs will be made according to cost bearer. To achieve this, forest

managers were asked to indicate per activity for which function (cost bearer) the activity is (mainly) carried out. A distinction is made between the following functions of the forest: wood provision, recreation, culture/history and landscape, nature and the environment, hunting. The results could play an important role in the discussion on the remuneration for the functions for the public good because they provide insight into the scale of the efforts that forest owners make for these various functions. There is still a lot of work to be done on the methods, particularly in working out clear product definitions, gaining insight into the demand from society for these products, and a contribution to the solution of the valuation issue (joint costs) also connected to this topic.

Other subjects which will affect the organisation of the Accountancy Data Network in the near future are small-scale forest management and large-scale application of natural regeneration. A study that was recently made discusses the economic consequences of the introduction of other management systems than the traditional final cutting system at some length (Wieman and Hekhuis 1996). This study shows among other things that especially by using natural regeneration, management systems that are applied on a smaller scale and on a more ecological basis can be more attractive from an economic point of view than the traditional system. The application of natural regeneration was also boosted by the discontinuance of subsidies for replanting. One of the consequences of these developments is that the distinction between thinning and final cutting is fading, or at least is now defined differently. This means that the current coding system will have to be revised.

As far as economic sustainability is concerned, the Dutch government has formulated the objective that 80% of the private forest holdings of more than 50 hectares should achieve positive results before the year 2003. No clear objective has been formulated for smaller holdings. The results per hectare in the surface area categories of 5 to 50 hectares are also considerably poorer than those of the larger businesses. It is expected that the wish of IUFRO to also take into account the results of forest holdings of less than 5 hectares (IUFRO 1989) will not be given much support by the Dutch policy makers. The fact that there is so little interest (on the part of the policy making bodies) in private forest holdings of less than 50 hectares – let alone less than 5 hectares – is somewhat peculiar, as these small holdings account for a large part of the total area of forest (businesses with less than 5 hectares of forest represent app. 40,000 to 50,000 hectares of the total surface area), and are therefore of great importance to economic sustainability.

In agricultural businesses, more than 3,500 hectares of new forests have been planted since 1989. The ultimate aim is to plant 30,000 hectares of new forest in agricultural business before the year 2020. In the long term, continuation of the sample as before would no longer give a representative picture of the operating results of the private sector as a whole. The problem with the addition of newcomers to the sample group is the fact that they are totally different from the forest businesses taken into account in the sample up till now. Not only their forests are extremely young compared to existing forests, but also the results per hectare are much higher in the first years because of the subsidies. In addition, this partly concerns subsidies for temporary woods (so far 2,000 hectares, although there is a tendency towards more permanent forests), the permanent existence of which is uncertain. Even if these businesses were classified separately, it

remains to be seen whether it would be sensible from the viewpoint of clarity and continuity to include these businesses in the current sample group.

Finally, LEI-DLO can report a novelty that will influence the data network for forest holdings. Work is in progress at the institute on making uniform the data networks for agriculture, horticulture and fisheries, also covering the accountancy data network for private forest holdings. One of the areas that will be focused on is the degree to which forests can be compared to permanent orchards. The methodological problems of sub-accounting systems will also be discussed in detail.

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NORWAY

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ABSTRACT

NILF gathers annually account statistics for agriculture based on tax accounts which are converted to management accounts. Contributors to this special survey of farm forestry statistics are selected from the holdings which provide account statistics for agriculture. In 1995 more than 250 farmers participated in the forestry survey. The statistics include figures on stocks and yields, roundwood cut and logging, labour input, production income, costs and results, investments and financing, and a balance sheet.

Keywords: *Farm forestry, management account, forestry survey*

1. WHAT IS NILF

The Norwegian Agricultural Economics Research Institute (NILF) is an independent research institute under the Ministry of Agriculture. NILF provides background material for general agricultural economics decisions, economic development and decisions on farms and rural development. NILF collects, processes and interprets large amounts of data on Norwegian agriculture, both at the individual farm and comprehensive levels. Through a number of permanent tasks that the institute is obliged to perform, and through research projects that the institute undertakes, NILF is one of Norway's main producers of data on economic conditions within agriculture.

2. FORESTRY IN NORWAY

The land area of the Norwegian main land (excl. arctic areas) is about 32 mill. hectares. About 1 mill. hectares are agricultural land and about

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- 7 mill. hectares are productive forest area.
- More than 75 per cent of the forest area is owned by private owners, the remainder is owned by companies and local and central government.
- Farm forestry, as defined by NILF, makes up about 1.5 mill. hectares,or 21 per cent, of the productive forest area.
- The total productive forest areas have a standing crop of 550 mill m^3.
- Roundwood cut for sale and industrial production is 9-10 mill m^3 a year, of which more than 90 per cent are conifers, the rest being broad-leaved timber.
- The gross value of timber delivered from Norwegian forests is 3-4 000 mill. NOK.

3. TAXES AND ACCOUNTING SYSTEM

In Norway almost all enterprises – both companies and self-employees – have to keep financial accounts in addition to tax accounts. Self-employees in agriculture, forestry and horticulture are exempt from this statutory rule and thus they only have to keep tax accounts. As in other countries, it is a voluntary decision to keep management accounts in addition to the tax account. Both the accounting year and the tax year is in Norway the calendar year.

There is no flat VAT system for agriculture in Norway. All farmers – like other self-employees and companies – are therefore accountable to the tax collector for VAT charged on their output but are allowed to deduct the VAT on their input. Therefore, in the management account all incomes and costs are entered without VAT. There are some groups of goods and services where there is no repayment for input VAT.

It is a special trading statement for both agriculture and forestry. The trading statements are very detailed and thus they are a great help in keeping management accounts. Agriculture is assessed as other industries on an annual basis, while in forestry a five year average income is assessed.

The management account differs from the tax account in various fields. Some of these differences are listed in Table 1.

4. SAMPLE SURVEY OF AGRICULTURE AND FORESTRY – STATISTICS NORWAY

Statistics Norway has worked out a sample survey of forestry for the years 1971-89. The samples for the period 1971-1979 were drawn from the Census of Forestry 1967. The samples for the years 1980-1989 were drawn from the census of Agriculture and Forestry 1979. The Census of Agriculture and Forestry 1979 was the first combined census of agriculture and forestry.

Since 1990, a yearly sample survey of agriculture and forestry has been performed. The samples are drawn from the Census of Agriculture and Forestry 1989, and include about 16 500 units with at least 2.5 hectares of productive forest area.

Table 1. Some comparisons between the tax account and the management account.

Matter	Tax account	Management account
Accounting principles Depreciation methods	Historical cost principle Usually declining balance depreciation	Historical cost principle Straight line depreciation
Depreciation of groups or individually assets	Both depreciation of groups of assets and depreciation of individually assets	Depreciation for each depreciable asset
Stock valuation • Purchased goods	Purchase value	Purchase value
Stock valuation • Self producing goods	Cost value	Net realisable value
Balance sheet	Low importance to separate current assets and fixed assets	High importance to separate current assets and fixed assets
Information about data beyond economics data	Little	A lot (man hours, code for terrain, code for equipment etc.)
Transfer of data between agriculture and forestry	Little	A lot more

5. ACCOUNT STATISTICS FOR AGRICULTURE AND FARM FORESTRY – NILF

5.1 Definitions and principles

The Norwegian farm business survey started in 1911 and it includes at present more than 1000 holdings. This survey is carried out every year and it is organised on a voluntary basis, i.e. every chosen holding has volunteered to participate. There is no limit as to how many years a holding can participate. The farmer, however, cannot be older than 67 years.

The survey intends to represent commercial farming. That means that farm income shall be a considerable part of the farm family's income. With farm income we mean income from agriculture, forestry, and other on-farm activities. It has been decided that the population should include farms where more than 30 percent of total income is generated from on-farm activities. Because of practical problems, forestry and other activities are unfortunately not taken into consideration when recruiting new holdings to the survey. Also, when classifying the holdings in types of farming, we do not take forestry into account.

For all holdings a detailed review of agricultural incomes and costs, and agricultural assets is produced. For all farms a family net income is calculated where also income from non-agricultural activities is included. It might be interesting to notice the way loans and interests are treated. Agricultural loans, forestry loans and other loans are not calculated. Therefore interests are taken into account only when calculating the family net income. When farm profits (or labour income in agriculture) are estimated, a rent on all agricultural capital is charged.

5.2. Criteria for the forestry survey

Many holdings in the agricultural survey have forestry activities. Therefore in 1966 NILF started a special forestry survey as a sub-sample of the agricultural survey. In 1995, the forestry sub-sample included about 250 holdings, and a detailed review of forestry incomes, costs and assets was produced. To be included in this sub-sample the sustainable yield must be at least 50 m^3 annually. This statistics are meant to represent the part of Norwegian forestry combined with agriculture, not the specialised forestry enterprises.

This means that we have to treat agriculture and forestry separately for all farms even when agriculture and forestry share some fixed resources, especially machinery. Often a rent has to charged, for instance when farm tractors are used in forestry transportation. As described in Chapter 3, agriculture and forestry are treated separately in the Norwegian tax system. This helps to make the division between agriculture and forestry.

The material is collected from South, South East and Central Norway up to the arctic circle. The material is classified into four size groups. The groups are 50-99, 100-199, 200-399 and more than 400 m^3 sustained yield annually. The farms are selected in a correct proportion according to the Census of Agriculture and Forestry 1989 (Census of Agriculture ... 1989).

5.3 Accounting system and grouping of data in forestry

The accounting system is very detailed. Therefore it is only shortly described here. Table 2 shows groups of the incomes, costs and balance. Note that creditors and debtors accounts are not defined as a part of the forestry account system (see Chapter 5.1).

Table 2. An abridged version of the accounting system for forestry

Incomes	Costs	Balance
Timber (sale):	Entrepreneurs	Growing stock, ground
Conifer:	Hired work:	Roads
• Sawlogs	• Cutting/hauling	Buildings
• Pulpwood	• Silviculture	Machinery, equipment
Broad-leaved	Machines from outside	Management plans
Fuelwood	Tractor from agriculture	Roundwood cut conifers
Timber for private use	Maintenance	Roundwood cut broad-leaved
Hired out machines	• Roads	Fuel and oil
Subsidies:	• Buildings	Other commodities
• Silviculture	• Tractor	
• Roads	• Other machines	
• Management plans	Commodities	
• Cutting/Hauling	• Plants, seeds	
Sold equipment	• Fertiliser, pest	
	• Fuel and oil	
	• Other commod.	
	Administration	

5.4 Data from outside the accounts

Since all the information is not recorded through the accounts, the farmer is asked to fill out a special form with information on the type of cutting carried out, kind of equipment used for transportation of timber, the time the timber was cut (season), kind of terrain, and the number of man hours used in cutting/hauling and silviculture.

5.5 Results from the account statistics

Appendix 1 includes some results from the account statistics for agriculture and farm forestry for 1995. A typical situation in farm forestry is that price and quantity are the two factors which have most impact on the financial result from year to year. The costs change less, and it is possible to compensate for the expenditures of logging and hauling by increasing the proportion of own labour. It is also possible to reduce the total costs for a short period of time with extensive activities in silviculture.

6. DATABASE FOR ECONOMIC DATA IN AGRICULTURE AND FORESTRY

Since 1991, all the material collected from farm accountancy has been assembled in a relational database. Figures for some years before 1991 can also be provided electronically. The database is also available for scientific work outside NILF.

7. FARM PLANNING

In order to take care of the total economy and management on farms, NILF has worked out methods and tools to be used by the farmers or by advisers in the extension service. This material comprises methods and tools for farm accountancy, planning and accounts analysis. NILF has also made computer programs for business planning and decision making at farm level.

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Appendix 1. Figures from the survey of account statistics for agriculture and forestry in 1995

		Size group. m^3/year					
		50-99	100-199	200-399	≥400	All forests	Per m^3
Some characteristics							
Number of forests in survey	No.	55	82	73	46	256	
Productive area of forest	ha	41	66	113	290	114	
Sustainable yield total	m^3/yr	70	140	280	765	280	
Sustainable yield	m^3/ha	1.7	2.1	2.5	2.6	2.4	
Volume cut	m^3	95	145	240	600	240	
Volume cut, % of sustainable yield	%	130	105	85	80	85	
Transport with agricult. tractor	%	70	85	85	60	70	
Labour in forestry[1]	hrs	210	270	450	660	360	1.5
Agricultural area	ha	17.2	21.0	20.1	24.7	20.6	
Total results, 1000 NOK							
+ Net farm income		191	176	158	107	162	
+ Net forest income		15	25	47	108	44	
+ Net income other occupation		19	20	33	55	30	
+ Wage income		116	110	83	119	105	
+ Pensions etc.		14	13	12	12	13	
+ Family labour in investments		6	5	4	4	5	
+ Income of capital		13	11	12	13	12	
= Left for labour costs and payment of interest		374	360	349	418	371	
- Interests of debts		27	34	27	49	33	
- Provisions for retired farmer		4	5	5	6	5	
= Total net income		343	321	317	363	333	
+ Extraordinary items, net		30	40	48	80	47	
- Paid taxes		119	93	102	111	105	
- Private consumption		222	218	228	250	227	
= Savings		32	50	35	82	48	
Forestry results, 1000 NOK							**NOK**
+ Income from timber		35	52	88	225	90	372
+ Other income		0	2	2	3	2	7
= Production income		35	54	90	228	92	379
- Hired labour and equipment		6	8	13	51	17	70
- Rented tractor from agriculture		4	6	9	12	7	31
- Administration		3	5	8	18	8	31
- Maintenance etc.		3	5	7	15	7	30
- Silviculture (net)		2	2	3	17	5	21
- Depreciation		2	3	4	7	4	15
= Costs		20	29	44	120	48	198
= Net forest income		15	25	46	108	44	181
Gross margin		19	30	53	132	53	217
Investments per ha	NOK	200	210	120	120	140	
per m^3	NOK	89	98	58	56	67	
% of result. excl. silviculture	%	49	52	28	27	33	

[1]Cutting and hauling totally managed by the owner

SWEDEN

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ABSTRACT

Some years ago the Swedish forest owners and the Swedish parliament/government reached a consensus that there should be no subsidiaries or fees in Swedish forestry. There is a common opinion in Sweden that the forest economy should not be manipulated and that market forces together with a modern forestry law form the most efficient way to develop the forest sector.

Earlier attempts to follow up and analyse the economy of private forestry through information from income taxation and inquiries have not been very successful. Such analyses are no longer made, partly because it is nearly impossible to separate forestry incomes and costs from the accountancy of agriculture and other small scale business.

The only official analysis that is made is a general analysis of incomes and costs in the whole forestry sector. This analysis, however, says very little about the efficiency and profitability small scale forestry.

In order to have a tool for measuring profitability in private forestry, The Swedish Federation of Forest Owners have developed a computer model for calculating the profitability of average private forestry holdings in four regions of the country.

1. HISTORY/BACKGROUND

The computer model has been developed and used gradually over the past ten years. The results are used for

- internal understanding of development of economy and profitability in private forestry; and
- discussions and argumentation with different governmental authorities about forest and tax politics.

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The results will also compared with similar calculations in Denmark, Norway and Finland.

2. THE MODEL STUDIES

The model handles forestry data, economic data and individual tax effects. Its output shows return on total capital in forestry. It is based on forestry data from all private forestry in Sweden but presented on a level corresponding to the normal size of a private forest holding in order to make it easier for the owners to relate to the figures.

The model has mainly been used to describe the actual situation. It can also be used to calculate different alternative situations, strategies and tax situations as well as the effects of different future development of prices, costs and tax system.

3. RESULTS

In the MOSEFA meeting in Woudschoten examples of computer sheets were shown (see Annex). They serve as a complete and pedagogical description of the actual forest and its economy and as an entrance form for anyone who wishes to see the calculation result when alternative inputs are used.

The model is based on spread-sheet technique. The advantages, in my opinion, are that the model has for many years been adjusted to practical needs and possibilities and that we now have time-series for practical Swedish small scale forestry for at least ten years.

4. THE FUTURE

The model will be further developed and introduced both to local forest associations and to the private foresters as a management tool. It is easy to replace the average forest holding, input data with forestry and economic data from the private foresters' own holdings.

ANNEX

MIDDLE SWEDEN, 1996, 70%

Area, ha	100	Volume, m^3ob/ha	133
Tree species, P - S - H	37-50-13	Site quality, m^3ob/year&ha	4,4
Growth, m^3ob[1]/year&ha	3,8		
Felling, m^3ob/year	266	Felling – of which thinning, %	15
Felling, % of growth	70	Felling – of which final felling, %	85

Age class	ha	Area, %	Volume m^3ob/ha	Total
0 -	5	5	14	70
3 -	10	10	8	80
11 -	10	10	20	200
21 -	6	6	53	318
31 -	7	7	97	679
41 -	9	9	152	1368
61 -	12	12	183	2196
81 -	13	13	211	2743
101 -	13	13	216	2808
121 -	9	9	197	1773
141 -	6	6	174	1044
S:a	100	100	133	13279

Felling / Cut	Age	%	m^3ob	m^3/ha	Area	Average diameter
First thinning	50	30	15	50	0,31	16
Second thinning	70	30	25	60	0,41	20
Final cut	100	100	226	245	0,92	25
Total			266			

Incomes	Volume	SEK/m^3ob	Income
First thinning	15	208	3186
Second thinning	25	229	5630
Final cut	226	254	57429
Total, average	266	249	66245

[1]Ob = over bark

Incomes (from first page), 66 245

Cutting costs	Volume	Felling SEK/m³ob	Fomarding SEK/m³ob	Total
First thinning	15	65	40	1608
Second thinning	25	49	36	2090
Final cut	226	43	28	16053
Total	266			19751
Average		45	29	74

Operations net	Volume	SEK/m³ob	Total
First thinning	15	103	1577
Second thinning	25	144	3540
Final cut	226	183	41376
Total	266	175	46494
Final cut area	1,03		

Silviculture costs	Area, ha	Plants/ha	Price	Total
Cleaning	0,10		1030	106
Soil preparation	0,88		1750	1534
Plants	0,57	2400	1,10	1497
Planting	0,57	2400	1,50	2042
Replanting*	0,21	400	3,50	289
Cleaning	1,55		2400	3712
Total				9181
Silviculture costs/ m³ob			35	

*Costs for both plants and planting

Other costs	Forest roads	3000
	Administration	2000
	Insurance	200
	Forestry fee	
	Other costs	
	Total	5200
	Total costs	34131
	Net income	32113

Net income (from second page), 32113

Capital etc	SEK/ha	Area	Without loans	With loans
Taxed value 1996	6500	100	650000	
Taxed value 1993	4800	100	480000	
Market value/taxed value			3,2	
Market value of 100 ha forest, SEK			1 536 000	
Capital placed in „forest account“			29 000	
Other capital				
loans, 1/3 of taxed value 1996				216667
Interest rate				10
Interest costs				21667
Net income before taxes			32113	10447
Annual returns (percent of market value)			2,09	
Tax calculation				
Adjusted own capital (räntefördelningsunderlag)			201700	-231633
State interest rate 8,88%				
For capital taxation			23962	-22885
left for next year for capital taxation			23962	-22885
For income taxation			8151	33332
Active, YES				
Social costs			1941	7936
Local tax 31,50			1956	8000
Above breaking point, NO				
State income tax				
State capital tax			7189	-6866
Total fees and taxes			11086	9070
Left after fees and taxes			21028	1376
Interest on market value after fees and taxes, %			1,37	

UNITED KINGDOM

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ABSTRACT

The paper begins by providing a historical context for the development of non-industrial private forestry (NIPF) in the United Kingdom. Following the Forestry Act of 1919, the Forestry Commission was charged with the principal objective of creating a principal reserve of home-grown timber. In the period prior to World War II, private sector involvement was concerned predominantly with the restocking of existing woodland. In the aftermath of World War II the emphasis changed. The private sector was charged with contributing substantially to an annual target of 33,000 hectares per annum. Unlike earlier periods, this was taken in direct conflict with agriculture, largely in the uplands of Scotland and Wales, and typically at a large scale often involving whole farm afforestation. Enumeration of the current extent of private small-scale woodlands within the UK is difficult since the last precise information emanates from the 1979-1982 census. Current estimates suggest that there are now 200,000 woodlands of less than ten hectares with a 100,000 different owners and covering 500,000 hectares. Sources of information on costs and revenues of private forestry are similarly various and intermittent. Forestry Commission surveys concentrate solely on traditional estate operations and have been designed to supply information for use in determining levels of planting grants. The last survey undertaken in this series led to three conclusions. Firstly, scale has a major effect on costs. Secondly, restocking is consistently more expensive than replanting. Thirdly, woodlands managed for environmental purposes included higher costs than average. The valuation of non-market benefits from NIPF is becoming increasingly important since such values are typically much higher than might be expected. Similarly, there is increasing interest in methodological aspects of cost accounting, particularly with respect to valuation changes of growing stock, the identification of direct costs, and the allocation of fixed costs. The paper concludes that recording arrangements similar to those existing for the FBS survey should be put in place in the UK. This will enable continuous monitoring of identical samples and annual reporting of results according to agreed conventions. Temporal continuity is

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important in the analysis, not only because of changing costs, but especially with respect to changes in the valuation of growing stock which can have a large impact on profitability

Keywords: *NIPF, policy, surveys, cost-accounting, farm-forestry*

1. THE CONTEXT OF NIPF IN GREAT BRITAIN

In 1914, in the absence of any systematic statistical information, Britain's forest cover was estimated to be about 1.2 million hectares, or five percent of the land surface. 90% or more of the timber used was imported. The existing woodland was in predominantly private ownership. In addition to traditional large-scale estates this total included many small woodlands, both on farms and as pure woodland ownership, with only 30,000 hectares of Crown forest. At the outbreak of the First World War, no statistics existed to show the volume of standing timber which could be made available in the short term should imports become restricted.

Considerations of the serious strategic implications of a potential timber shortage became an important part of government policy, and a parliamentary subcommittee was created in 1916 with the brief: "to consider and report upon the best means of conserving and developing the woodland and forestry resources of the United Kingdom, having regard to the experience gained during the war" (Ryle 1969). The committee's recommendations resulted in the passing of the Forestry Act, 1919, which led to the creation of the British Forestry Commission, with the principal objective of creating a "strategic reserve" of home grown timber sufficient to withstand a four-year interruption in supplies of timber from overseas. The principal method of achieving this was to be the afforestation of more than 700,000 hectares in the eighty years following the war. In the shorter term, the first ten years were earmarked for the creation of 63,000 hectares of new forest by State action, with activity in the private sector being predominantly in the restocking of existing woodland. A final feature of this early period of forest expansion was that there was an "abundance of ill-used or virtually unused land upon which to draw" (Ryle 1969).

This situation was to change dramatically in the period between the end of the Second World War and the present day, when government targets for continuing the creation of new woodland by 33,000 hectares per annum, predominantly in the private sector, but in a situation where there is no longer an "abundance of land" upon which to draw. A major factor in considering any aspect of farm and small-scale forestry in Britain is the general lack of forestry tradition and experience amongst British farmers, whose perception is that forestry and agriculture were incompatible and opposing forms of land-use. This is especially so in the uplands of Scotland and Wales (Hutton 1984) where the bulk of the afforestation took place. This dichotomy is naturally strengthened by tenant-farmers' lack of financial benefit from trees on their farms, which, under the Agricultural Holdings Act, 1986, remain the property of the landlord.

The emphasis remained initially on large-scale operations. Grant-aid for replanting small woodlands – in this case, defined as those less than ten hectares – was explicitly

excluded from post-Second World War forestry incentives (Scott 1992) on the grounds that greater public benefit would be gained by concentrating on larger forests. Although from 1950 onwards grants were available for the restocking of felled small woods and the creation of new small woods, the emphasis remained strongly on the afforestation of bare land. Forestry Commission research into costs, income and expenditure of private forestry from 1951 to 1992 was designed to provide relevant information to interested parties in the review of planting grants (Mitchell et al. 1994).

The earlier emphasis on the need for a strategic reserve of timber in case of an extended war gave way, in the nuclear age, to an emphasis on the need for economic returns of public investment in afforestation, whether by the State itself or through subsidised private plantings. In line with the times, these economic returns were originally judged in purely financial terms, with a strong emphasis on calculations of discounted costs and revenues. No grant aid was available for private woodlands if the primary objective was not timber production. By the 1970s non-market forest products were being included in cost-benefit analyses (Treasury 1972, for example), but still with the emphasis on large-scale afforestation projects. From then until 1988 there were many increasingly vociferous, and in many cases justified adverse comments on the environmental implications of large-scale afforestation. This was typified by blanket coverage of coniferous monocultures – principally Sitka spruce (*Picea sitchensis*) or lodgepole pine (*Pinus contorta*) in the wetter areas and Corsican pine (*Pinus nigra* spp. *maritima*) in the drier eastern areas. This rapid expansion of private sector afforestation was based on the then current taxation arrangements, which meant that not only could the costs of afforestation (including land-purchase) be set against the tax due on income from other sources, but also that by later manipulation of the way in which tax was assessed, no tax would need to be paid on revenues from timber sales. This phase ended in 1988 when the tax arrangements for forestry were changed. In place of tax-relief on expenditure, the incentive for future planting was to come from grant-aid. The criticisms of forestry practices were also heeded, with the result that guidelines for appropriate environmental management (covering wildlife and nature conservation; landscape design; water protection; and the provision of recreational facilities) were quickly introduced by the Forestry Commission. The guidelines are not enforceable by statute, but unless they are satisfactorily met, no grant-aid will be made available. Furthermore, for the first time it was not necessary for timber production to be an objective of the creation of new woodlands.

With so much earlier emphasis on large-scale afforestation, it is not surprising that, by the late 1970s, the state of Britain's small woods could be considered as neglected. Their condition is described in a series of reports (Gwent County Council 1976; Countryside Commission 1982, for example), and was characterised by poor quality stems of non-preferred species and by low stocking. However, these surveys did not share a standard methodology or cover the whole country so there is no national information on various aspects of these woodlands, be it on growing stock, age distribution or, in particular, ownership. The most precise published information available on the number and size of private small-scale woodlands (i.e. less than ten hectares) is from the 1979-82 census of woodlands and presented in Table 1 (Forestry Commission 1982).

However, even these figures were known to be incomplete and, allowing for a further

Table 1. Number and area of "other" British woodlands, 1982.

Size of Woodland	No	ha.
0.25 - 1.99 ha.	108,460	109.755
2.00 - 9.99 ha.	62,180	242,840

increase since 1982, a current estimate would be that there are now 200,000 woodlands of less than ten hectares, with 100,000 different owners and covering 500,000 hectares (Scott 1992). This represents nearly 20% of the total forest area of Great Britain. Of this, about 300,000 hectares are farm woodland, and the significance of this in loss of potential production is illustrated by the fact that even in 1987, when describing the components of the private sector of British forestry, Hart (1987) felt it necessary to make the distinction between growers (the traditional owner; the absentee investment individual or co-operative owner; and institutions) and farmers (Coverts, spinneys, shelterbelts and hedgerows).

At the same time that the tax changes were made in 1988, a new Farm Woodland Scheme (FWS) was introduced, with the specific principal aim of diverting surplus agricultural land from production. Initially, the overall rate of new planting, which had been running at about 28,000 hectares per year, fell dramatically. The take up of the FWS was much lower than the target of 36,000 hectares of farmland in the three years 1988 to 1991. Subsequent adjustments to the FWS, which was also renamed the Farm Woodland Premium Scheme (FWPS), increased the attractiveness of the scheme to farmers. The pattern of planting of all woodland types from 1989 to 1993 is shown in Table 2. The abrupt changes in planting activity clearly illustrate that behaviour is at least in part associated with financial policy measures.

The pattern of woodland establishment on farms is complex, with differences at national level (the increase in 1989 came almost totally in Scotland and Wales, with little change in England) and also in the type of land planted.

Three points should be made in the context of this paper. Firstly, that in general the take-up of the planting grants is on larger farms which have fewer financial pressures, thus having little impact on the whole farm budget; and not on smaller, more marginal holdings where cash flow advantages could make a significant impact to farm viability (Appleton and Crabtree 1991). Secondly, that while forestry cost and revenue information is clearly necessary to enable farmers to make decisions on woodland planting, the opportunity cost of the alternative uses of the land are equally important and, in the current climate of uncertainty, not necessarily easily calculated. Finally, that despite generally positive attitudes to existing woodlands, many farmers (especially those with no existing woodland on their farms) typically exhibit hostility to the idea of converting agricultural land to woodland (Watkins et al. 1996).

The current overall balance of ownership is in the region of 60% private and 40% public, which is a significant change from the position in 1987, when the proportions were approximately equal. The proportion of privately owned forest is expected to continue to increase steadily, because more new planting is currently being carried out by private owners and because the sale of publicly owned forests (mainly of smaller,

Table 2. Woodland planting in Britain 1989 to 1993 by type of planter.

Year	Forestry Commission		Private Non-Farm		Farm		Total
	ha	%	ha	%	ha 1	%	ha
1989	4,105	14.1	24,9822	85.8	126	0.1	29,113
1990	4,081	20.9	12,767	65.5	2,639	13.6	19,487
1991	3,515	18.5	11,859	62.6	3,577	18.9	18,951
1992	2,999	17.5	10,782	62.9	3,366	19.6	17,147
1993	2,356	9.8	13,206	55.1	8,3903	35.1	23,952

1. FWS and FWPS plantings only.
2. This level of planting occurred in the first planting season after the 1988 tax changes.
3. Includes approvals for the 1993 planting year under FWPS.
Sources: The Forestry Industry Committee of Great Britain (1994). MAFF, Scottish Office Agriculture and Forestry Department (SOAFD), Welsh Office Agricultural Department (WOAD) & Department of Agriculture Northern Ireland (DANI).

isolated blocks) which began in 1981 and largely accounts for the shift in ownership will continue. The question of transferring the whole of the publicly owned forest estate to private ownership, and possible ways in which that could be done, have recently been considered by a government working party, with the result that ownership will stay in the public domain for the time being.

It can therefore be seen that when considering the costs and revenues of farm and small-scale forestry in Britain, the following factors are particularly relevant:

- The costs of establishing new woodland on agricultural land.
- The costs of silvicultural improvements to existing neglected woodland, primarily broadleaved, usually with environmental benefits as a major management objective.
- The revenue which can be raised from these existing woodlands. This is associated with a strong need to find markets for small quantities of timber at the local scale.

Conversely, while there has been much talk of the future possibility of farm woodlands making a significant contribution to farm incomes, it is probably true to say that very few farm households currently rely on income from woodlands for their economic well-being, and that the planting of trees will be seen as only one of a range of possibilities when farm households consider diversification options.

2. SOURCES OF INFORMATION

2.1 The private woodlands survey

From 1951 until 1988 the Forestry Commission funded research into the costs and revenues of private forestry, published as two series of Economic Survey reports: Costs of Operations (e.g. Holmes and Stowe 1979); and Income and Expenditure (e.g. Balman

and Dolan 1974), and concentrating solely on traditional estate operations. These were specifically designed to supply information for use in establishing levels of planting grant. In 1991 it was decided that information on costs could be obtained more cost-effectively through periodic consultations with practitioners in the industry, without having to carry out a full-scale survey. Accordingly, the Forestry Commission decided to wind-down the survey and publish the results of the final three years' work. (Mitchell et al. op cit).

The sampling frame used in the survey was drawn from a database of approved applications, which were, in the vast majority of cases, either for assistance with restocking of felled sites, or for the planting of new woodlands. This database was supplied by the Forestry Commission as part of five grant schemes which came under the Commission's administration then in force. A random sample of all types of forest properties was chosen, and of those approached 62% agreed to co-operate. It was necessary to establish minimum standards of record-keeping before a property could be included, and after this had been considered 794 properties were surveyed. This represented 34% of the total sampling frame by number, and 10% of the total area of private forest ownership of Great Britain.

Ownership was classified by four categories:

- *Traditional* – typified by having a resident owner, a full-time forest manager, directly employed labour and a range of land uses other than forestry – usually agriculture and/or sport.
- *Investment Estates* – typified by having absent owners, usually no residential accommodation, management by a specialist company and with commercial forestry as a single land use. These estates were usually very large, and typically had few age classes.
- *Farm woodlands* – the primary land use was agriculture, with little provision for sport and forestry subsidiary to farming activities; woodland blocks were small, primarily providing shelter for crops or animals. Initial planting was often carried out by a contractor, with subsequent management in the hands of the farmer.
- *Amenity/other woodlands* – mainly small amenity and town council plantings, often with a wide range of species. Management was usually undertaken by a specialist company or by the council itself. Aims of management were diverse, but landscape, recreation and conservation were usually important.

Table 3. Number of management units and area of woodland surveyed in Great Britain by ownership and exposure class, 1991.

	Traditional		Investment		Farmer		Other		All types	
Exposure class	Nº	Area (ha)	Nº	Area (ha)	Nº	Area (ha)	Nº	Area (ha)	Nº	Area (ha)
Lowland	67	17512	61	3388	76	1179	73	2932	277	25288
Inter	81	28033	67	7776	61	941	57	2078	266	38828
Upland	44	18947	166	54015	16	768	25	4704	251	78434
All classes	192	64492	294	65179	153	2888	155	9714	794	142550

A further primary classification was by ‘exposure class’. The three classes used were ‘lowland’, ‘intermediate’ and ‘upland’ and were determined by mean annual wind-speed and an accumulated temperature above 5.6°C. Classifications for each holding in the sample were taken from a map prepared by the Macauley Land-Use Research Institute, Aberdeen (Bibby et al. 1988). The sampling frame eventually used is presented in Table 3.

2.2 Other sources of information

2.2.1 Woodland establishment

Two government departments are actively involved in ongoing research programmes: the Forestry Commission; and the Ministry of Agriculture, Fisheries and Food (MAFF). For example, in 1992 MAFF spent £1.75m on research to provide support for the FWS and FWPS, in such areas as ‘tree establishment’; ‘control of mammal damage’; and ‘the utilisation of farm woodland products’ (Costigan 1992). The Forestry Commission Research Division has also worked for a number of years on aspects of establishing woodlands, both on its own account and in conjunction with other bodies. One such collaborative experiment investigating methods of establishing trees on former intensively-cropped arable land started in 1988 and involved the Forestry Commission, MAFF, and two commercial organisations (Williamson 1992).

The results of such research are disseminated through papers in academic journals, and also through official publications. Of particular importance are two Forestry Commission publications: Handbook 8: Establishing Farm Woodlands (Forestry Commission 1992); and Farm Woodland Planning (Insley 1988). The former gives detailed information about the techniques required in different situations, while the latter includes a comprehensive section on costs of operations. Each operation of the establishment phase, from fencing through ground preparation to weeding and cleaning is considered for each site-type likely to be encountered; and each operation is broken down into the individual components of machinery, labour and material requirements in terms of time and quantity, with current prices for each included. The prices will of course vary with time and total costs will be recalculated accordingly, but the basic information will remain relevant until such time as technology changes. Research in this area continues (e.g. Britt et al. 1996).

Detailed information on establishment costs is available in two works by Cyril Hart, O.B.E. This is based on his own extensive experience in private woodland management and on information supplied by “owners, foresters, managers, economists, consultants, contractors, merchants and sawmillers” (Hart 1987) as well as major customers for forest products. “Private Woodlands: a guide to British timber prices and forestry costings” contains a section on costs of land, labour, overheads, establishment and the tending of new woodlands. Some of the costs are disaggregated so that changes in price can be used in recalculations, while others are quoted as aggregate costs and are now outdated. A more recent work is also available (Hart 1991), but the author has no plans for further revisions (Hart, pers. comm.)

2.2.2 The management of existing woodlands

There is a very large resource of existing but unmanaged woodland. Research falls into two main areas, with recent work on techniques of management, especially for environmental improvement (e.g. Countryside Commission 1990), but more significantly, on marketing research. Existing markets for thinnings were investigated in 1992 (Lindsay Marketing Services 1992) and an overview of all current markets was completed in 1994 (International Marketing Services 1994). A range of markets in Wales was provided by Coed Cymru (1989) and this has since been developed into a "Welsh Wooduser Database" (Doolan 1993) which contains information on more than 500 individuals or firms who will purchase timber from Welsh farm woodlands. Mitchell et al. (op. cit.) suggested that operational costs were higher than average in woodlands managed for environmental and amenity objectives and this was investigated and confirmed in a study in Wales in 1995 (Samuel et al. 1997).

2.2.3 Non-market values

This is an increasingly active research area from the perspective of value to society and for large-scale forestry. Some work specific to farm- and small-scale forestry has been undertaken, particularly with respect to recreational values (Whiteman and Sinclair 1993; Price 1993; and Samuel et al. 1997 [in press]). Such values, as mentioned above are now considered when grant assistance is reviewed.

3. PROFITABILITY ANALYSIS

3.1 Existing examples of profitability analysis

Historically, the types of analyses undertaken using survey data involve some elements of cost accounting. Firstly, operational costs included expenditure on 'establishment' which could encompass the first nine years from time of planting; and 'maintenance' from year ten onwards. Overhead expenditure was identified as a separate item but all three were typically analysed according to the following groupings:

Country	'England', 'Scotland', and 'Wales';
Exposure Class	'Upland', 'Intermediate', and 'Lowland';
Ownership	'Traditional Estate', 'Investment Property', 'Farm Woodlands', and 'Other';
Planting Type	'New Plantings' or 'Restocking of Felled Areas'; and 'Size' of operation.

The value of timber production was analysed according to the following groupings:

Market	‘sawlogs’, ‘small round wood’, ‘pallet material’, ‘fencing material’, ‘firewood’ and ‘niche products’;
Point of Sale	‘standing’, ‘roadside’, ‘delivered’ or ‘other’;
Type of Felling	‘clear fell’, ‘thinning’, ‘windthrow clearance’, or ‘mixed’;
Species	‘coniferous’ or ‘broadleaved’.

The results presented typically led to only three conclusions:

1. The scale of operations has a major affect on costs, particularly when the size is less than ten hectares;
2. Restocking is consistently more expensive than new planting;
3. Woodlands managed for amenity, conservation and wildlife – which in this survey were principally in the ‘farm’ and ‘other’ categories – incurred higher costs than average.

This was in itself a result of two major factors: small scale of operations, and a requirement for more intensive management.

The results of analyses drawn from this survey would offer no firm guidance to a particular owner considering planting a woodland, in that it would have been necessary to present results in a much more highly classified way, with tables of costs of operations (to give one example) on a particular (and restricted) size range, and on a traditional estate in the lowlands of England. However, any attempt to analyse the results in such a way would have been frustrated by the low numbers available in most categories within the sampling frame.

This survey has now been terminated and no other information on the costs and revenues of private forestry is collected systematically as part of the national statistical overview of Britain.

There is now a considerable body of evidence that many farmers in Britain are unwilling to plant trees on productive agricultural land, to the extent that Watkins et al. (op. cit.) are able to refer to a study reporting “the usual suite of reasons” for not planting trees. This “suite of reasons” includes examples such as: “woodland is not financially viable”, “the time delay is too long” “not enough information” and “fear of uncertainty”. Whereas Regulation 2080, is expansionist with respect to farm forestry, this brief review points to a lack of systematic data acquisition and analysis appropriate to supporting forestry adoption decisions by farmers. This can only serve to reinforce their negative perceptions.

Farmers are used to disaggregated and continuous monitoring of the profitability of their various farm enterprises. The Farm Business Survey (FBS) administered by the Ministry of Agriculture, Fisheries and Food, provides UK farmers with this information which is derived from identical samples located regionally to reflect differences is site productivity and enterprise types. Methodological aspects of cost accountancy have long been clarified making results compatible between similar activities across the industry. The authors believe that much needs to be done in order to achieve an equivalent state of affairs with respect to NIPF. In particular, common approaches to the following issues need to be resolved.

3.2 Outstanding methodological issues

3.2.1 Transfers

Sometimes there are transfers between cost centres – the nursery provides plants for compartments, compartments provide timber for the sawmill, and so on. Although enumeration of the values of these transfers will not affect the overall profit of the estate, they will affect that of the cost centres. Therefore, if it is desirable to be able to assess cost centre profitability with reasonable accuracy, the value of transfers must be included as output from the producing cost centre and in the same amounts as costs for the consuming cost centre. Furthermore, for the same reason, it is important that the price used is a realistic market price. If transfers were omitted or prices were too low, for instance, then the producing cost centre would appear to produce less than it actually did and the consuming enterprise, more, giving a false picture of profitability.

3.2.2 Valuation changes

Because of forestry's long production cycles, the output of the compartment will not only be shown in the revenue figures, but also in the change in the valuation in the stock of timber between the start and end of the year. This 'valuation change' tends to be extremely important and consequently the question of appropriate valuation method is currently the subject of considerable debate in Britain. The major methods are market price, expectation value and a combination of net accumulated costs (adjusted for inflation and interest) for immature stands and actual (devastation) value for mature stands.

3.2.3 Benefits in kind

In some businesses, especially those which are privately owned, the owner may take some of the produce for his or her private use, and also provide employees with an allocation. Such items are termed 'benefits in kind', 'perquisites' or 'perks', but they are still part of production and should therefore be valued as such. They are also, however, a form of payment, in lieu of wages or salaries, and therefore are really also a cost, and should also be included as such. In that case, the output and cost effects will cancel out and will not affect profit. If the amounts are small they can be ignored, but otherwise they need to be included to ensure an accurate reflection of performance.

3.3 Costs

As with the outputs, if the desire is to be able to consider performance of enterprises and cost centres rather than that of the organisation as a whole, then costs must be allocated to the appropriate sections of the business. Some costs, such as plants and

chemicals, are readily divided between enterprises, but others, like supervision and office expenses, are not. Costs in forestry are normally categorised as **direct costs**, **on-costs** or **overhead costs**, although there are other terms used in accountancy.

3.3.1 Direct costs

Direct costs are those which are readily identified with the product and include wages of production workers and raw materials. Although normally classified in other fields as production overheads, costs of production machinery (including depreciation) are commonly considered in forestry as direct costs.

Direct costs are allocated for accounting purposes by recording materials used or time expended on that cost centre.

3.3.2 On-costs

These are mostly associated with labour, and to some extent machinery. Slack or wet time, sickness and holiday pay, employers insurance contributions and machinery tax and insurance are considered as on-costs. Although often considered as a category by themselves, the authors support the views of Openshaw (1980) and Price (1989) that they should be subsumed under one of the other two categories, mainly by allocating to direct costs.

Allocation of on-costs can be according to proportion of direct costs or the labour element of those. For any machinery on-costs they can be apportioned to cost centres by machine hours incurred.

3.3.3 Overheads

These can be classified as either non-direct production costs or non-production costs. Thus costs of supervision and other costs associated with the forest enterprise, would be considered to be non-direct production costs, while costs which might apply to the whole estate or enterprise costs not related to production would be non-production costs. The latter would include general secretarial, office cleaning and administrative costs as well as interest earned on borrowed money.

The ways in which overheads should be allocated vary, but should follow a general rule. Openshaw (op. cit.) recommends ‘that the major factors which influence overheads should be picked out and the costs allocated accordingly’ (Openshaw, op. cit., p.55)

This begs the question as to what factors influence the level of overhead costs. Some costs do not, in fact, seem to vary with the size of the compartment; the cost centre; or with the volume of production. These are called fixed costs. By contrast, most costs do vary with size and/or volume and so can be called variable costs. In practice even fixed costs such as, for example, those incurred in running the estate office, are likely to vary if the enterprise is increased sufficiently in size.

Some costs, such as maintenance and protection costs related to the land, can be reasonably allocated by area. Others, such as haulage and marketing of produce could be allocated, not perhaps by value of production, but by value of sales. Allocating most of the overheads by sales or production, however, would mean that many forest enterprises would have little or no allocation during the major part of the rotation. Thus, most overhead costs are best allocated in some other way.

Hart (1991) and Price (1989) both suggest that the most common allocation base is according to the proportion of direct costs incurred by that costs centre or operation. If, for instance, a compartment is budgeted to incur 10% of the direct costs, then it would also be allocated 10% of those overheads which are allocated on this basis. Given that many of the costs of management, administration and so on are related to the production costs of the business – supervising and paying workers, and ordering contracting services, materials and spare parts – then it seems sensible to allocate overheads accordingly[1]. In effect, some elements of overhead costs can be allocated directly themselves; take, for example, that part of a manager's time involved in measuring, marking and supervising. Provided it is possible to forecast the proportion of his or her time spent in each cost centre, these costs can be allocated directly.

Some items, such as the supervision of labour, in particular, often take up a large proportion of a manager's time. Consequently, these can be more accurately allocated on the basis of direct labour rather than direct costs in general.

In summary, then, most of the overhead costs can be allocated in proportion to the various cost centres' direct costs or labour costs. Those costs which depend upon the how much we sell can be allocated according to estimated sales revenue, and those are closely linked to area can be shared out on a per hectare basis.

4. CONCLUSION

This brief review of information and analytical approaches relating to NIPF suggests that what has been undertaken historically and what is available is inappropriate to the needs of future investors in small-scale forestry. If farmers' needs in particular are to be addressed, an approach similar to that pursued by the Farm Business Survey would be much more preferred. A key feature of this survey is the existence of an identical sample of farmers monitored annually. A similar system for forestry would enable temporal changes in both costs and revenues to be accurately recorded. From a methodological perspective, simple and universally agreed conventions are important to both elements of profitability. This is especially important in the case of valuation changes in growing stock, since these have been observed to be crucially important in profitability.

5. ACKNOWLEDGEMENTS

[1] It could be said that overheads are closely related to the number of transactions, rather than the total value of those transactions, allocation could therefore be on that basis. That would involve, however, counting the numbers of both purchase and sales transactions and would also omit the effect of other factors such as time needed for supervision.

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ANNEX I: PROGRAMME

MOSEFA – Monitoring the Socio-Economic Situation of European Farm Forestry

Workshop A: Methodological issues of cost accountancy in European farm forest enterprises 28 - 31 August 1997 Woudschoten Conference Centre, Zeist, The Netherlands

THURSDAY, AUGUST 28TH

19:30 Welcoming buffet

FRIDAY, AUGUST 29TH

09:00 Session I:
- Introduction to the MOSEFA Concerted Action, Pentti Hyttinen
- The letter of agreement of the Concerted Action, Timo Kallio
- Introduction of the participants

10:30 Session II, Country report presentations: Central and Southern Europe
- Austria: Walter Sekot
- Germany: Willy Nain
- France: Olivier Picard
- Italy: Luca Cesaro
- Greece: Athanasios Christodoulou
- Discussion

13:15 Session III, Country report presentations: Nordic Countries
- Finland (A): Juha Hakkarainen
- Finland (B): Mikko Kurttila
- Denmark: Finn Helles
- Sweden: Sven Hogfors
- Norway: Finn G. Andersen & Kjell Staven
- Discussion

16:00 Guided Tour, Spaarnwoude
(woods in the urban agglomeration of Western Holland)

22:00 Back at the workshop venue

SATURDAY, AUGUST 30TH

9:00 Session IV, Country report presentations: North-West Europe
- Belgium: Noël Lust
- The Netherlands: Raymond Schrijver
- Ireland: Eanna Gillen
- United Kingdom: Terry Thomas
- Discussion

10:45 Session V, Task group meetings A:
- Nomination of the task group chairmen
- Starting the task group meetings

12:15 Departure to Wageningen

15:00 Guided tour and slide show in nature reserve “de Blaauwe Kamer”

18:00 Back at the workshop venue

SUNDAY, AUGUST 31ST

09:00 Session VI, Task group meetings B:
- Task group meetings continue
- Reporting the outcome

10:45 Final session:
- Conclusions of the workshop
- Agreeing on the tasks before the next workshop

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ANNEX III: REPORTS OF THE TASK GROUP MEETINGS

OUTCOMES OF THE TASK GROUP MEETINGS

Three main questions were stated as a basis for task group discussions:

1. What is the current situation (state-of-the-art) with the farm forestry accounting?
2. What are the most crucial gaps between the information needs and the current data available?
3. What are the most crucial methodological issues in accounting to be solved to be able to address the above mentioned gaps?

TASK GROUP I - EXPERTS (AUT, DEN, GER, NED, NOR)

1.
   - The networks proved to be useful but incomplete and isolated
   - Routine work vs. real decision making
   - Problems in interpretation on farm level
   - IUFRO recommendations are imperfect (terminology, methodology)
   - Main output on farm level is the master balance sheet giving the types of costs within each cost centre

2.
   - Information on non-timber functions
   - Concept of farm forestry
   - Integration of forestry with other production lines
   - lack of non-monetary data
   - lack of data regarding capital invested

3.
   - Measuring total output including forest services
   - Pricing of imputed costs (e.g. own labour)
   - Concept of farm forestry
   - Valuation of capital invested
   - General definition of ratios in the field of productivity, rentability and efficiency
   - Standards of accounting

TASK GROUP II - CANDIDATES (FIN, IRE, SWE, UK)

1.
   - No established network of farm forestry accounting
   - Accounting data sources only from forestry income taxation system and national FADN/RICA system in each country
   - Private companies offer an relevant data base in United Kingdom and in Ireland
   - Current situation varies a lot within the countries of this task group
   - Considerable methodological research work has been done

2.
   - What is measured? Profits, costs?
   - Who is measured? Full-time, part-time, small-scale?
   - How is measured? Sampling schemes, accounting standards?
   - Why is measured? Policy, management?
   - Definition of farm forestry? Financial accounting, cost accounting or managerial accounting?

3.
   - Concept of accounting system
   - Concept of farm forestry
   - Valuation of growing stock
   - Land price effects
   - Sampling schemes

TASK GROUP III - NEWCOMERS (BEL, FRA, GRE, ITA)

1.
   - No established network and no concrete plans to do it
   - Few studies
   - No established methodological approach
   - FADN/RICA system as a starting point for farm forestry accounting

2.
   - Where do we start from?
   - Where are we going?
   - What is included in the system?
   - Definition problems: farm forestry, forest, common properties, consortia

3.
   - Homogeneous definition of farm forestry is needed
   - Statistical data (population)
   - Sampling scheme
   - Evaluation of growing stock
   - Own consumption of timber
   - Non-monetary benefits must be considered
   - Simplicity of the network
   - Ratios of economic performance

ANNEX IV: MINUTES OF THE FINAL SESSION ON 31 AUGUST 1997

1. Pentti Hyttinen opened the final session. It was started by discussing about whether the objectives of the workshop A, set at the beginning of the workshop, were met. Generally, the objectives were seen well fulfilled.

2. The steps needed to finalize the proceedings of the workshop A were stated. All the participants should **deliver the final version of their presentations at the Workshop A to EFI by 15 September 1997**. It was also agreed that the minutes of the final session will be included in the proceedings.

3. The place and time of the next workshop was decided. The workshop B will be arranged in April 1998 in Trento, Italy. Dr. Luca Cesaro from INEA is responsible for the arrangements of the workshop. The final programme will be prepared in the small group meeting of the coordinator, associate coordinator and task group chairmen to be arranged in early 1998.

   NOTE: Afterwards Mr. Luca Cesaro has informed that at the same time there will be an other meeting in Italy closely related to the theme of MOSEFA, namely IUFRO group on "Managerial economics and accounting of forestry". The new timing for the **MOSEFA Workshop B is 19-22 April 1998.**

4. The tasks to be done before the next workshop were discussed. The outcome of this discussion was that **every partner should prepare a presentation for the next workshop containing at least the following aspects:**

   - definition of farm forestry in their countries
   - description of the availability of statistical information on farm forestry (what types of information there is, what for it is gathered etc.)
   - forestry activities in national FADN/RICA system
   - how to include forestry in the FADN/RICA system

   The title of the paper should be "Farm forestry as a part of the national FADN system in XXX" and it should be approximately 3-6 pages long.

5. It was also proposed that the state of the art in every country should be compared to the IUFRO guidelines, which were also proposed to be developed further. This matter will be discussed in detail at the next workshop.

6. The topic of the next workshop ”Sampling schemes...” was noted to be too ambitious for many countries, because there are no sampling system for farm forestry at all. Therefore, instead of each partner preparing a presentation, some external experts should be asked to give a presentation on the possibilities to use the sampling in picking farms to an accounting system of farm forestry. Both the practical problems and theoretical framework were noticed to be valuable to bring out in those presentations. As potential persons to be invited, names of Krijn Poppe (LEI-DLO), Jan Dijk (LEI-DLO), Mr. Garcia (EC), Gerard Buttoud (INRA) and some Italian FADN/RICA expert were mentioned in the discussion. The decision were left to the coordinating team (coordinator and associate coordinator) and the task group chairmen.

7. It was agreed that **the expert countries (Austria, Denmark, Germany, the Netherlands and Norway) will give a presentation on the sampling schemes as a part of their national FADN system.** It was also agreed that **Terry Thomas (UK) and Timo Kallio (Finland) will give presentations about their experiences on sampling schemes in their countries** as representatives of the candidates. Then the possibility of inviting a Swiss speaker to the workshop was also proposed, because there is a very well organized sampling system for forestry accountancy network in Switzerland.

8. One of the most important objective of the whole MOSEFA Concerted Action is to produce the guidelines for establishing farm forestry accounting data networks. It was discussed how we could best fulfill this crucial objective. It was decided to have a particular session on this matter in the next workshop. This matter will be prepared before the next workshop among the task group chairmen and the coordinator.

9. The role of additional partners and external observers in the CA was discussed. There have been some interest to take part in the workshops and the activities related to MOSEFA. It was decided that if the applying partner is from EU or EFTA country, it is welcome to join and some additonal funding for its costs will be applied from the Commission. If the partner is not from the above mentioned countries, it is still welcome to the workshops on its own expenses.

Joensuu 15 September 1997

Pentti Hyttinen
Coordinator

Timo Kallio
Associate coordinator

ANNEX V: PHOTOS

Workshop participants and organisers in front of the Woudschoten Conference Centre in Zeist, the Netherlands.

Terry Thomas and the “mountains” of the Netherlands

Recreation value exceeds the other benefits of forests in densily populated areas.

Not all the presentations were too dry ...

Multiple benefits of forests were discussed during the two field trips arranged between the indoor sessions.

Raymond Schrijver and Walter Sekot

Kjell Staven

Finn Helles

Willy Nain