

# **FOREST HARVESTING CASE-STUDY**

# **20**

## **FOREST OPERATION IMPROVEMENTS IN FARM FORESTRY IN SLOVENIA**

Encouragement of advanced operation methods  
among forest owners in local community

by  
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## **FOREWORD**

Case studies on wood production, adapted to the environment, represent a part of the series of initiatives introduced by the Forest Products and Economics Division (FOP), of FAO, by which environment friendly techniques of timber harvesting and road construction are promoted. Their endeavour is to encourage progress in technologies and their adjustment to the objectives of sustainable forest management. Reaching such objectives is particularly demanding in non-industrial private forests of rural areas, to which this Case Study is also dedicated.

In the past, forests and wood represented a basis for economic stability in rural areas. This especially applies to Europe, where a large share of private forests and a number of forest owners are historically conditioned. After social changes at the end of the twentieth century and global environmental transformations, advances in harvesting and utilization of wood in small-sized forests are urgently needed.

All the above-mentioned issues apply also to Slovenia – a young European county and recent European Union member. In Slovenia over 65 percent of forests are privately owned, and the size of an average forest estate is below 3 ha. For this reason both the Ministry of Agriculture, Forestry and Food and the Ministry of Education, Science and Sport of the Republic of Slovenia have, in the framework of the target-oriented research programme – entitled Competitiveness of Slovenia 2001-2006 – supported the study of development and promotion of innovative approaches for improvements in forest operations in rural areas. This has been in cooperation with FAO's FOP.

The study is an example of a holistic approach to the possibilities of encouraging technological progress among forest owners within the local community, in areas that are related to timber harvesting/processing and utilization of wood. Regarding the assistance offered in the realization of this study we owe particular gratitude to employees of the Slovenian Forestry Institute and the Slovenian Forestry Service, to foresters from the Local Unit Luče and to all forest owners in the Solčava region.

## SUMMARY

In order to contribute to sustainable rural development practices in forest operation improvements among non-industrial private forest owners, the encouragement of technological development in timber harvesting/processing and wood utilization has been conducted in the local community of Solčava (North Slovenia) with a:

- study of the significance of timber harvesting/processing and wood utilization, the core of which was an inquiry carried out among forest owners owning more than 5 ha of forests;
- study of the developmental incentives among owners, the crucial part of which represented a set of two workshops with the forest owners and foresters involved.

The rural local community of Solčava includes 552 inhabitants and 10 238 ha of forests on the eastern part of the Alps. Isolated farm estates are the predominant type of settlement; the largest settlement is the village of Solčava, where 242 inhabitants live in a total of 100 households. Nearly 80 percent of the area is covered with coniferous forests, 83 percent of which belong to 135 households.

The inquiry covered 58 households that own 82 percent of the private forests in Solčava. The questionnaire comprised 120 questions that analysed present conditions and future expectations in the households, forests belonging to households, wood balance, work performance in timber harvesting and sawing, use of wood biomass for energy, machinery and equipment, accessibility of the forest, work qualifications and occupational safety, timber sale as well as information and cooperation with other forest owners.

By comparing advantages and obstacles in areas of equipment, qualification and integration of forest owners, the priorities for encouraging technological development – which should alleviate the trend in declining economic significance of forestry and at the same time ensure environmental protection – were identified. According to opinions of forest experts in Solčava, one should above all consolidate interest ties among forest owners, raise the levels of qualification and knowledge of modern methods of work in forests and with wood in general and methodically support the investment in equipment for those owners who are already semi-professionally performing services in the sector of production and processing of wood.

Expert meetings were prepared where the assessment of development options related to forest operations served as a link between inquiry and workshops. The workshops themselves were organized on the principle of full participation aimed at the forest owners who have a clear vision and sufficient courage to assume a leading role in this sector within the local community of Solčava. The following methods and techniques that were applied related to work with groups: generation of ideas, attainment of agreements, group techniques and an action plan with an H-method.

Group procedures, conducted among Solčava's forest owners, were a new and valuable lesson for all participants. First results indicate that large blunders or resentment did not occur, whereas to exult in possible success is still premature. Interest groups were formed, the principal actors are known and what follows this is the realization of technological initiatives, which are close to owners and should lead to sustainable exploitation of forests and a holistic development within the area of Solčava.

Through present research some obstacles have been removed for the realization of concrete projects, which will in the ensuing years surely lead to new and better work practices in forests and a higher quality of wood products in Solčava. The Case Study proved to be a highly enlightening lesson for all those who will be involved in similar endeavours, not necessarily due to a precise quantity, but due to the complexity of approach, selection and application of methods.

## SYMBOLS, ABBREVIATIONS, DEFINITIONS

### Symbols

cm	centimetre
ha	hectare
km	kilometre
m	metre
m <sup>2</sup>	square metre
m <sup>3</sup>	cubic metre
kWh	kilowatt hour
€	Euro (US\$1.1)

### Abbreviations

WH	working hour
M	household group: locals – medium sized forest estate (5.0 – 49.9 ha)
L	household group: locals – large forest estate (50.0 – 99.9 ha)
XL	household group: locals – very large forest estate (100.0 ha and more)
OUT	household group: non-locals – forest estate in the community, over 5.0 ha
SFS	Slovenian Forestry Service
FAO	Food and Agriculture Organization of the United Nations
NIPF	Non-industrial Private Forest

### Definitions

**Forest exploitation:** common term for all production procedures in timber harvesting as well as construction and maintenance of forest roads.

**Wood utilization:** common term denoting procedures for sawing timber, the use of wood biomass for energy purposes and sale of wood products.

**Forest owner:** a person, who according to the data in the registry of forest owners, owns or co-owns a forest. A synonym for the term ‘forest owner’, also is the term, ‘private forest owner’.

**Household:** every family or non-family group of persons, who resides at the same place and collectively uses the means for meeting the basic life requirements.

**Forest estate:** total area of private forests owned by all household members. The management of the forest estate is unified, it is managed in the same manner.

**Local community:** spatially rounded off area where the working population and inhabitants of a settlement, of a part of the settlement or of more connected settlements fulfils certain common interests.

**Local communal authority:** a basic local self-managing community, which, within the framework and in compliance with the constitution and legislation, arranges and performs its tasks that have been legally transferred to it, and which comprises one or more settlements.

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## **1. INTRODUCTION**

Forests in Europe are predominantly privately owned. The average size of private forest estates in Europe amounts to approximately 11 ha, whereby several millions of private forest owners own less than 3 ha of forest property (TBFRA, 2000). Some typical characteristics of owners of small forest estates are (Lahdensaari [ed], 2001):

- reduced interest for working in forests;
- inefficient equipment and qualification for work in the forest environment;
- low profitability and insufficient skills for promoting wood products in the market.

The consequences of such management practices are reflected in the lack of exploitation of small forest estates and in non-usage of silvicultural and protective methods. Extensive management in small forest estates is a frequent phenomenon also found worldwide (TBFRA, 2000).

When applying suitable timber harvesting/processing and wood utilization technologies, forests and wood products can be an important and – in mountainous regions – a strategic natural resource (Buttoud, 1999a). This may significantly contribute to sustainable rural development (Jisha, 1998). Results are wood assortment and various wood products, which are used within the household or are marketed. When used in households they reduce costs, whereas when marketed they increase household revenues. Technologies applied by forest owners in these activities should within the legislative frame enable efficient transformation of the raw material into products and services.

The technological process that relates to timber harvesting/processing and the utilization of wood is interconnected in an all-inclusive production and value chain (Heinimann, 2000). Improvements in the equipment, qualification level and the organization of private forest owners should lead to a considerable increase in economic and social efficiency, as well as an environmental acceptability of the harvesting, processing and utilization of wood in rural areas. Improvements may be attained not only by optimization of individual practices with a specific owner, but also through optimization of the entire chain within the local community.

Advisory services that are oriented towards individual forest owners need to be upgraded by developmental plans and projects ‘adapted to the measure of the local population’ (Niskanen and Vayrynen, 1999; Pelruso and Turner, 1994; FAO, 1997) so that foresters can balance between protective and developmental tendencies in the utilization of private forests. There is a need for effective examples of such promotional and encouraging activities, which, if adapted to local conditions and tradition, will re-establish the rightful role of wood in modern society.

### **1.1 OBJECTIVES AND SCOPE**

The development of timber harvesting/processing and wood utilization technologies represent intended changes in the existing technological level through the introduction of new methods and procedures or by the reorganization of existing ones among forest owners. The goal of technological development is to increase commercial and social efficiency, as well as environmental acceptability of the entire chain (Harrison [ed.], 2003).

Technological progress on the one hand depends upon the conditions and trends in the individual household and on the other hand on the social conditions in the local and larger environment. Although financial incentives (e.g. subsidies) are of great significance, important environmental and social objectives related to the technological development of timber harvesting/processing and utilization of wood may also be achieved by mobilizing the innovative potentials of forest owners in the local community.

The objective of this study is to contribute to sustainable forest management practices by the promotion of advanced timber harvesting/processing and wood utilization among private forest owners in the local community.

The Case Study consists of two parts:

- the study of the significance of timber harvesting/processing and wood utilization among private forest owners for the development of the local community of Solčava;
- the study of developmental incentives for the improvement and progress of timber harvesting/processing and wood utilization in the local community.

The study of the significance of timber harvesting/processing and wood utilization also includes an analysis of current conditions and assessment of development possibilities in this area. The study of developmental incentives, however, includes the detection, selection and verification of proposals related to improvements in the technology of timber harvesting/processing and wood utilization in the local community.

In the production chain of forest exploitation also considered are the production procedures of opening up the forests by means of forest roads and skid trails. Similarly, in the complex of wood utilization also included are the sawing of timber, use of wood for energy purposes, as well as the marketing and sale of wood. This entire procedure will hereafter be known as timber harvesting/processing and wood utilization.

The selected local community of Solčava is an example of a small rural community in the Alps, with a long tradition in the management of private forests.

## 2. LOCATION OF THE CASE STUDY

The Republic of Slovenia lies at the heart of Europe where the Alps and the Mediterranean meet the Pannonian plains and the Karst. Slovenia has a population of 2 000 000, and its capital city is Ljubljana (see Figure 1). It covers an area of 20 273 km<sup>2</sup>. The terrain is characterized by a short coastal strip on the Adriatic Sea, an Alpine mountain region adjacent to Italy and Austria, and by a mixed area of mountains, valleys and plains with numerous rivers to the east. More than one-third of the area lies 600 m above sea level. Climate is Mediterranean on the coast and moderately continental with mild to hot summers and cold winters on the rest of the lower altitudes.

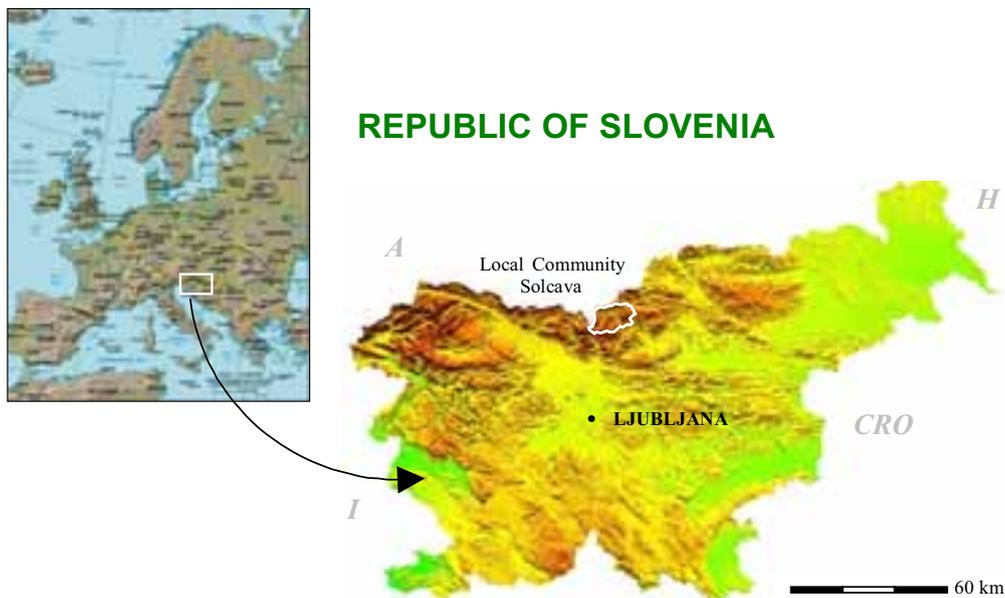


Figure 1. *Location of the case study*

The official language is Slovene, which belongs to the group of the South Slavonic languages. Slovenia gained its independence in 1991, and it enjoys one of the highest GDPs per capita among the transitional economies of Central Europe. The investment inflow as a percentage of the GDP, however, is still the lowest in the region. Historical ties to Western Europe, a strong economy and a stable democracy recently make Slovenia a small but prosperous EU and NATO member.

### 2.1 CHARACTERISTICS OF PRIVATE FORESTS IN SLOVENIA

Slovenia may have only one inch of the sea coast per inhabitant, yet on the other hand it may boast of over one-half ha of forests per inhabitant. According to the Global Forest Resources Assessment (TBFRA, 2000) forests cover 54.5 percent of Slovenia. Seventy percent of the forests are owned by non-industrial private forest (NIPF) owners (see Table 1).

Table 1. *Slovenian NIPF forests compared with forests in Europe*

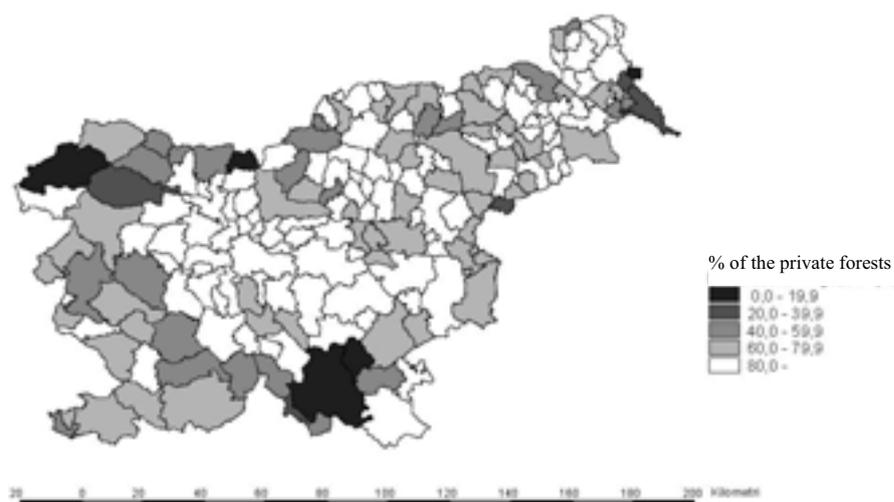
Parameter	Units	Country			
		Slovenia	Europe	Italy	Austria
Forest and other wooded land	(1 000 ha)	1 166	21 5422	10 842	3 924
Share of private forests	(%)	70.0	54.8	66.0	82,5
Average woodlot size	(ha)	3	11	9	8
Average annual cut in NIPF	(m <sup>3</sup> /ha)	2.1	---	1.4*	5.4*

\* (Source for annual cut in NIPF: LAHDENSAARI [ed], 2001)

Forestry and forest management in non-industrial private forests may pride itself of a long tradition in Slovenia. The first known piece of legislation in this field, the Ortenburg Forest Regulation, was written already in 1406. Another important nationwide regulation – which established sustainability of timber supply – was Empress Maria Theresa's, Forest Regulation for Carniola, in 1771. Because of timber shortage in the Karst region, which was caused due to its vicinity to the Italian port of Trieste, the well known “control method” of forest management has been consequently practised since 1890.

After the Second World War the idea was extended from state-owned forests to the NIPF sector in Slovenia – at that time part of Yugoslavia. The nationalization of private forests also occurred at that time. By 1968 the first regulations related to all private forests in Slovenia were endorsed and regularly updated within the period of ten years. After Slovenia gained its independence, a new Forestry Act was passed in 1993, which adequately reflected changes in the political system. Forest land restitution was conducted in the mid-1990s, and it has not yet been completed.

Although various forest management approaches for the private forest have been implemented in the past, practically none of these has remained unchanged during the transition period. At present, non-industrial private forests are unevenly distributed throughout the country (see Figure 2) with several local peculiarities. Now the transition from “restriction” to “collaborative” management among private forest owners has also been introduced, and recently new approaches in forest extension have been launched as well (Zavod za gozdove Slovenije, 1999; Ingles, Musch and Quist-Hoffman, 2000).

Figure 2. *Share of non-commercial private forests in local communities in the year 2000*

## **The future of the small private forest estates in Slovenia**

In Slovenia 65 percent of the allowed wood felling is being realized, whereby the major part of the non-realized potential is in private forests. Among 300 000 forest owners only 1 or 2 percent of them possess 20 or more hectares of forests. The tendency of the further breakup of forest estates is continuing. Within the last 20 years the size of an average forest estate has fallen from 3.01 to 2.37 ha. The qualification of forest owners to perform work in the forest is inadequate, their level of organization and connections is similarly insufficient. There are fewer and fewer farm estates, whereas the number of increasingly aging owners and non-farmers is increasing.

The socio-economic conditions that influence the management of private forests are rapidly changing. Forest work activity and wood processing represent an appropriate occupation for those farms where agriculture yields inadequate incomes. Because of the heterogeneity of forest owners the measures needed in technological development in wood harvesting among forest owners will have to be targeted and adapted to local conditions. Within local communities foresters will have to identify and encourage forest owners to acquire a partial specialization for work in forests. Technological development and suitable tools and work methods are required for survival in market conditions.

## **2.2 DESCRIPTION OF THE STUDY AREA**

### **Selection of the study area**

During the selection of the subject for the Case Study, required was a sufficiently interested local community with diverse types of forest estates regarding size and socio-economic levels. Interest for cooperation is greater where there is a clear objective of such cooperation and where there is a sufficient number of local support in the progress – i.e. innovative forest owners and representatives of the forestry sector who are well trusted by the inhabitants.

Subsequent to preliminary inquiries at the Slovenian Forestry Service (SFS) three local communities (Lom, Železniki and Solčava) were considered in the final selection of candidates for the subject of the study. On the basis of further detailed discussions with local foresters it was assessed that the strongest interest for cooperation could be expected from forest owners in the municipality of Solčava, which possesses all the typical characteristics of a rural community. Local foresters and representatives of the Solčava municipality have shown a great interest in gaining additional information on development plans through the study. In this manner, one of the essential conditions for cooperation was attained – namely, a common objective.

The average size of the forest estate in the Solčava community is one of the largest in Slovenia and is more comparable with conditions in Central Europe and Scandinavia. Because it is easier to promote technological development among larger forest owners, the community of Solčava was chosen.

### **2.2.1 Characteristics of the Solčava local community**

#### **Location**

The local community of Solčava (see Figure 3) is located within the Zgornje Savinjska (Upper Savinjska) region, which consists of the communities of Gornji grad, Nazarje, Luče, Ljubno and Mozirje. It lies in the mountainous area of the Kamniško-Savinjske Alps and the alpine ridge of Karavanke, where amid predominantly carbonate peaks there are three typical glacial valleys: Robanov kot, Logarska valley and Matkov kot. It is the third smallest municipality in Slovenia. It comprises two cadastral communities with a total area of 10 238 ha, and according to the latest census (SURS, 2002) it has 552 inhabitants. The predominant type of settlement is an isolated farm estate; the largest settlement is the village of Solčava, where 242 inhabitants live in altogether 100

households. Forestry, agriculture and tourism are its principal economic activities. Among these, forestry – particularly for agricultural households – represents a very important source of income. The forest land restitution process in the local community is approaching the end.



Figure 3. Location of the local community Solčava

### Forest management characteristics

The total area covered by forests amounts to 8 179 ha, whereas the area of forest space is 9 067 ha. A typical feature of Solčava's forest environment is a considerable intertwining of the ecological, social and productive functions of forests. The area of the community is in the district of the future Karavanško-kamniško-savinjski regional park, and a large part of the forests is situated in the landscape parks of Logarska dolina (valley) and Robanov kot.

The forest management unit of Solčava comprises all private and state owned forests within the Solčava local community. The management of forests within this unit is directed by the SFS, by the Regional Unit Nazarje and the Local Unit Luče. The unit consists of two forest districts: Solčava and Logarska valley.

In accordance with the proposal introduced by the forest management unit of Solčava for the period 2000–2009 (Zavod za gozdove Slovenije, 2002), within this unit a private form of ownership prevails (6 818 ha or 83.4 percent). When the denationalization process is completed there will not be left almost any state-owned forests. The share of forest ownership by another type of private ownership is equal to 3 percent. More detailed analysis of the private forest estates is represented in an independent chapter.

The major part of this forest management unit is located among a mountainous forest landscape. Within this unit one finds mostly multipurpose forests (49 percent), while 11 percent of the forest area is intended for special purposes, there where the forest management measures are allowed. The latter are located predominantly in the region of landscape parks. Here 14 percent of the area is covered by forest reserves, where forest management measures are not allowed.

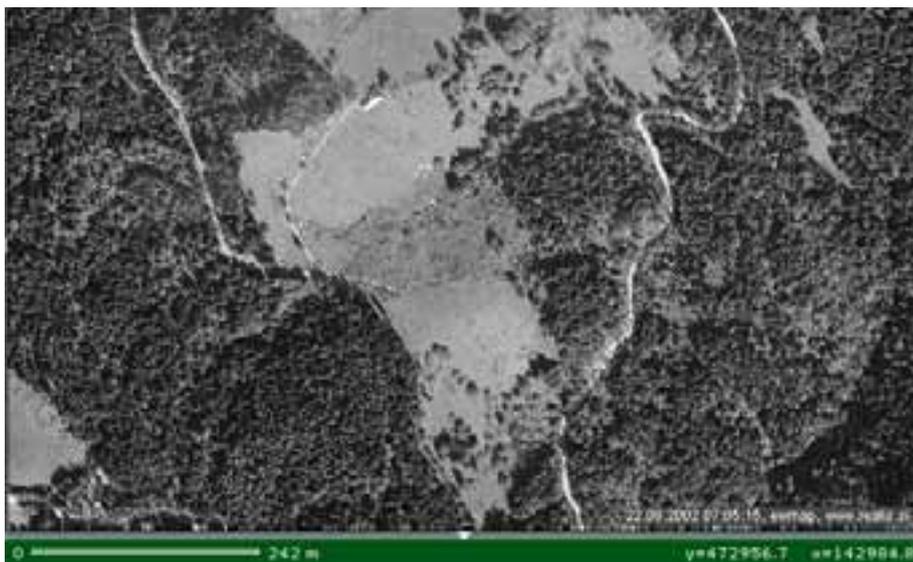


Photo 1. *Forest landscape with individual settlements of small units in the environs of Solčava*

The average growing stock of forests within this unit amounts to approximately 300 m<sup>3</sup>/ha. The prevailing tree type within this growing stock are conifers (71 percent); no less than 37 percent of the growing stock are trees with a diameter of over 40 cm. Among the conifers the predominant tree is spruce (50 percent of the growing stock), whereas among the broad-leaved trees it is the beech (25 percent of the growing stock). Ten percent of the growing stock is represented by the larch, which in higher altitudes is mixed with the spruce and beech stands. The growing stock and increments are larger in privately owned forests, which is primarily due to the lower share of the protective forests. Within this unit there is a predominance of large timber, and what is typical is also the high proportion of well-preserved forests.

The total length of all roads in the Solčava unit amounts to 107.3 km. Almost 60 km of forest roads are located in private forests, while 10.6 km of these roads run through the state-owned forests. The average density of forest skidding tracks in the unit amounts to 15.7 m/ha, whereas their average density in private forests is equal to 41 m/ha. The further opening up of forests is limited by field conditions and restrictions related to construction of forest infrastructure within the protected areas.

## **2.2.2 Development of private forest estates in Solčava**

A century and a half ago one-third of the area of the present Solčava community was covered by forests. It was settled by 796 inhabitants, who bred 749 heads of cattle, 246 pigs, 812 sheep and 5 horses (Gozdno gospodarstvo Nazarje, 1979). At that time, Solčava was an integral part of the Austro-Hungarian Empire; wood and consequently also forests did not have any particular value, except for private use in construction and heating of farm premises as well as for cooking. Because of this predominantly self-sustainable way of life, farms were oriented to the highly developed cattle-breeding and arable farming.

A hundred years later, according to the census of the Agricultural Farm Estates from the year 2000 (Dernulc, 2002), the community numbered 53 family farm estates which bred 472 heads of cattle, 11 milch cows and 131 pigs. These farms use 5 108 ha of land, of which 681 ha are intended for agricultural use. These agricultural areas are primarily pastures and meadows, whereas tilled grounds and vegetable gardens represent only 2 226 ha. Fields intended for the cultivation of cereals no

longer exist. Fruit-trees cultivated in intensively tended plantations are also absent, whereas there are 991 fruit-bearing-trees distributed around in non-plantations.

A comparison between the year 1900 and the current situation indicates the following negative trends: a decrease in the number of inhabitants by 29 percent, number of cattle by 35 percent and that of pigs by 46 percent. The area of private forests has only in the last 65 years increased by 123 percent. In Table 2 is a survey of forest areas after the year 1935 regarding the type of ownership. From the year 1960 onward, already five silvicultural plans have been elaborated, which are also the main source of the data given in the Table.

Table 2. *Forest acreage in FMU Solčava regarding the type of ownership (Sources: Forest management plans of the FMU Solčava 1961-1970, 1971-1980, 198-1990, 1991-2000, 2000-2009)*

Forest category	Forest acreage through the years (ha)					
	Year 1935	Year 1960	Year 1970	Year 1980	Year 1990	Year 2000
Total, all forests	---	6 957	6 966	7 042	7 807	8 179
All private forests	3 057	3 113	3 132	3 205	3 352	6 818
-Commercial forests	---	2 850	2 920	2 993	2 946	4 432 *
- Protected forests	---	263	211	211	406	2 686 *
% of private forests	---	44.7	44.9	45.5	42.9	83.4

\* In 2000 commercial forests are multipurpose forests as well as forests for special purposes, where certain measures are allowed; to protected forests, however, are added also the special purpose forests, where the measures are not allowed

Prior to the Second World War there were 3 057 ha of private forests in the Solčava region. Because of the nationalization after 1945 the acreage of private forests was not significantly changed, since nationalized areas are mostly composed of non-forest (pastures) and infertile areas. At that time the farmer-forest owner was allowed the maximum possession of 50 ha of forest land.

During denationalization these areas were, in the form of protected forests, returned to forest owners. The acreage of the commercial forests in private ownership has thus increased by 50 percent, whereas the area of protected forests by no less than 661 percent. The factor that also greatly contributed to the increase in the forest area was the spontaneous afforestation of pasturelands.

Parallel to the increase in forest acreage the ownership structure was altered as well. Up to 1990 it was fairly similar; after the denationalization, however, it has significantly changed. The land was returned primarily to mountainous farms. These restitutions, however, brought about an increase in the number of larger estates.

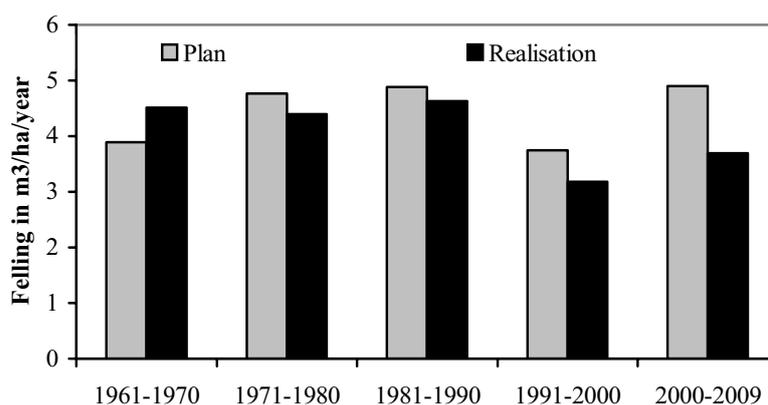
Due to the large number of heirs, the number of co-owners increased as well (see Table 3). For the year 1935, forest management plans indicated the following classes and numbers of owners: 50 – 80 ha: 11; 80 – 120 ha: 5; and over 120 ha: 6 forest estates. In Table 3 are represented the size categories, and in the case of the category over 100 ha, considered are the same number of owners as it used to be after the denationalization in 2000.

Table 3. *Structure of the private forest estates in FMU Solčava (Sources: Silvicultural plans of the FMU Solčava 1961-1970, 1971-1980, 1981-1990, 1991-2000, 2000-2009)*

Size category	Number of forest owners in different periods (n)					
	Year 1935	Year 1960	Year 1970	Year 1980	Year 1990	Year 2000
Up to 1 ha		0	3	0		58
1 – 2 ha	17	14	17	18	21	84
2 – 3 ha		2				
3 – 5 ha		4	3	10		
5 to 10 ha	2	8	9	12		20
10 to 15 ha	5	3	5	3	20	
15 to 20 ha	5	2	4	3		49
20 to 30 ha	6	9	10	8		
30 to 50 ha	10		8	7	16	(30 to 100 ha) 70
		44				
Over 50 ha	15		36	35	38	
Over 100	7					7
<b>Total owners</b>	<b>67</b>	<b>86</b>	<b>95</b>	<b>96</b>	<b>95</b>	<b>289</b>

The number of forest owners is equal to 145, yet if taken into account also the co-owners, who abound particularly in the denationalized areas, the amount is no less than 289. In Sočava, similarly as elsewhere in Slovenia, there occurred a considerable breakup of land ownership, primarily into the small-sized forest estates of up to 5 ha.

Ratios between the planned and realized felling in private forests in the Solčava community are shown in Figure 4. The data covering the latest period took into account the realization in 2000 and 2001. The realization of felling exceeded the amount envisaged by the plan only during the period 1961–1970. In the penultimate period the planned felling was by one-quarter lower than in the two prior periods. Within the last plan the envisaged felling increased to 4.9 m<sup>3</sup>/ha per annum, whereas only 75 percent of that figure was actually achieved. This discrepancy between the planned and achieved felling emphasizes the need for the development of timber harvesting and wood processing among forest owners in Solčava.

Figure 4. *Planned and realized felling in commercial forests in m<sup>3</sup>/ha/year*

### The history of the exploitation of forests

Prior to the year 1850 forest management in the Solčava region considerably lagged behind agriculture as an economic activity. Wood was primarily used as fuel and as construction material. Larger felling of beechwood commenced with the increased needs for charcoal in the Železna Kapla

and Gorenjska regions (Štifter, 1997). At that time a “charcoal” road was also constructed across the Pavlič’s mountain ridge. Parallel to new market demands (masts, heavy beams), later there also began the harvesting of conifers, particularly larch trees.

The closed nature of these forests also conditioned the technology of skidding. According to notes written by Robanov Jože (Vršnik, 1978), felling was conducted in summer, which was followed by manual skidding, with the use of picks (lifting hooks), to large piles in the proximity of channels and ravines and the subsequent wait for the winter season. An abundant snowfall, followed by the rapid arrival of spring with an immediate rise in temperature were the favourable conditions for the unleashing of large avalanches, which smoothed the hollows, edges and rocks in the channels (ground slides). Loggers had to seize the right time to clear the logs of snow and release them along the avalanches down to the walls and across the walls. If they managed to get half of the logs undamaged under the walls as the snow melted away they were quite satisfied. In rainy weather, or during the next winter, the manual skidding was then once again done from under the walls and up to the place that was accessible to draught livestock.

A second way of skidding was along the wet or frozen wood chutes and by loose floating (wood drifting [on the rivulet Bela and other torrential streams flowing into Savinja]). The wood was floated to the selected sawmill, where the buyer took the wood, marked it and paid for it. Several years might have passed from the actual felling and frequently the costs of the skidding and the loss and devaluation of wood considerably exceeded the received payment. The revenues were then invested into the construction of roads, buildings and in the removal of stone material from the harvest land.

The above described technology of timber harvesting demanded a great deal of time, labour and an adequate work force. In the Solčava region, similar to elsewhere during the middle of the twentieth century, the technology has undergone significant changes. An increase in the number of tractors, chainsaws and the forest road mileage indirectly also influences the number of workers employed in the forestry sector in the Solčava region. This number of workers dropped from 40 in 1961 to 27 in 1985 and to only 4 in 1997. Furthermore, at present, the forest management unit with a capacity of over 15 000 m<sup>3</sup> does not employ a single forester (Štifter, 1997).



Photo 2. *Wood skidding in the Solčava region around 100 years ago*

### 3. METHODS

In the community of Solčava, where there is a prevalence of privately owned forest estates and where the majority of forest owners are farmers, the encouragement of technological development in the timber harvesting/processing and utilization of wood was conducted with two studies, each with its own methodological background:

- **Study of the significance of the production and utilization of wood.** The methodological basis for it is an inquiry carried out among the forest owners.
- **Study of the development incentives among the owners.** The methodological basis for it are participatory procedures among the interested forest owners.

#### 3.1 METHODS FOR ASSESSING THE ROLE OF THE FOREST OPERATION

##### 3.1.1 Inquiry background

During preparations of the inquiry on the significance of timber harvesting/processing and wood utilization it was assumed that the development of wood production among forest owners in the local community:

- depends on the size of the forest estate and is related to the type and extent of the domestic utilization of wood;
- depends on the conditions in the primary wood production and the use of the wood for energy purposes in the region;
- is less dependant on agricultural production and activities that are not based on wood.

The objective of the research was not the verification of the above-mentioned assumptions; however, on that basis a list of variables was elaborated for the analysis of conditions and trends in the production and utilization of wood that are of the greatest importance to forest owners.

The selected data collection method was sample interviewing of forest owners directly at their residences. In gathering the data the scope was limited to forest owners who own a forest in the region of the municipality of Solčava and whose permanent residence is located within Slovenia.

##### 3.1.2 Questionnaire on the role of timber harvesting/processing and utilization of wood

###### Interview unit

The interviewed unit in the study was a **household**, which comprised at least one person who was, in the spring 2002, listed in the index of forest estate owners as an owner of a forest in the area of the Solčava municipality, as well as the **entire forest estate** owned by any member of such a household. The basis for the selection of interviewed units (respondents) represented the index of forest owners. The SFS – Regional Unit Nazarje provided an excerpt stating the holders of property rights for forest land in the municipality of Solčava. According to this document there are 95 such holders of property rights for forest land in the community of Solčava, and in the community of Logarska Valley there are 59. The number of all co-owners, according to the latest available data (Zavod za gozdove Slovenije, 2002), amounts to 289.

From this list of all holders of property rights for forest land in the Solčava municipality eliminated were all non-private owners (the state, companies, etc.) and of what was left was assembled the private owners who live at the same address. This assembling was conducted with the assistance of district foresters so that a list of private forest owners was obtained according to households. The

forest areas owned by household members was summed and thus was obtained the size of the forest estate per household.

### Sample of households and the list of respondents

The analysis of data acquired from all collected excerpts from the forest owners' index demonstrated that the population of households which own a forest in the region of the Solčava municipality totals 135 units (see Table 4).

Table 4. *Analysis of households that own a forest in the area of the Solčava municipality*

Size category of the forest estate	Number of households	Share of households	Forest area	Share of area	Average estate size
	(N)	(%)	(ha)	(%)	(ha)
Up to 1 ha (*)	24	17.8	9.3	0.1	0.4
From 1 to 5 ha (*)	25	18.5	66.6	0.8	2.7
From 5 to 30 ha (**)	25	18.5	390.5	4.8	15.9
From 30 ha to 50 ha (**)	10	7.4	351.8	4.3	35.2
From 50 up to 100 ha	29	21.5	1 964.0	24.1	67.7
Over 100 ha	22	16.3	5 376.1	65.9	244.4
<b>Total</b>	<b>135</b>	<b>100.0</b>	<b>8 158.3</b>	<b>100.0</b>	<b>60.4</b>

The first- and second-sized categories of the forest estate jointly cover only 0.9 percent of the total area of forests in Solčava, although these comprise no less than 36.3 percent of the forest owners. The owners of such small forest estates usually do not participate in the role of the local promoters of technological progress (local doers, resource persons) (Sennblat, 1988a,b). For this reason the first two-sized categories (\*) of the forest property were removed from the list of potential respondents, yet they were not eliminated from cooperating in group procedures in the workshops.

In order to obtain a similar number of forest estates, according to size categories, the third- and the fourth-sized categories (\*\*) were unified into a single one and thereby obtained three broadened forest estate size categories. The fourth category of the research is represented by owners who reside in Slovenia, yet outside of the studied local community. These owners possess 25.3 percent of the forest area in the region of the Solčava municipality. Assuming that their relation towards technological development in the timber harvesting/processing and utilization of wood differs from that of the locals, they were ranged in a separate group.

In studies of larger local communities, where there are several hundred or even several thousand owners, the stratified sampling proved to be obligatory for a rational realization of the inquiry (Medved, 2002). In the case of interviewing a relatively small population of the Solčava households, the sampling level was determined by taking into account our experience and a starting point that would include at least ten sample units in a single category.

Subsequent to the exclusion of small forest owners, there were 84 households where the random sampling was conducted in 75 percent of the households from the second and in 50 percent of the households from the first forest estate category; this as well as separately for households within the Solčava municipality and those located outside of it. In the interviewing process in the third category of the forest owners all households were included. In the fourth category, a random selection was done of ten households located out of the Solčava municipality.

The final interviewing list comprised 63 addresses and represented also the same number of households classified into four groups (see Table 5). The data on the size category were based on the extract of the state of forest areas provided prior to the inquiry. The final classification of a household in the individual category was conducted after the interview was completed, when the owner provided an updated condition of the estate.

Table 5. *Groups of households where interviews were planned*

Household group		Abbreviation	Number of planned interviews (n)
1. group:	Locals – medium forest estate (5.0 – 49.9 ha)	M	14
2. group:	Locals – large forest estate (50.0 – 99.9 ha)	L	14
3. group:	Locals – very large forest estate (100.0 ha and more)	XL	25
4. group:	Non-locals – forest estate in the local community, over 5.0 ha	OUT	10

Regarding the selected households, the local district foresters provided names of persons who were best acquainted with the timber harvesting/processing and utilization of wood in households; this facilitated the interviews.

### Questionnaire

On the basis of experience from previously conducted interviews and in cooperation with both the local foresters in the Regional Unit Luče, as well as with representatives of the Solčava municipality, a complex questionnaire was devised containing 120 questions. The questionnaire was divided into 13 chapters. The draft and the proposal for the questionnaire were tested prior to the actual interviews among the forest owners who did not possess forests in the Solčava municipality; all the comments and notes were carefully included in the final version of the questionnaire, which was contained in 10 A4 pages.

The largest possible number of data collected per household amounted to 490. The questionnaire's chapters were prepared and modified by experts for individual sectors. The questionnaire's most comprehensive chapter examined the wood balance in households (125 variables), whereby the input and output of wood per interviewed household was analysed. Also fairly extensive was the chapter on the purchase and equipment (103 variables) for timber harvesting/processing and utilization of wood.

Two perception questions (personal viewpoint) questions were placed at the end of each chapter. The first one concerned the general assessment of the state of affairs related to the chapter's principal topic. In the second question the respondent expressed his/her prospects for the future and expectations related to the development of technology for timber harvesting/processing and the utilization of wood for his/her particular household within the next five years.

### Realization of the inquiry interviews

Two months before initiating the interviews the first announcement in the local newspaper was published, in which an approximate time framework for the inquiry was given. The final term was established during the period when there were no major agricultural activities (mowing) so that the interviews were held between 20 and 30 May 2002. Fourteen days prior to the interview a written notice was sent to the selected households concerning the intention and timing of the interview, how it would be conducted, its course and the ultimate use of the collected data.

The questioning of selected household members in the wider area of the Savinjska Valley was conducted in three days, from 20 to 22 May 2002; for others, located in other parts of Slovenia, until 30 May 2002. The questioning was conducted by eight interviewers, who also collaborated on preparing the contents of the questionnaire. Prior to conducting the inquiry they did practice interviews among themselves so as to unify their approach to the respondent as well as the interview procedure.

Each interviewer was given an inquiry district, where – on the basis of a prior telephone announcement and of the adjustment of the timing of the interview – from three to ten interviews were conducted with the respondent. The interviewer also received a folder containing questionnaires, a map of the district, directory of addresses (including telephone numbers and local names of the farms), a personal visiting card, an authorization by the Slovenian Forestry Institute permitting the inquiry and a small present (a book, *Safe Tree Felling*) to be given to every respondent. Because of the sparsely located farms and relatively large inquiry districts each interviewer used one's own means of transport.

The questions in the questionnaire were answered by the forest owner or a member of the selected household who was well acquainted with the timber harvesting/processing and utilization of wood within that household. Only exceptionally were questions also answered by several household members (e.g. father and son). In many instances the respondent was a son of the forest owner (See Photo 3). The average duration of a single interview was 94 minutes.



Photo 3. *Atmosphere during an interview*

### **3.1.3 Methods for the appraisal of development options**

After the entry of the inquiry data into the computer and following the control of the data, a unified file was created which represented the basis for further processing. The anonymity of the data in the processing was ensured by coding the questionnaires and by condensing the processing concerning the size categories of the forest estate or of the socio-economic household types. The processing of data of specific chapters was completed by the authors of chapters concerned.

The appraisal of the development options for technological progress development in the timber harvesting/processing and utilization of wood among forest owners in the Solčava municipality was profiled at three meetings of the interdisciplinary project team and at the workshop conducted with local foresters.

The results of the inquiry was the basis for the assessment of the development possibilities; this was critically considered first within the project team at the institute and later was completed in collaboration with experts and connoisseurs of forestry, adult education experts, forest owners and conditions within the local community. The meetings and a workshop with experts were conducted using material, minutes and resolutions prepared beforehand. At these meetings were elaborated the draft and the entire scheme of group procedures for Solčava's forest owners.

## 3.2 PARTICIPATION METHODS FOR FOREST OWNERS

### 3.2.1 Participatory process set-up

The second part of the study comprised a series of two half-day workshops conducted with forest owners and other interested members from the local community. The objective of the first workshop was the collection and formation of development incentives, devised as action plans, for the increase of revenue from the production and utilization of wood. The objective of the second workshop was to encourage forest owners to realize their selected incentives.

The workshops were prepared on the principle of full participation (Chambers, 1992; Buttoud, 1999b), which signifies the equal role of all participants within the group process, i.e. owners and public and professional expert services. To achieve the objectives of the workshops the following methods and techniques related to work with groups were applied: generation of ideas, attainment of agreements, group techniques, action plans with an H-method and various modified approaches adapted to work with groups (Ingles, Musch and Quist-Hoffman, 2000; Toplak *et al.*, 2002).

The activities in the workshops were directed by moderators who were trained within the framework of FAO's project Training For Trainers, at the Academy for Moderators and at the internal workshop of the project group (in January 2003). The number of moderators was adapted to the number of participants and to the arrangement of participants into groups.

### 3.2.2 Work methods in workshops

#### Work methods in the first workshop

At the first workshop there was a selection of the method of voting with neutral voting units and the H-method.

#### Voting

We proposed to the participants of the workshop four topical subjects that could further influence the development of the production and utilization of wood. Each participant was given the possibility of three votes (beans), which he/she might, following his/her own judgement, distribute among the proposed subjects. Further activities were planned to take place in two separate rooms, where a different subject matter was discussed. Two subjects that were granted the majority of votes were then assigned to the individual group by the casting of lots.

#### H-method

This method is used for the evaluation of the conditions and the collection of proposals for the improvement of current conditions. It is composed of three parts, namely: **H-form**, **pairing comparison** and **action plan**. The work begins with the preparation of an H-form, whereas the results are allocated to pairing comparisons. The selection in comparisons of pairs determines the subject matter that the group is to deal with in greater detail within the action plan. Each group selects its leader and reporter.

The **H-form** is planned in five steps, which are arranged in a logical sequence from an individual reflection on the subject studied by the group discussion. Questions within this method usually begin with: "How do you assess ...?". The H-form contains the following steps:

- Individual assessment of conditions: each participant evaluates the current conditions by a grade from 0 to 10.
- Each participant notes down at least three explanations, why he/she did not opt for mark 10 (and clarifies the deficiencies). The group discusses individual proposals and arranges them according to their significance.

- Each participant notes down at least three reasons why he/she did not opt for mark 0 (and clarifies the benefits). The group discusses individual proposals and arranges them according to their significance.
- Joint evaluation: on the basis of benefits and deficiencies the group defines the joint evaluation of the conditions.
- The group elaborates at least three proposals for improvement of present conditions.
- After the elaboration of the H-form, reporters from groups report results of the groups' work.

**Pairing comparisons:** group (sitting by the table) works again on its own. In the pairing comparison method all proposals are compared for improvement in pairs – everyone with each other. At the end, the individual proposals that have been chosen are counted; this results in a list of proposals arranged in order of importance.

**Action plan:** The group deals with the proposal that has been selected in most cases and prepares the action plan. It should answer the basic questions: What, Why, How, By what, By whom, How are we to know?

### **Work methods in the second workshop**

Work methods in the second workshop differed from the first one because it was necessary to inform the participants of the possibilities offered by already existing plans for cooperation and education of adults, as well as of a survey of development incentives.

**Lecture method:** Participants were offered three different lectures and thus provided additional information on the process of initiative verification.

**Target:** Participants assessed the course of work and its results. Within the target they presented their evaluation by scores from 1 to 5 (the highest score is the target's centre).

**Modified basic group technique:** The basic group technique was modified, since the list of development incentives from the first workshop (H-method) were already available. In complementing the list of proposals, the basic principles of the basic group technique were applied, whereby participants propose new contents. The voting or identification is subsequent to the elaboration of the list that includes the opinions of the participants. The workshop participant writes his/her name on a piece of paper. It is then fixed beside the incentives that he/she considers important for his/her development and for the realization of which to actively cooperate in the future. Such a method represents at the same time a voting procedure on the importance of incentives. Regarding the three incentives that were granted the majority of votes one should select those individuals who would organize and direct further activities of the interested forest workers within the local community.

### **3.2.3 Realization of the workshops**

The realization of the workshops in the Solčava local community was first planned five months after the completion of the interviews, in October 2002. In relation to the availability of moderators and the thorough and complete preparations for the workshops, the dates were postponed to 18 and 25 January 2003, respectively. In order to prevent interruptions in contacts with forest owners during the intervening time, the following procedures were followed:

- All forest owners were informed on the course of the works within the project via the local newspaper.
- A leaflet was published which contained the principal findings of the inquiry, which actually was enclosed with Christmas and New Year greetings, all of which were sent to personal addresses of interviewed forest owners (see Photo 4).

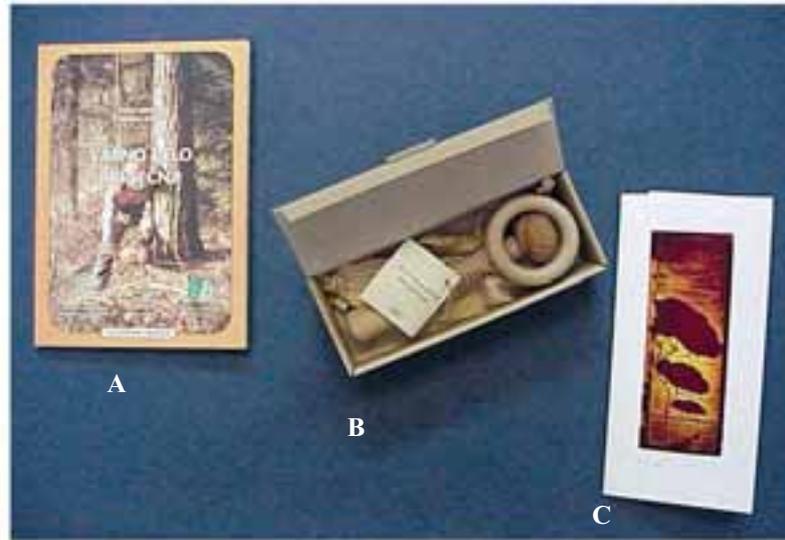


Photo 4. *Presents given to participants of the inquiry and group procedures: A – a book, 'Safe Tree Felling', B – small wooden mortar for participants of the second workshop with forest owner; C – New Year's greeting card with a note of thanks for participating in the interviews*

Information on the workshop proposed for all inhabitants was published in a local journal, which was sent to all households within the local community. In addition, the interviewed forest owners were notified by a written invitation, and together with the Christmas greeting card was sent a summary of the principal findings of the inquiry. The forest owners were also personally invited by local foresters, who traditionally meet them during the period of New Year festivities.

Regarding the precise timing of workshops and the rural nature of the local community, a great deal of attention was concentrated on the adequate timing of sending messages and on their form, since numerous forest owners receive mail only once per week. The term 'workshop', which had been used in our direct collaboration with forest owners, was replaced with the term 'meeting'. Messages were simple and contained only basic information on the 'meeting'.

All members of the project team participated in the realization of workshops, yet not all of them already had experience in the organization, procedure and realization of group methods. For this reason two weeks prior to the realization of workshops the preparatory education was organized on the basic elements of the work in group procedures.

The preparations also included the selection and equipment of premises where the workshop was to take place. The workshop space was arranged differently in each case, depending on the programme and organization of workshop activities.

As stated above, the workshops took place on the Saturdays of 18 and 25 January 2003. The first one was conducted in the forenoon, whereas the other in the afternoon. Both were held in winter conditions (30 cm of snow), which hindered the access; on the other hand it is precisely in such conditions that farmers have more time to spare.

## 4. RESULTS

### 4.1 ROLE OF TIMBER HARVESTING IN SOLČAVA

#### 4.1.1 Importance of the forest for households

##### Characteristics of the interviewed households

Out of a total of 135 households that own a forest in the region of the Solčava community, 58 of them were interviewed. This covered 82.3 percent of the total area of private forests in the community. Eighty-six percent of the interviewed households are located within the region of the Solčava community, whereas 14 percent are situated outside. The distance of an average household from the centre of the local community is 6 km, and it is situated at an altitude from 660 to 1 140 m above sea level.

For the most part (66 percent) the interviewed households are rural farm economies, which are situated in the countryside, out of settlements. They include a total of 221 members, out of which 36 percent at least occasionally work in the forest. Seventeen percent of them are children under 15; 14 percent are employed; 30 percent are farmers; 24 percent are pensioners; and the rest (15 percent) are students, invalids or those employed in liberal professions.

The overall sample of the socio-economic status (see Table 6) is typical of conditions in the Solčava region. The only exception is the small share of senior farm estates, which are more frequently found in the local community than in the sample.

Table 6. *Socio-economic status of interviewed households*

Socio-economic status	Description	Proportion in the questionnaire (%)	Total area (ha)
Full-time farm	No one of the active family members (15–65 years) of the household's core is employed outside of the farm	50	3 340.0
Part-time farm	Different forms of employment on/outside the farm. At least one active family member is employed solely on the farm	21	1 471.4
Supplementary farm	No one of the active family members is employed on the farm on a full-time basis	12	356.2
Senior farm	All members of the farm household are older than 65 years - (senior non-farm estates are classified under 5)	5	138.0
Non-farm estate	Family members who do not perform any farm work and do not live on the farm	12	307.3

The average size of the area managed by an interviewed household amounts to 112.2 ha, out of which 87.3 percent are forests, 9.7 percent are agricultural areas and 3.0 percent are areas under spontaneous afforestation. In addition to this, 13.8 percent of interviewed households also rent additional areas (agricultural plots of land, areas under spontaneous afforestation). The average size of the rented agricultural area measures 7.3 ha.

On the basis of the actual size of the forest estate, the interviewed households were ranged into groups (see Table 7), which represented a base for further analyses.

Table 7. *Number of filled-in questionnaires and the area of forests owned by interviewed households*

Household group	Number of questionnaires (n)	Average area of forests			Total area (ha)
		exploitable (ha)	other (ha)	total (ha)	
M	15	20.4	5.5	25.9	388.5
L	18	48.5	22.2	70.7	1 251.0
XL	17	126.2	94.5	220.7	3 707.4
OUT	8	27.9	5.3	33.2	265.7

### Condition of forests and their role

The interviewed households that have permanent residence in the Solčava community (groups M, L and XL) own an average of 108.3 ha of forests (out of which 38.4 percent are protected forests). The owners in group OUT possess an average of 33.2 ha of forests (out of which 15.8 percent are protected forests).

Almost 90 percent of respondents claim that the condition of forests they manage is good or excellent. In the past five years the major part of the damage in forests was caused by natural phenomena, such as sleet, snow, wind and hail (see Table 8). There are also many forests where the damage was a consequence of timber harvesting (felling and skidding). In the last five years only 5 percent of interviewed owners did not incur any commercial damage in their forests.

Table 8. *Proportion of respondents who incurred commercial damage since 1998*

Factor	Percentage of answers (%)
Tourism and recreation	8.6
Construction of forest thoroughfares	37.9
Insects and disease	39.7
Skidding	50.0
Wild animals	60.3
Snow, sleet, wind	70.7

All interviewed owners believed that besides timber harvesting there may also be some other roles, listed below, of considerable importance related to their forests (see Table 9). The majority of respondents selected as a very important function of their forests the protection of the soil and water resources, while as second they placed timber harvesting. Respondents considered as less important the production of non-wood forest products and the role of the forest as a subject of research, education and conservation of the cultural heritage.

Table 9. *Significance of the role of forests owned by the interviewed households.*

Role of the forest	Insignificant	Important	Very important
	(%)	(%)	(%)
Protection of the soil and water resources	5.2	3.4	91.4
Wood production	14.0	19.3	66.7
Conservation of rare/protected plants and animal species	28.1	28.1	43.8
Recreation and tourism	32.7	32.8	34.5
Research and conservation of the cultural heritage	40.4	24.5	35.1
Production of non-wood forest products	89.7	6.9	3.4

The ecological role performed by the forest may be in conflict with the forest's production role. Forty-three percent of the respondents stated that they are restricted in managing their forests. In the majority of cases this is a restriction or prohibition related to felling in the protected forests and in

those forests that are a part of the landscape parks. Up to the present, none of the respondents has ever received any compensation for the loss of income due to such limitations in forest management; however, since 1998, 55 percent of the interviewed owners received subsidies for individual activities in the forestry sector. The largest part of subsidies has been paid out for silviculture activity. Slightly less than half of the respondents (45 percent) have not received any subsidy from the forestry sector since 1998.

The interviewed households in the region of the Solčava community gain most of their revenues from forestry and sawing (42 percent), which confirms the immense commercial economic significance of forests within the local community. The employment outside the farm represents slightly less than one-third of the total household revenues (25 percent). Pensions are also a relatively important source of income (19 percent). The income generated by agricultural activities represents the smallest share. The respondents estimate that household income related to employment will until 2007 increase on average by 5 percent, whereas income from agriculture will average a drop of 2 percent; revenues related to forestry and sawing will average a drop of 3 percent (see Table 10).

Table 10. *Average sources of income in households in the year 2001 and until 2007*

Income source	M		L		XL		OUT		Total average	
	2001	2007	2001	2007	2001	2007	2001	2007	2001	2007
<b>Forestry and sawing</b>	<b>29.2</b>	<b>31.9</b>	<b>49.4</b>	<b>41.9</b>	<b>59.4</b>	<b>55.5</b>	<b>9.8</b>	<b>11.0</b>	<b>41.6</b>	<b>39.1</b>
Agriculture	14.5	13.5	19.2	16.7	12.3	11.4	2.3	1.6	13.6	12.2
Employment, self-employment	26.6	24.9	16.4	28.3	20.2	23.6	54.8	54.3	25.4	29.6
Pensions, student grants, etc.	29.7	29.7	15.0	13.1	8.2	9.5	33.3	33.1	19.3	19.1

Approximately 55 percent of households are satisfied with the current economic situation. Twenty-two percent evaluates their economic state as sufficient, whereas 19 percent of them rate it as fairly good. As to the question related to the expectations regarding the future economic situation of the household, 33 percent do not expect any changes, 26 percent expect an improvement, 19 percent expect a deterioration and 22 percent of the respondents have their own plans for the improvement of their economic condition. Regarding the household category, there appeared some evident differences. The greatest optimism is found in group L, whereas in category XL respondents are either very optimistic or exceedingly pessimistic.

#### 4.1.2 Wood balance

##### Importance of wood for households

Wood balance in households includes data on the quantity of wood that enters into households and data on further wood utilization. The wood, which becomes part of the system as a raw material, is used in households primarily for domestic use (fuelwood, wood for construction and sawn wood) or for sale.

The questions related to wood balance in households were completely answered by 95 percent of the respondents. Seventy-six percent of them believe that they are well aware of the quantity and structure of wood utilization that occurred in the household within the last five years.

Analysed were the flow of wood for the entire sample (see Figure 5) and the individual household categories (groups M, L, XL). The general finding was that the structure of wood balances regarding household categories does not significantly differ; what differs are merely the absolute quantities of wood between different groups. Individual households within a certain category, however, may, with regard to the quantity and structure of wood balance, significantly deviate from the average (see Figure 6).

The most important source of wood used in households is the forest (88 percent of all wood), 7 percent of wood belongs to the category of other wood material and only 5 percent of the wood is bought in the market. Most of the wood is obtained by regular or exceptional felling in group XL (55 percent), which is followed by L with 31 percent and M with 11 percent. The respondents outside the local community acquire only 3 percent of the entire quantity of wood, which was covered by our questionnaire.

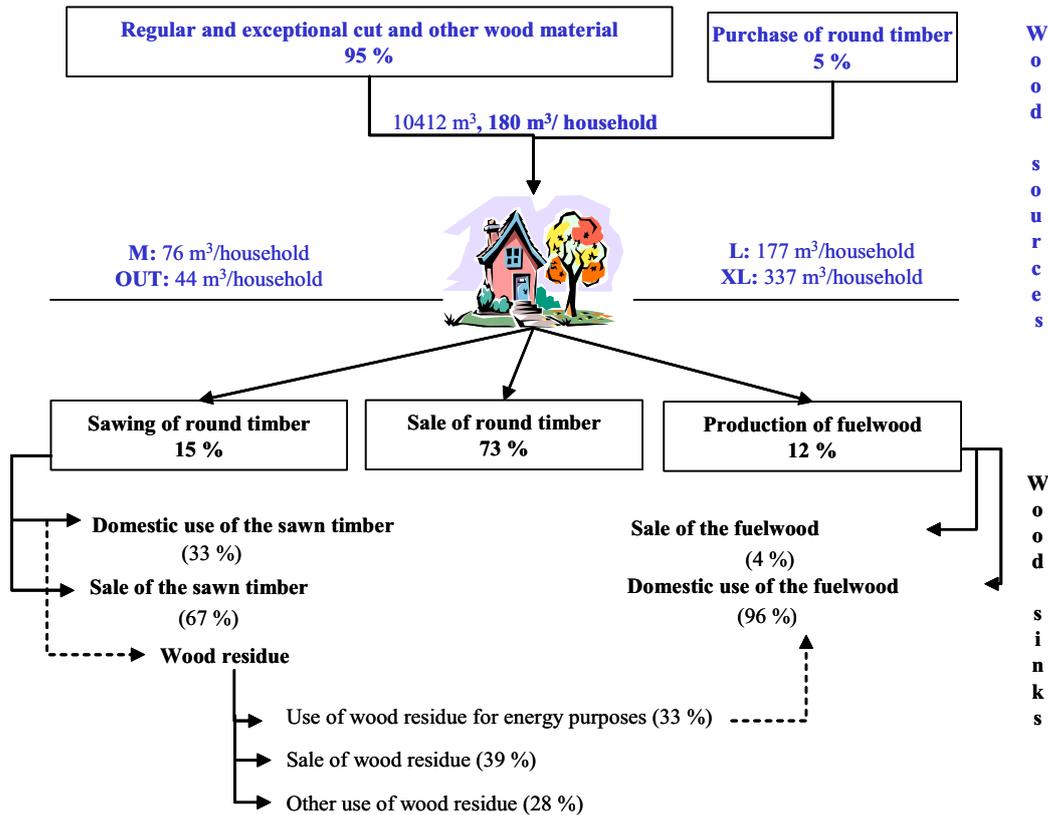


Figure 5. Average wood flow in interviewed households

The total quantity of the regular and exceptional felling among the interviewed households amounts to 9 168 m³/year, which is 40 percent of the entire recorded cut in the community or 42 percent of the cut in private forests. The respondents who possess more than 50 ha of forests (L, XL) cut no less than 82 percent of the entire quantity. The respondents in the group OUT cut only 3 percent of the recorded quantity of wood. Sixty-two percent of the total cut is contributed by full-time farms, followed by the part-time farm with 22 percent, whereas other 3 socio-economic types contribute only 16 percent of the recorded annual cut.

The average cut among interviewed households in commercial forests amounts to 2.5 m³/ha/year. The lowest intensity of felling is found in group OUT (1.5 m³/ha/year), whereas the largest is in group L (3.3 m³/ha/year). Respondents from group L cut 33 percent of the total amount of felled wood among the interviewed, yet they manage only 25 percent of commercial forests owned by all interviewed households.

In all groups the sale of round timber represents the most important element (73 percent of round timber is sent to the market). The majority (87 percent) of the total of 7 768 m³ of the conifer wood is sold. The predominant type of wood to be sold is round timber (58 percent), followed by pulpwood,

wood for boards (22 percent) and construction timber (19 percent). The most significant market share is found in groups L and XL (selling 85 percent of all conifer wood).

At home they process only 10 percent of the conifer wood. The timber of the broad-leaved trees represents only 15 percent of the total cut, the most of which (54 percent) is used as fuelwood. Yet despite this fact they still sell no less than 44 percent of timber of the broad-leaved trees in the market. The prevailing sorts of the wood sold are round timber (35 percent) and fuelwood. The more valuable sorts of timber of the broad-leaved trees are almost entirely sold-out (91 percent). The respondents from group XL are exceptional in the sale of timber of the broad-leaved trees, and they also have no less than 90 percent of the market share.

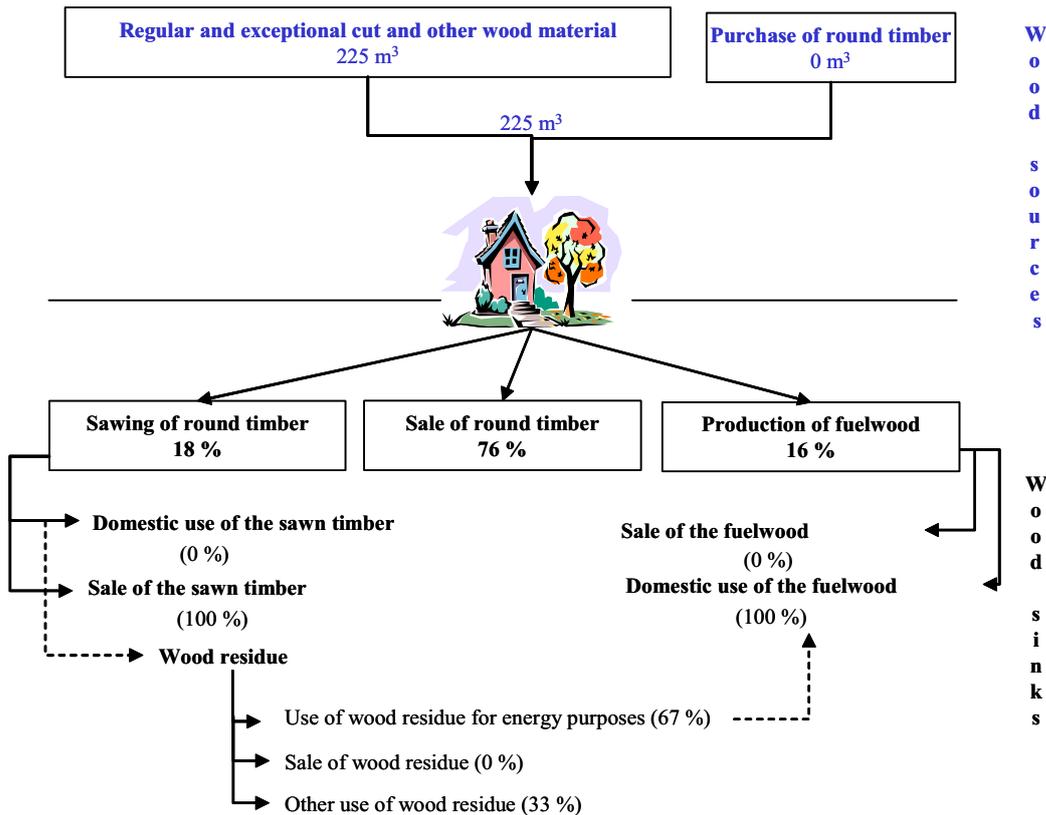


Figure 6. Wood flow in a randomly selected household in group L

The total annual purchase of wood among the interviewed households amounts to 533 m<sup>3</sup> (5.4 percent of all sources of wood in households). Only 9 interviewed households were buying wood and 75 percent of the entire purchase was conducted by 1 single household. The comparison between the purchase and sale highlights the fact that the majority of the timber felled in the community is sold and processed out of the home community.

Annually respondents harvest 747 m<sup>3</sup> of other wood material (on average 12 m<sup>3</sup>/household/year). The prevailing activity among these respondents is felling outside forests (57 percent), which is followed by silvicultural and protection activities in the young stands (29 percent) and by wood residue from felling and wood waste (14 percent). The majority of this wood is used as fuel (40 percent), 27 percent of it is processed, whereas 11 percent remains unused.

Fifteen percent of the round timber is used in primary processing. Practically only the conifer wood is sawn (99 percent). The interviewed households perform the majority of sawing by their own wood saws, while only 15 percent of timber is sawn by others. The largest share of timber is sawn in group

XL (19 percent) and the smallest share in group M (only 7 percent). One saws primarily one's own timber and predominantly for one's own use. The extent of services provided for others is relatively small. Twenty-nine percent of the interviewed households sell its sawn timber, mostly from categories L and XL, which represents 97 percent of the total sale of the sawn timber.

For energy purposes households use 12 percent of the round timber. They annually prepare on average 21 m<sup>3</sup> of fuelwood per household. The greatest share of wood intended for energy purposes is spent in group XL (10 percent), which is, according to the absolute quantity, also to be expected. The major part of the fuelwood is used by this group (96 percent) for heating and cooking. No less than 87 percent of the prepared fuelwood are classical billets (20–30 cm); 3 percent are wood chips; whereas the rest are metric billets and wood bunches. The locals, who possess more than 50 ha (groups L and XL), collectively prepare 74 percent of the recorded fuelwood. The major part of the fuelwood is prepared on full-time farms (56 percent of the entire amount), followed by part-time farms with 24 percent and supplementary farms with 9 percent.

### 4.1.3 Timber harvesting performance

#### The workforce

The interviewed forest owners estimate that more than half of the felling and skidding operations are carried out by themselves and their family members and almost 40 percent of it in the framework of the neighbour assistance scheme; they hire companies primarily for loading and transport of timber (70 percent) and for the construction of forest roads. However, they themselves carry out the majority of the daily work related to silvicultural and protection activities and to the maintenance of skid trails and forest roads (see Figure 7).

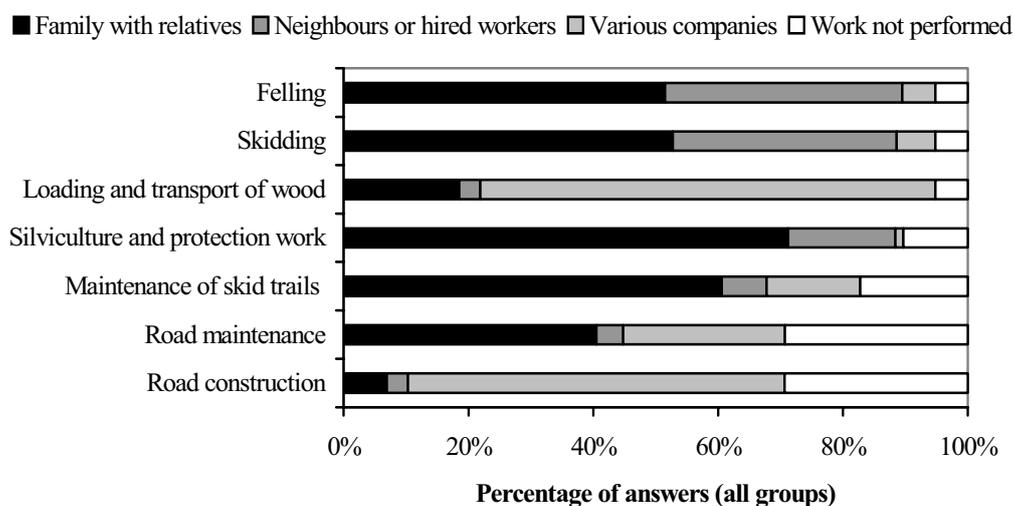


Figure 7. *The workforce and performance since 1998*

The majority of interviewed households that harvest timber every year belong to full-time farms. The usual time for felling in their forests is divided between the spring and autumn (38 percent each) and partially during winter (22 percent). The owners outside the local communities perform by themselves less than 20 percent of the felling, whereas half of it is done by hired workers. Since 1998 the felling and skidding were not performed by more than one-quarter of the interviewed households in group OUT.

In silviculture and protection activities the respondents themselves perform more than 70 percent of the daily work – in the circle of family and relatives. Somehow different is the case in group M,

where 30 percent of the daily work is done by hired workers or companies, while 40 percent of the daily work is done by the family and relatives. In group OUT, however, since 1998, half of the respondents did not perform such works at all.

Respondents from groups L and XL maintain skid trails regularly and primarily on their own. Similar also is the case of the maintenance of forest roads. In group L respondents with the assistance of their family members and relatives carried out 60 percent of the work, whereas in group XL 42 percent of the daily work related to the maintenance of forest roads. In group OUT, 38 percent of households have not maintained forest roads since 1998. All interviewed households from group XL participated in the construction of forest roads, whereas the share of daily work amounted to 11 percent.

Thirteen interviewed households, out of which three-quarters are full-time farms, perform forestry activities using their own mechanization in the framework of neighbour assistance. The major part of the daily work in forests owned by others is performed by the forest owners from group XL (on average 357 daily wages), followed by group M (116 daily wages) and group L (88 daily wages). In total they perform on average 559 daily wages per annum. Regarding the structure, the most part of the daily work is spent on skidding (379 daily wages) and felling (138 daily wages).

The needs of forestry related services until 2007 will be greater in the felling, skidding and transport of timber. No less than 60 percent of respondents believe that they will need additional services in wood production. The minimum of those interviewed believe that in future they will need services for the production of fuelwood.

The majority of respondents in groups XL and L believe that they will be in need of services related to the loading and transport of timber. The increased needs are to be expected particularly in senior and supplementary farms. One-half of those interviewed from full-time and part-time farms judge that in future they will require services in the realm of wood production.

### **Modes of timber skidding**

In the majority of commercial forests (59 percent), skidding is conducted by tractors. In 40 percent (1 286 ha) of the total area of commercial forests, skidding is performed manually, most frequently as pre-skidding. Cable skidding (logging) currently covers 2 percent (54 ha) of commercial forests of interviewed households, which is less than is actually dictated by terrain conditions in their forests. The areas of manual skidding correspond to the areas that are inaccessible to tractors in commercial forests of the interviewed households (1 343 ha).

## **4.1.4 Machinery and equipment for timber harvesting and wood processing**

### **Accessibility of the forests**

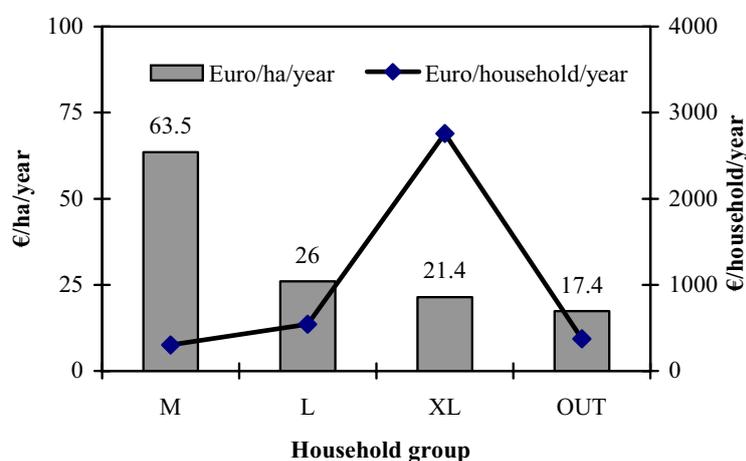
The interviewed households harvest timber on 3 333 ha of forests, which are located in 78 spatially rounded off forest complexes. The comparison of the basic accessibility indicators among different groups of interviewed households are shown in Table 11. Households in groups XL and L have their forests situated in smaller numbers of complexes in the direct vicinity of their residence. The differences in the skidding distance between the interviewed households in groups XL, L and M are atypical. The longest skidding distances are in group OUT, which has also the longest distance from the residence to the forest estate.

Table 11. *Average forest accessibility conditions among interviewed groups of households*

Parameter	Unit	Household group			
		M	L	XL	OUT
Average area of commercial forests	(ha)	21.1	47.5	115.1	25.6
Average number of forest complexes per household	(n)	1.3	1.1	1.5	1.6
Average distance from the residence to the complex	(km)	3.3	1.6	4.7	29.5
Average skidding distance	(m)	913	936	1 064	1 265

Regarding the accessibility for harvesting, the locals evaluate as poor one-third of their forests. Less than one-third of their forests may be considered as properly open.

No less than 73 percent of the interviewed households in groups XL, L and M and 57 percent in the group OUT have been since 1998 active in construction of forest roads – for the most part tractor skid trails. From 2000, regarding the area unit, the respondents from group L invested on average the most, while those from group OUT the least (see Figure 8). The largest absolute investments were made by locals who own 100 ha of forests or more.

Figure 8. *Average annual investment in infrastructure per hectare of commercial forests*

One-half of the respondents evaluate the maintenance of the forest roads in the area of their forests as very good or good, while less than one-quarter believe that the forest roads are poorly maintained. Twenty-seven percent of the respondents answered that in their forests there are no forest roads, since along the bottom of valleys public roads exist, and they are used for the transport of wood. With rare exceptions in group L, respondents do not encounter any difficulties in the use of forest roads in forests owned by others.

The majority of respondents in group L and all respondents in group OUT do not support the restrictions for the tourist use of forest roads. On the contrary, 62 percent of those interviewed in group XL and 39 percent of those from group L would like to limit, or they already restrict, the tourist use of forest roads in their forests.

The needs for co-financing the opening up of forests in the future are largest in the realm of skid trails, which is followed by the co-financing of maintenance of skid trails and construction of forest roads (see Figure 9). No less than 25 percent of the interviewed would like to stabilize individual skid trails in their forests for the transport of wood by trucks. All who would like to upgrade their skid

trails are located in the Solčava community, and among them the respondents from the group XL are the most numerous.

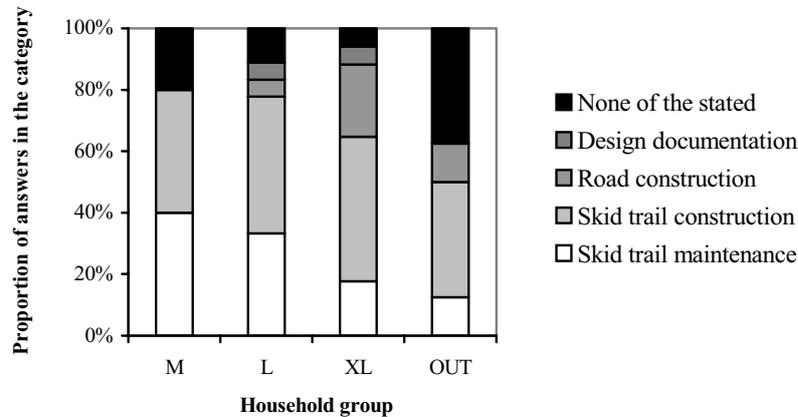


Figure 9. Interest in the co-financing of opening up of forests among the interviewed forest owners

### Possession of machinery and equipment

All interviewed households possess at least one machine for the production or processing of wood. Interviewed households do not have this type of machinery in collective use. Within the non-formal machine pool the interviewed households share only a cleaving machine for fuelwood. With the exception of one household all other interviewed households own at least one chainsaw (in total they own 145 chainsaws). (see Table 12).

Table 12. Machinery for the production or processing of wood among interviewed households

Type of machine	M		L		XL		OUT		Total	
	number	machine/estate								
Chainsaw	29	1.9	48	2.7	53	3.1	15	1.9	145	2.5
Brush cutter	2	0.1	2	0.1	4	0.2	1	0.1	9	0.2
Agricultural tractor	14	0.9	25	1.4	24	1.4	4	0.5	67	1.2
Forestry tractor	0	0.0	3	0.2	7	0.4	1	0.1	11	0.2
Tractor winche	11	0.7	19	1.1	22	1.3	2	0.3	54	0.9

The minimum amount of mechanization for the production of wood is found on senior farms. With the exception of chainsaws, the supplementary and non-agricultural households are also very modestly equipped with this type of mechanization.

The average age of newest machinery for timber harvesting in interviewed households is quite high. The age of the oldest machinery owned by households exceeds 30 years in the case of tractors, forestry tractors and tractor winches; 20 years in the case of chainsaws and 15 years in the case of brush cutters. These numbers indicate the extreme antiquated state of machinery for the production of wood. The average age of the latest chainsaws is the lowest in the group XL (2.7 years). The average age of all chainsaws in interviewed households is almost three times higher (7.8 years). In senior agricultural households the obsolescence of machinery is the most obvious.

The average utilization of machinery for the production of wood is shown in Table 13. The average utilization of mechanization in the forest represents the average annual total of working hours

performed by all machinery of the same type on the farm estate. Differences in the exploitation of machinery among respondents in groups XL, L and M and in group OUT are statistically characteristic.

Table 13. *Average annual utilization of machinery in the production of wood (WH: working hours)*

Type of machine	Unit	Household group				
		M	L	XL	OUT	Average
All chainsaws	WH/year	137	159	529	77	252
All brush cutters	WH/year	15	---	13	---	9
All agricultural tractors	WH/year	117	115	182	---	147
All forestry tractors	WH/year	---	220	643	300	464
All tractor winches	WH/year	68	102	347	250	182

Other mechanization is less involved in work in the forest, yet it is related to wood which comes out of forests. Machinery of interviewed households has been detailed in the following inventory: 31 tractor trailers/semi-trailers, which usually serve also for wood transport; 3 trucks and 3 loaders with forestry tongs. A cleaving machine is owned by 24 interviewed households and 1 household possesses also a cutter for the production of wood chips. No more than 30 households own a saw for sawing round timber. Other inventoried machinery are: 3 fork-lifts, 1 circular saw and a tractor attachment – tractor excavator.

Full-time farms own 70 percent of the stated mechanization, whereas non-agricultural households do not possess such machinery at all. One-half of the described mechanization is owned by respondents from group XL, while one-third of the machinery is owned by those from group L. The age of the newest machinery is on average even higher than the age of equipment for wood production. The oldest machinery are 2 saws for sawing round timber, which already reach 80 and 150 years, respectively. On the average one finds the oldest machinery for the production and processing of wood in group XL. During the year this equipment is slightly used. The most utilized are tractor trailers (108 working hours/year), which are also the most numerous, and saws for cutting round timber (102 working hours/year).

Average annual costs of maintenance of equipment for the production and processing of wood in interviewed households amount to €718. Because they are for the most part personally able to repair and service the machinery that they own, the time spent by each interviewed household for this sort of work is equal to 36.4 hours per year. The highest costs due to repair and servicing of equipment for the production and processing of wood occurred in households from group XL, since they spend up to three times more time for repairs than respondents from other groups.

For the future, the majority of respondents intend to invest their assets into cleaving machines (6 respondents), and they are also interested in investments in chainsaws (5 respondents), as well as to invest in saws for wood cutting (5 respondents). In future they also intend to invest in tractors adapted to the work in forests (in total 7 respondents), while 3 of them are even considering the purchase of chipping and splitting machines. All prospective investors are members of full-time or part-time farms, and their forest estates measure more than 50 ha.

#### 4.1.5 Processing, utilization and sale of wood

##### Timber sawing

Two-thirds of the interviewed households saw the majority of round timber on their own. Among interviewed households the round timber is not sawn by only 28 percent of respondents, particularly from groups M and OUT. Seventy-five percent of wood is sawn by households that possess more

than 100 ha (1 111 m<sup>3</sup>) of forests. The majority of saws for the cutting of round timber is owned by interviewed households with more than 50 ha of forests (80 percent); two-thirds of all saws for wood cutting are owned by full-time farmers. The extent and exploitation of saws is small, since only 2 respondents saw more than 100 m<sup>3</sup>/year. In their providing services to others, however, they also do not saw more than 240 m<sup>3</sup> per year.

The mean value of the saws' age is 11.5 years, which signifies that 50 percent of the saws are older than 11.5 years. The prevailing type among them are draw saws (75 percent). Among saws used for wood cutting, which are older than 30 years, prevail horizontal and vertical track saws (81 percent). The average working efficiency of saws amounts to 0.45 m<sup>3</sup>/WH.

### **Utilization of wood for energy purpose**

The majority (97 percent) of interviewed households use wood for power generation, yet only 81 percent of households heat their premises exclusively by fuelwood. In 11 cases the wood is only a supplementary fuel material. Besides the principal residential buildings, which are on average older than 90 years and measure on average 200 m<sup>2</sup>, in 12 cases the households also own another residential building. The heating season lasts on average for 7 months. The majority of interviewed households (74 percent) possess a central heating system for their homes. No less than 20 percent of interviewed households are still heating by means of individual devices, i.e. by rustic brick or ceramic ovens. Regarding data related to the wood balance in households, the conclusion is that the interviewed households spend 1 297 m<sup>3</sup> of wood per year for heating and cooking. The minimal diameter of wood used as fuel measures on average 5 cm.

Households that heat their premises exclusively by wood, spend 1 078 m<sup>3</sup> of fuelwood for heating. They spend on average 23 m<sup>3</sup> of fuelwood per year, or 0.2 m<sup>3</sup> per m<sup>2</sup> of residential area, or 472 kWh/m<sup>2</sup>, which is more than twice as much as the average energy consumption per m<sup>2</sup> in the classically constructed buildings (189 kWh/m<sup>2</sup>). The lowest consumption of wood for heating is found in households with an autonomous type of heating (15 m<sup>3</sup>/year). Differences exist between groups in the utilization of wood for energy purposes, yet they are statistically characteristic only between categories XL and OUT, as well as between M and OUT (F-test,  $\alpha=0.05$ ).

No less than 38 percent of the respondents intend to change their way of heating in the future. The changes in their heating system are planned by the majority of those who still do not own a central heating system. A relatively large number of respondents (12) is reflecting on the system which would use their own wood chips. Less of them are considering the purchase of a modern boiler using billets. Only one respondent intends to start using fossil fuel in the future.

### **Sale of wood**

Interviewed households annually sell (the average value since 1998): 7 399 m<sup>3</sup> of forest timber assortment (92 percent conifers); 1 025 m<sup>3</sup> of sawn timber; and approximately 200 m<sup>3</sup> of other wood material and fuelwood. Wood is sold by 93 percent of interviewed households. The largest buyer of the round timber is a cooperative, which buys 76 percent of all wood sold by the interviewed forest owners (5 605 m<sup>3</sup>). Owners sell on their own 14 percent of all round timber (see Figure 10).

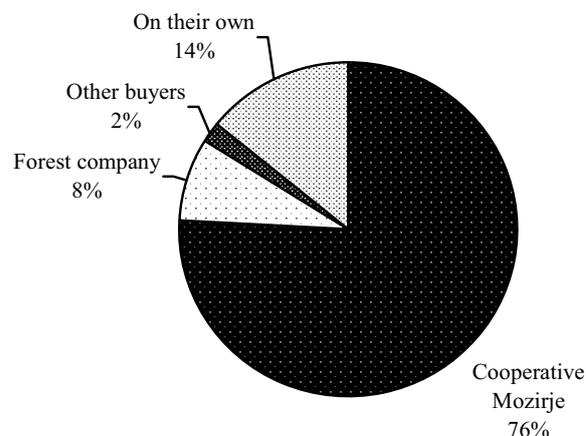


Figure 10. *Manner and structure of the sale of wood by interviewed households*

Over 50 percent of the sale of round timber is by respondents from group XL. Less important participants in the sale of round timber are respondents from groups M and OUT, who represent only 14 percent of the entire sale among all interviewed households.

Parallel to the enlargement of the forest area is an increase in the average sale (see Table 14). An increase in the diversity of the sale methods is simultaneous with an upsurge in the quantities of sold timber. Since the share of sales conducted on one's own (without intermediaries) is on the rise, the prevailing influence of the largest timber buyer in the community of Solčava – the Agricultural Cooperative Mozirje – is slightly decreasing.

Table 14. *Characteristics of round timber sales in groups of interviewed households*

Parameter	Unit	Household group				Total
		M	L	XL	OUT	
Interviewed households	(n)	15	17	18	8	58
Households that sell wood	(n)	14	17	18	5	54
Share of the sale (% of the entire amount)	(%)	11	32	54	3	100
Average sale	(m <sup>3</sup> /year)	58	137	222	51	137
Sale performed on their own	(%)	0	12	18	12	14
Sale to the cooperative	(%)	84	80	71	88	76
Sale to forest companies and to others	(%)	16	8	11	0	10

A comparison of the frequency of felling and sales methods among the interviewed households demonstrates that those households that fell trees every year have a more diverse structure of the sale. Those who are not felling trees each year (they contribute 15 percent to the total amount of wood sold), sell practically all their timber to the cooperative. Among interviewed households 83 percent sell their wood exclusively according to the quality classes. Thus 90 percent of the roundwood is sold separated into quality classes.

#### 4.1.6 Qualification and safety at work in forests

##### Qualification for work in forests

The respondents were asked how they evaluate the qualification level of household members for work in forests and for sawing timber. The basic results are shown in Table 15. If a comparison is made of only those who are capable of performing work in forests or at wood processing, then

respondents' assessments of the qualification in different groups are very similar. The majority of them are not qualified for the loading and transport of timber. In general, answers representing the assessment that they are very poorly qualified for work are very few (2), and for that reason the differences in the average evaluations are insignificant. This applies particularly to groups of households in the framework of the local community, whereas those outside it (OUT) assess their qualification in less positive terms. The owners assess that they are the most proficient in production of fuelwood. In the case of timber harvesting the evaluations for different types of work are very similar. One-third believes that they are well qualified for felling and skidding. Most of them are also able to practice silviculture, yet only one-third is convinced that they can perform it well.

Table 15. *Qualification of household members for various work (Possible answers :1-not capable; 2-bad; 3-good; 4-very good)*

Type of work	n	Household category					Total
		M	L	XL	OUT		
		15	18	17	8	58	
Chainsaw felling	Not capable (1) - n	4	3	-	2	9	
	Capable (2,3,4) - average		3.5	3.4	3.4	3.0	3.3
Manual skidding	Not capable (1) - n	3	3	-	3	9	
	Capable (2,3,4) - average		3.3	3.3	3,2	3.2	3.2
Tractor skidding	Not capable (1) - n	3	3	-	3	9	
	Capable (2,3,4) - average		3.4	3.5	3.4	2.6	3.4
Loading and transport	Not capable (1) - n	10	11	10	7	38	
	Capable (2,3,4) - average		3.4	2.9	3.0	2.0	3.0
Silviculture and forest protection work	Not capable (1) - n	2	1	-	1	4	
	Capable (2,3,4) - average		3.2	3.2	3.2	2.7	3.2
Firewood splitting	Not capable (1) - n	1	2	2	3	8	
	Capable (2,3,4) - average		3.4	3.6	3.8	3.2	3.6
Sawing logs (boards, roofings)	Not capable (1) - n	8	5	3	7	23	
	Capable (2,3,4) - average		3.4	3.4	3.1	4.0	3.3

The National Safety and Health at Work Act stipulates that full-time farmers shall prepare their risk assessment of works in the forest and on the farm. Out of the 29 interviewed full-time agricultural households only 21 percent is well acquainted with the Act's requirements, 62 percent only partly, whereas others are not acquainted with the Act at all.

### Accidents in production and processing of wood

Within the last 10 years the interviewed households have experienced 12 accidents with long-lasting consequences (11 at forest works and 1 at wood processing).

Considering the total felling, which in the last years on average amounted to 9 200 m<sup>3</sup> and the realization of work (felling 48 percent, skidding 55 percent), the evaluation of the the quantity of cut per 1 accident is: on each 4 000 to 4 500 m<sup>3</sup> of felled trees 1 accident occurs with long-lasting consequences for household members. The number of accidents with long-lasting consequences due to injuries is equal to 2.2 to 2.5 on 10 000 m<sup>3</sup> of the cut, that is within the range of the Slovenian average (1.3 to 2.6 per 10.000 m<sup>3</sup> of felled timber). The major difference in the average conditions in Slovenia is the fact that the forest property in Solčava is at least 10 times larger than the Slovenian average, whereas the average property of respondents is no less than 20 times larger.

In Germany such frequency has been ascertained in case of all accidents and not only regarding those with long-lasting consequences, which according to the Austrian statistics (Stadlmann, 1986) represent 10 to 20 percent of all accidents. For this reason it could be assumed that the safety

conditions in private forests in Solčava represent a problematic issue, and despite the high degree of self-confidence related to the qualification level there is a need for a more detailed analysis in order to improve the current situation. In the considered period of time, in one of the interviewed households in the Solčava region there occurred an accident which claimed one life.

### Interest for training

The level of owners' interest for additional training may be quite diverse, and differences among groups are characteristic. Smaller forest owners have thus lesser interest for any additional training (see Table 16). Interest for training in groups M and OUT is similarly low, except in the case of silviculture (larger interest in the OUT group) and in the sale of wood (lower interest in OUT). In general the conclusion is that owners are interested in education and that their interest is growing proportionately with the size of the estate. Knowledge is in a close and positive correlation with successful management, and because larger owners are more dependent on income from the forest they regard knowledge with greater significance.

Table 16. *Share of respondents who have need for additional education*

Topic	Household group				
	M	L	XL	OUT	Average
	(%)	(%)	(%)	(%)	(%)
Utilization of wood biomass	27	50	59	38	45
Wood processing	20	50	71	25	45
Timber harvesting	20	67	71	38	52
Silviculture	40	78	71	63	64
Wood sale	53	83	73	13	64

The absolutely lowest interest for training in the realm of wood sale is in group OUT, whereas in groups L and XL such interest is the highest. In group M there is only a small interest in education in the realm of wood production and processing, since only one-fifth of them expressed any interest for such training. The interest in training is also influenced by the socio-economic status of the household. The highest interest for training is found among full-time farmers, since the forest and the income related to it represent the largest share in the structure of the household's revenues.

Regarding the type of training, the respondents consider the most appropriate the courses that are organized in their vicinity (in their local environment) and the excursions. Courses organized in the educational centre in Postojna do not interest them. They are also favourably disposed to new approaches, since no less than a half of them (28) supports the idea of individual coaching with a personal instructor with whom they would work in their own forests. The respondents perceive another possibility of training also in study circles, which throughout Slovenia are gaining in importance.

#### 4.1.7 Information and cooperation

Forest owners in general assess the degree to which they are informed as 'good' (57 percent of the answers), while parallel to the size of the forest property there is also an increase in the share of replies that state such degree as 'sufficient'. Respondents from group L are the most satisfied with the quality and amount of information received, whereas those from group OUT are the least satisfied. In the future, a half of them expects improvement in the field of information, although only 6 households devised their own plans for improving their level of information received.

### Information sources

The two most important sources of information in the Solčava region are oral consultation by the SFS and informal meetings with other forest owners (see Figure 11).

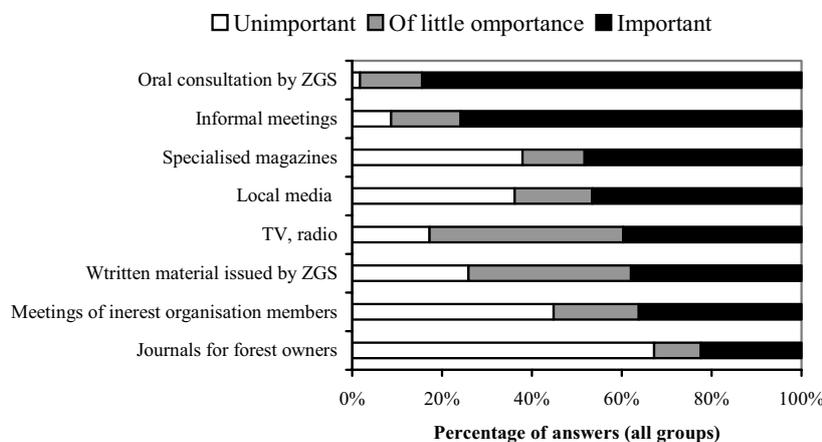


Figure 11. *Assessment of the significance of information sources for forest owners*

### Types and accessibility of information

Respondents enumerated 31 information sources that were of some importance to them and are related to the field of production, processing and utilization of wood. The majority of them consider as the most important information related to: prices of wood, demand for wood, wood sale, silviculture, the offer of machinery, the offer of services and wood processing. Other information, which they also mentioned, were: timber buyers, prices of forest works, permitted annual felling, contractors, bucking of wood, management plan, timber harvesting, forest technology, construction of skid trails, education, modes of payment, damage done to trees, wood transport, utilization of wood for fuel, sawing of round timber, forest road construction, tree planting, the status of wild animals in the forest, subsidies, heating technology, safety measures at work, protection of the environment, maintenance of forest roads and information regarding SFS.

By uniting information on the price of wood, demand for wood, wood sale and buyers of wood, one obtains the common category of information on wood sale (55 percent of answers). The sources of the most important information – wood price – are for the most part (78 percent of answers) purchasers of wood; only 5 percent are foresters of the public forestry service; and 8 percent of the respondents find such information in a newspaper or at the internet wood exchange.

The accessibility of information is in 58 percent of cases assessed as good, in 30 percent as bad, and only 5 percent of them estimate that the accessibility is very good. Owners of larger forest estates turned out to be less satisfied with the accessibility of information and the efficiency of the communication channels for the needs of timber harvesting/processing and wood utilization.

### Communication channels

Members of interviewed households spend on average 2.7 hours per month in reading literature related to the field of timber harvesting and production and utilization of wood, as well as 2.6 hours in watching or listening to specialized broadcasts in the field of timber harvesting and production and utilization of wood.

Internet is also becoming an increasingly important information provider in rural areas. More than half of the interviewed households own a personal computer (see Table 17).

Table 17. *Ownership of personal computers in different groups of households*

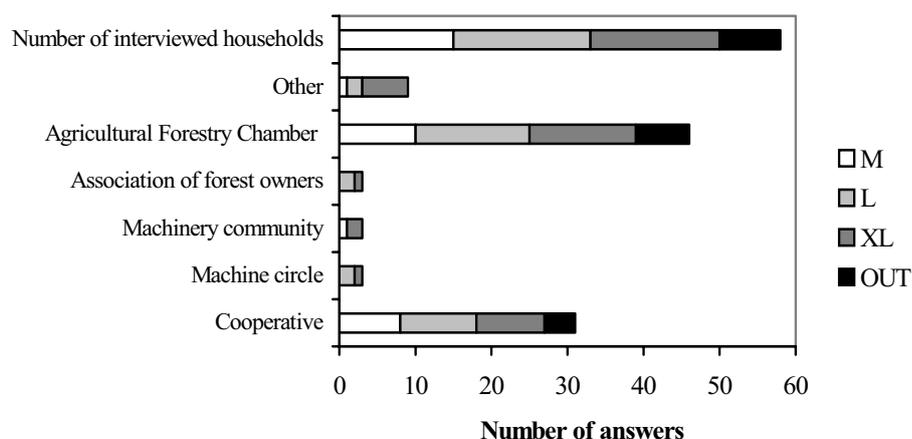
Personal computer	M	L	XL	OUT	All respondents
	(%)	(%)	(%)	(%)	(%)
Already has one	53.3	66.7	58.8	62.5	60.3
Plans to buy	13.3	22.2	23.5	0	17.2
Do not have any	33.3	11.1	17.6	37.5	22.4
<b>Total</b>	<b>100</b>	<b>100</b>	<b>100</b>	<b>100</b>	<b>100</b>

The analysis of different groups of households demonstrated that the least equipped with PCs are respondents in group M, yet even there half of them possess one. In the future, respondents from groups L and XL intend to be better equipped with PCs.

### Membership in interest organizations

Membership in interest organizations is a complex communication channel and may represent a complex service for a forest owner. In the former socialist system the forest owners were linked by means of special organizations. In the ensuing transition period their role was taken over by cooperatives, which are active in trading and sale of agricultural and forestry products.

Because of the obligatory membership in the Agricultural Forestry Chamber most of the respondents are members precisely of this organization (79 percent), which is understandable, due to their fairly large forest property. Many of them are also members of cooperatives, i.e. 31 respondents or 53 percent. Membership in other organizations is fairly rare (see Figure 12).

Figure 12. *Membership of forest owners in various organizations and their number*

Respondents were given a possibility to express their opinion on the functioning of individual organizations using the grades: 1 - not satisfied; 2- satisfied; and 3 - very satisfied. Most unfavourably was evaluated the activity of the Agricultural Forestry Chamber with an average grade of 1.2, while the best grade was given to the machine pool with a grade of 2.5. Regardless of the fact that the Agricultural Forestry Chamber has been active only for a brief period of time, it is obvious that it did not gain much esteem from forest owners: out of 46 members no more than 27 declared that they are satisfied with its capability, 17 did not know how to evaluate it, while only 7 were satisfied with the function of the Agricultural Forestry Chamber. Respondents assessed much more favourably the Agricultural Forestry Cooperative Mozirje: 43 percent of the respondents were

satisfied with its capability, whereas only 8 percent expressed dissatisfaction, yet no one declared great satisfaction with the cooperative's performance.

### Interest for cooperation with other forest owners

To the question whether they would like to establish links with other forest owners within the local community 90 percent of the respondents replied positively. Only four of them answered negatively, while two remained undecided.

Respondents who would like to establish such contacts evaluated the significance of the various types of association. Wood sale is almost for the absolute majority the most important, which is followed by mutual exchange of information (see Figure 13). Three-quarters of them believe that the links are important also for wood processing and the execution of forest works. Opinions differ among groups on the need for associating with others in the utilization of wood for energy purposes; however, on average 60 percent of them believe that the use of wood for energy needs, as well as the construction and maintenance of forest roads, are also important fields for cooperation. Exactly one-half of them believe that such association is also important in the field of education.

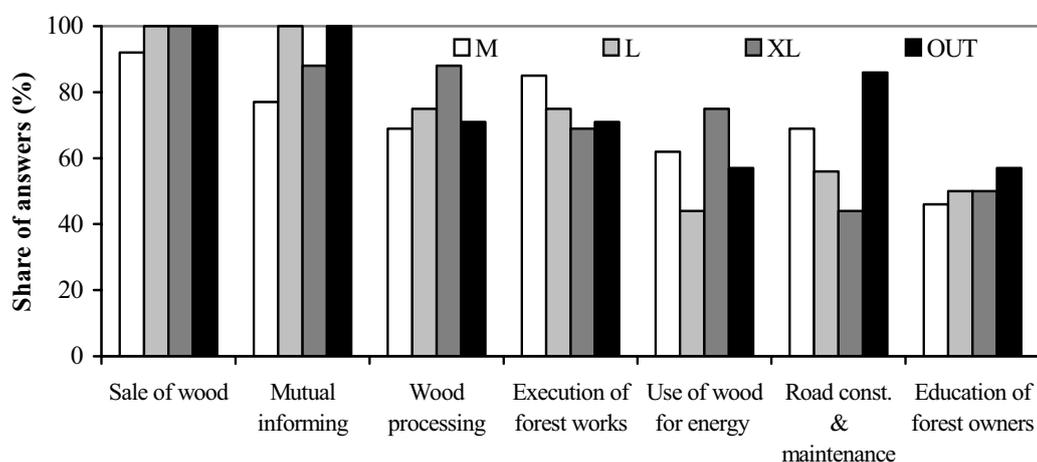


Figure 13. *The importance of topics for the cooperation of forest owners in Solčava (n=52. The figure represents the share of those who believe that cooperation is important)*

Machine pools are also among the voluntary types of association, and for that reason it was necessary to ascertain how well acquainted the forest owners are with this type of association and whether they would join such a pool. These are known to 81 percent of the respondents; the differences among groups, however, are quite large. From such attitudes stem the different interests for participating in these pools. The interest in this type of an association is increasing in correspondence with the size of the forest estate.

Because of the relatively poor formal association among forest owners it was expected that owners cooperate and communicate a great deal more on an informal level. Up to the present, in household groups M, L and OUT no more than 50 percent of the interviewed forest owners have engaged in any mutual consultations regarding their plans for harvesting, processing and utilization of wood. Only 29 percent of these forest owners were represented in group XL. All who are consulting and seeking advice from each other have declared that they could describe such an experience as a positive one.

#### 4.1.8 Perception of timber related conditions and expectations

In encouraging technological progress in the local community, it is not only the objective conditions in timber harvesting/processing and wood utilization that are of significance in the study, but it is also information on how each individual forest owner perceives these conditions and reacts to them.

In order to determine the owners' attitudes towards the current state in timber harvesting/processing and wood utilization in their household, we posed the following two questions at the end of each questionnaire's chapter (contents 'X' represents the chapter's title):

- **How do you assess the present state of 'X' in your household?** (scores: 1: insufficient; 2: sufficient; 3: good; 4: very good; 5: excellent; 8: no answer).
- **What are your five-year expectations in the realm of 'X' in your household?** (scores: -1: I expect further aggravation; 0: no changes; +1: I expect an improvement; +2: I have plans for improvements; 8: no answer).

Because both perception questions (personal viewpoint) were presented at the end of individual chapters, the interviewee already knew the topic under consideration. The uniformity of interviewing enabled the comparison of evaluations between the topics and respondents.

#### Perception profiles

The respondent's assessments of the current conditions are represented in the graph (see Figure 14), using an ordinal scale for scores. The profile of conditions was achieved in topics relating to timber harvesting/processing and wood utilization in his/her household.

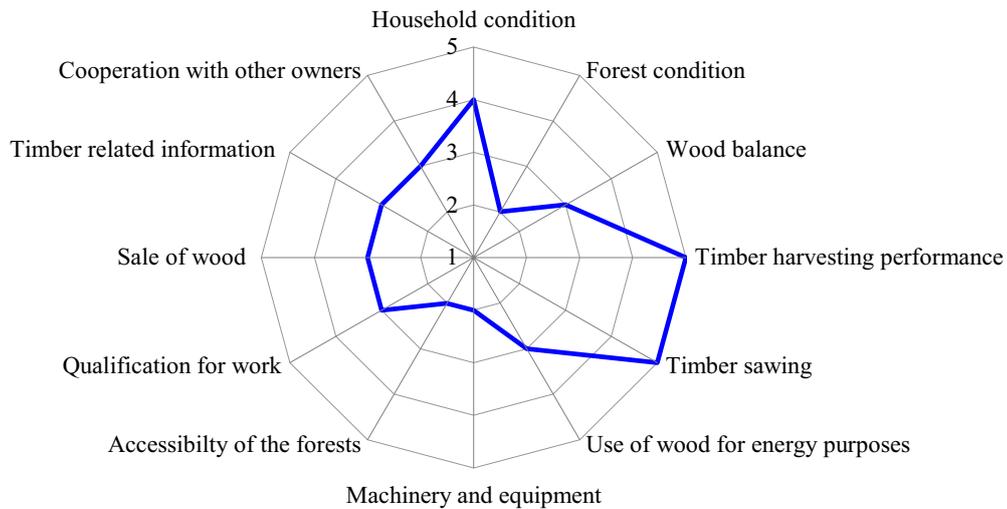


Figure 14. Perception profile of conditions for a randomly selected respondent from the XL group (scores: 1: insufficient; 2: sufficient; 3: good; 4: very good; 5: excellent)

The assessments of conditions differed with respect to the topic. This was a consequence of actual differences in the households as well as differences in the respondents' perceptions of these conditions. The extent of the perception profile suggested the respondent's attitude towards the current state (optimism, pessimism). The shape of the perception profile presented a visualization of the priority topic in relation to the technical progress in timber harvesting/processing and wood utilization. In the same manner, yet with a different scale, the opinion profile of expectations can be represented.

Due to the rather rough scale and subjective character of responses, perception profiles are not suitable for detailed analyses of timber related issues in the local community; nevertheless for our purpose collected answers may be considered for the identification of target groups and priority topics.

### Comparison of perception profiles among household categories

Perception profiles enable visual comparisons among a few individual forest owners (up to 5). The ordinal scale of the scores enables two types of analytical comparisons to ascertain whether respondents from different household categories perceive conditions in harvesting, processing and utilization of wood in a different way. First there was a comparison of the average grades of perception responses for individual topics, later there was a comparison of the sum of scores for ten selected topics.

Differences in mean scores among household categories for individual topics are statistically insignificant in a majority of cases, yet in the case of some topics there are noticeable differences between locals and non-locals. Local owners have on average evaluated the current state higher than non-locals regarding the qualification for work in forests and practices in harvesting and utilization of wood for energy purposes, whereas conditions in wood sawing and openness of forests were given lower grades. Similar but less significant are differences in the mean scores related to expectations.

Thirty-nine respondents replied to all perception questions. For this group two general chapters – A (state of the household) and B (state of forests) – were eliminated, and the rest of the scores per each type of question was totalled. The lowest number of scores in the evaluation of conditions given by a respondent was 10 and the highest 50. The fewest number of scores in evaluating expectations was -10, whereas the highest was 20. Because there were only three respondents from the category OUT who replied to all questions, comparisons of differences in the sum of scores were done with only three categories of locals.

Comparison of mean values for the sum of the scores among groups of locals reveals significant differences ( $p < 0.05$ ) between group XL and M (see Figure 15).

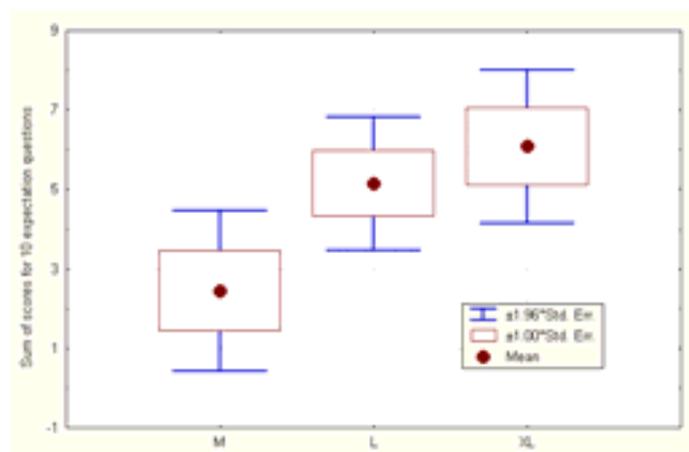


Figure 15. Differences in totals of 10 expectation grades among interviewed locals ( $n=36$ )

Parallel to the increase in the average size of the forest estate there is also a rise in the average sum of expectation scores, which implies a slightly higher awareness of the importance of technological development among large- and medium-sized forest estate owners.

### Priority topics and target groups

Within each household category at least one individual was identified who had a noticeably participatory attitude towards conditions in topics related to timber harvesting/processing and wood utilization. Owners of larger and very large forest estates resulted as more active, since some of them proposed no less than four concrete plans for improving conditions until 2007. On the other hand, no more than 20 percent of the interviewed owners of very large forest estates proposed any concrete plans in the realm of harvesting, processing and utilization of wood. The situation in other categories was even worse, so that in category M no more than 20 percent of respondents presented a single plan for improvements in timber harvesting/processing and wood utilization.

For the encouragement of technological progress equally important are topics with several plans for the improvement of current conditions and topics where large portions of interviewees expected noticeable worsening conditions.

Figure 16 presents the share of selected expectation replies. Respondents perceived the worsening of conditions in the sale of wood and in practices of wood sawing, and on this topic there were no differences among household categories. Numerous forest owners in category XL (over 100 ha of forests) expected a general deterioration of economic conditions because of the decline in the sale of wood. Plans for increasing the qualification level and improving cooperation with other forest owners were relatively rare.

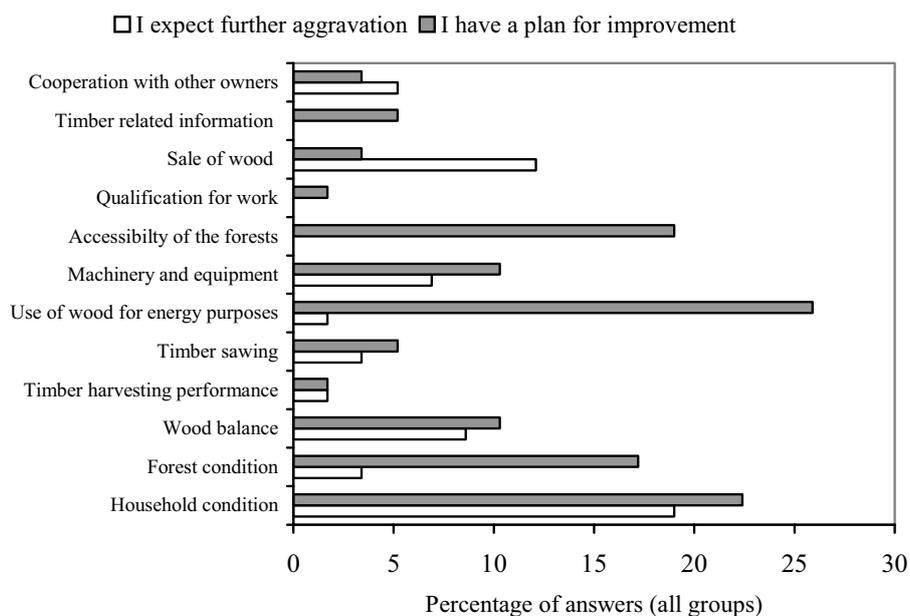


Figure 16. *Percentage of collected answers – expectation grades for 58 interviewed forest owners (light: they expect aggravations; dark: they have an improvement plan)*

The majority of respondents who have plans for improvements in the following areas:

- utilization of wood for energy purposes (15 answers);
- opening up of forests by means of forest roads (11 answers);
- investment in machinery and equipment for wood harvesting (6 answers);
- wood balances – structure of wood utilization in households (6 answers).

By means of a synthesis of answers to perception questions on the current state and expectations related to harvesting, processing and utilization of wood, approximate provisional priorities and target groups were defined for technological development (see Table 18).

Table 18. *Priority areas and target groups for encouraging technological development in Solčava according to the data collected by the inquiries*

Topic	Target groups
Improvement in the sale and sawing of wood	Households that have a permanent residence in the local community and an estate in excess of 5 ha
Improvements in collective cooperation, sharing of information, opening up of forests, work qualification	Households that have a permanent residence in the local community and an estate in excess of 50 ha
Improvements in the utilization of wood for energy purposes within households	Households that have a permanent residence in the local community and an estate in excess of 100 ha

Because of considerable individuality in encouraging technological progress in individual households one should invite and involve all forest owners in such cooperation, whereas the programmes and solutions should be adapted to different forest estate size categories. The key role in defining the programmes for development of technology belongs to the owners, since only thus will they be motivated to overcome any obstacles that may arise.

## 4.2 ASSESSMENT OF THE DEVELOPMENT OPTIONS

The sample inquiry among forest owners has confirmed the assumption that the production and utilization of wood represents in the local community of Solčava a strategic production chain, which at present relies almost entirely on the work of forest owners. According to the opinion of the majority of respondents, the two most important roles of their forests are wood production and protection of the forest soil.

The owners are also well aware of the forest's significance for tourism. Despite the numerous roles and functions of forests, owners expect a further drop in the share of revenues from wood harvesting and sawing in the future. In order to avert such a turn of events it will be mandatory to prepare and implement projects within the local community that will exploit advantages and/or remove obstacles concerning equipment and qualification of forest owners and which may enhance their collective association and integration into economic processes within the region.

### 4.2.1 Development advantages

#### Equipment

An undisputable uniqueness and a basic development advantage of the private forestry sector in Solčava is the structure of the forest estate. It is significantly more favourable than the Slovene average and is comparable to conditions in Scandinavia. Regarding the number of forest owners and forest areas that they possess, there is a predominance of forest owners who own more than 50 ha of forests. An additional advantage is also the fact that the majority of these owners reside within the local community and generally make their living by both agriculture and forestry.

In the municipality of Solčava the actual conditions of private forests – which are according to respondents' opinions well preserved, of appropriate structure and satisfactorily tended – represent an important development potential. Somewhat surprising may be the conclusion that the majority of the interviewed households are relatively satisfied with their economic status. This is most likely a consequence of property structuring and reflects their optimism and belief in development, which is an indispensable prerequisite for any progress.

In the area there is a great deal of machinery for harvesting and timber sawing, predominately power saws, agricultural tractors – adapted for work in forests – and circular saws of lesser capacity for sawing log timber. In recent years the forest owners have been intensively building tractor skid trails, with which they shortened the winching distances and reduced the share of manual (preliminary) pre-skidding, which is, however, still somewhat largely practised.

Because of the positive experience with modern heating machinery fuelled by wood biomass in some individual households in Solčava and due to the construction of remote heating systems in the local community, there is a great deal of interest in investment in advanced appliances for heating with wood biomass and the organization of the market for wood fuel.

### **Qualification**

Most of the work in wood harvesting is still carried out by owners themselves. This is made possible by their being well acquainted with all needs and problems related to the felling and skidding of wood, to the preparation of fuelwood and to the maintenance of forest roads. At present, work in wood production, construction and maintenance of forest roads and also partly wood processing represent an important regular or occasional employment in Solčava. Regarding the fact that the employment sector within the local community is in general very limited, there is a need for a well-planned effort in the preservation and development of work posts that are related to forests and wood.

Non-formal group training for forest owners is performed by the Local Unit of the SFS in Luče. In the realm of wood harvesting they organize periodical courses dealing with safety in felling and skidding of timber. Recently, however, there are also courses on bucking of broad-leaved trees. Thus far they have not initiated any individual training with qualified instructors; nevertheless there already exists a great deal of attention for this educational method among forest owners. Interest for cooperation and for purchasing computer equipment, as well as an active attitude towards the future, indicate great educational potentials among the interviewed locals.

### **Cooperation and sharing information**

The most frequent voluntary type of association of forest owners is a reciprocal neighbour assistance, which may in future, due to potential dangers related to the work in forests, imply a great risk for the concerned owner. In the local community there are ten individuals who are working in the sector of timber harvesting and processing on a larger scale, as a service, and are interested in associating on the basis of a common interest, particularly with buyers. Forest owners are acquainted with the existence of machine pools but they do not take an active part in them.

The most important type of association is the Agricultural Cooperative Mozirje, which also purchases more than 70 percent of the felled round wood. Cooperation between the forestry sector and forest owners is satisfactory. Direct contacts with a district forester and wood buyer also represent the principal source of information for owners. The use of a personal computer for collecting information related to timber harvesting/processing and utilization of wood is already fairly widespread among forest owners and will soon become quite a daily practice on all larger farms. The Cooperative Solčava is still in a phase of formation. The first objective of the cooperative is the construction of a local plant for cattle, whereas later the members intend to deal also with the production, sawing and marketing of wood.

#### **4.2.2 Development barriers**

##### **Equipment**

Aged, and above all, obsolete and inadequate exploitation of tractors and power saws are reducing the work economy in forests. Existing mechanization hinders any larger expansion of services in the wood production sector. Investments in equipment planned among interviewed owners is fairly modest, and owners of smaller forest estates are even in a more unfavourable position. The latter are

vacillating between the purchase of equipment that is less suited to their needs and contracting services of felling and skidding of timber. The potential purchase of modern cable systems for wood skidding, the possibility of machine felling by harvesters or wood transport by forwarders are matters they can hardly reflect upon.

Due to demanding terrain requirements and complicated documentation, owners similarly cannot even consider building forest roads, which could reduce skidding costs. But the inexpensive construction of skidding trails in difficult and demanding terrain causes considerable degradation of the natural environment.

The quality of conifer round timber is below average, whereas the amount of quality assortment is negligible. Wood processing, with the exception of sawing, is underdeveloped. Existing saws for wood sawing are unexploited and outdated. The owners are reflecting, to a surprisingly great extent, on their needed upgrading, but not on the requirements of the wood sawing services. Theoretically forest owners support the local initiative to set up a small-sized saw plant but they still sell their timber to the highest bidder.

The heating machinery is for the most part outdated, while buildings that are heated by them are poorly insulated and for that reason wood consumption is not advisable. When added to this is the low economy rate in the harvesting and production of fuelwood, then it is painfully obvious the ineffectiveness of wood as a raw material, both in domestic consumption and in the sale of round timber and fuelwood.

### **Qualification**

The formal education level of interviewed forest owners is similar to the Slovene average for the rural population. For the time being, Solčava does not possess capacities for formal education of adults and a similar situation is found in the neighbouring Luče. The educational infrastructure for non-formal training methods is poorly developed. The SFS cannot cover education in sectors that are of crucial importance to owners (wood marketing).

Forest owners read very little and surprisingly rarely discuss the technological problems of wood production. They apparently underestimate the significance of any recent knowledge related to skills in the felling and skidding of timber and in the production of fuelwood. Innovations in the technological area are slight.

The owners are aware of inadequate knowledge and lack of skills in the bucking and sale of wood. They waver between the traditional (e.g. learning, sharing knowledge among household members) and modern methods of learning (e.g. the use of internet), yet in their quest for educational practices and methods that would suit them the most they are relatively indifferent.

In order to reduce production costs, forest owners personally maintain machinery and equipment for work in the forest; they are willing to invest very little funds or nothing at all in acquiring adequate knowledge in work methods, safety measures and how to reduce damage done to trees and soil. The awareness of environmental issues is very limited.

### **Cooperation and sharing of information**

The inhabitants of Solčava are traditionally renowned as proud and self-relying peasants, which enabled them to survive in the past. They are hardly willing to accept the fact that present conditions in society dictate cooperation and integration in the production and added value chains. Their indifference is a major obstacle to any attempt at enhancing an integration among forest owners.

Present organizational types of integration are either restrictive or do not offer any direct benefits to the forest owner. Presently no institution or individual exists who could adequately represent the

interests of the forest owners in timber harvesting/processing and utilization of wood. Regarding the implementation of projects with a communal significance, there are several institutions whose attitude towards forestry – and especially towards a forestry related technology – is noticeably passive.

The central motivation of forest owners for associating is to enhance log timber marketing. This is, however, not the most important and it is also not the only option. In conditions of the European market of wood and wood assortment, the difference between the wood's purchase price and production costs is getting ever slighter. The forest owners are underestimating the significance of reducing production costs and of wood processing, which are the weakest links in the production chain involving the majority of forest owners and the entire local community of Solčava.

#### **4.2.3 Technology development priorities**

On the basis of identified development advantages and obstacles and together with district foresters and representatives of the institution for adult education, a list has been elaborated of ten crucial topics for encouraging technological progress among forest owners in Solčava:

- enhance the exploitation of machinery for timber harvesting;
- open up of forests and the use of forest roads;
- establish local offers of services for the works in wood production;
- increase the efficiency of utilization of wood for energy purposes within households;
- improve the qualification and safety of household members in their work in forests;
- improve the availability of information and cooperation among forest owners;
- improve the integration with local /regional wood consumers (buyers);
- reduce the negative consequences of timber harvesting and construction of forest roads;
- improve the success rate of marketing of wood products;
- improve the economy of domestic wood processing.

Determined priorities do not denote the projects themselves, since the owners should first declare their own standpoint. The meetings with the forest owners should be devoted to this principle and where they select and concretize the project proposals. In order not to mislead the participants of these meetings with expertly outlined proposals, these areas were merged into four topics, which were used for realizing group procedures with forest owners.

### **4.3 INITIATIVES OF FOREST OWNERS**

The principal objective of both workshops was to encourage the participants to create their own plans for improvements in harvesting, processing, utilization and marketing of wood. In order to achieve this principal objective a combination of proven group procedures were applied. Both workshops with forest owners were held on the premises of a hunting lodge, which offered sufficient space for accommodating work groups in separate rooms. A great deal of our attention was dedicated to the preparation of space and conditions for a pleasant and creative atmosphere (arrangement of tables, biscuits, non-alcoholic beverages, etc.) (see Photo 5).



Photo 5. *Team work of subgroup – table*

Each of the workshops was attended by 22 forest owners (see Table 19). In both cases men aged from 31 to 50 years predominantly attended, and there was also one woman participant. Numerous forest owners who had attended the first workshop participated also in the second one, but there is no detailed data on how many of them. In addition to the invited forest owners, 10 experts were also present at the first workshop. The group of experts included foresters from the SFS and researchers from the Slovenian Forestry Institute.

Table 19. *Age structure of forest owners who attended the workshops*

Age group	First workshop	Second workshop
Up to 30	5	5
31 – 40	7	7
41 – 50	6	7
51 – 60	3	3
61 and over	1	0
<b>Total</b>	<b>22</b>	<b>22</b>

#### 4.3.1 Formulation of the initiatives

The aim of the first workshop dealt with the development of initiatives for increasing revenues from harvesting, processing and utilization of wood among forest owners in Solčava and the elaboration of action plans. It was held on 18 January 2003 from 11.00 to 15.00 hours and was directed by two moderators from the SFS. Each moderator had two assistants.

Subsequent to the introductory presentation of the workshop's objectives, aims and work methods, moderators presented the main topics, whereby the owners should search for ways that would lead to the attainment of the workshop's general objective, which was: **"Creation of development initiatives for the improvement of harvesting, processing, utilization and marketing of wood in Solčava"**. Participants assessed which topics are, according to their opinion, the most relevant for encouraging improvement in this objective. During the voting period each attendant used three beans, which each allocated to the proposed subject (see Table 20). In addition to forest owners, four experts, i.e. local foresters, voted as well.

Table 20. Results of the voting on the proposed topics

Proposed subjects	Number of votes	Share (%)
<b>WORK IN THE FOREST</b> (machinery, services, safety and qualification)	13	17
<b>ACCESSIBILITY OF FORESTS BY ROADS AND SKID TRAILS</b> (construction, reconstruction and maintenance)	12	15
<b>PROCESSING AND UTILIZATION OF WOOD</b> (sawing, further processing and use of wood for heating)	18	23
<b>MARKETING OF WOOD</b> (sale of log-timber, processed wood fuelwood and wood chips)	35	45

The majority of participants believe that the most important area for encouraging technological development and increasing revenues from the forests involves the marketing of wood (45 percent of the votes), whereas in second place they attributed the processing and utilization of wood (23 percent of the votes).

After the voting the attendants were divided into two working groups and seven ‘tables’ with at least four members at the table. The first group dealt with the processing and utilization of wood, while the second one dealt with the marketing of wood. Groups worked in separate rooms. Inside the first one there were four tables of which one consisted of experts. In the second room there were three tables; also in this group one table was composed of experts.

### Work results of the first group

After the presentation of the work method the participants at the table filled in the H-form. The first group searched for solutions and answers to the following question: ‘How do you assess the processing and utilization of wood (see Photo 6)?’



Photo 6. H-method as presented at the non-professional table in the first group

The overall results of the H-method in the first group (four tables) are given in Table 21. Participants within the first group assessed the current conditions in the processing and utilization of wood at their own homes. Evaluations were relatively low, which signified that the majority of them were to a large extent dissatisfied with the conditions in the domestic processing and utilization of wood. Subsequent to this they wrote down, on stickers, at least three reasons why they had not opted for grade 10. Deficiencies in processing and utilization of wood were, according to the participants:

the poor quality of the log-timber, poor competitiveness, outdated technology and the lack of time. Among the advantages of the domestic processing and utilization of wood the participants specified: covers one's own needs for wood, the tradition and reduction of costs within households. Collective evaluations proposed by four panels were also low, which evidently signifies that participants are not satisfied with the current state of the processing and utilization of wood.

Table 21. *H-method: How do you evaluate the current state in the processing and utilization of wood in your home*

<p><b>Why not 10 (deficiencies)</b></p> <ul style="list-style-type: none"> <li>• poor wood quality</li> <li>• poor accessibility of forests</li> <li>• lack of work force and time</li> <li>• incompetiveness of the home skilled work with respect to companies</li> <li>• absence of wood products appealing to the market</li> <li>• absence of any large processing plant (larger saw mill)</li> <li>• it is difficult to find a buyer for the processed wood</li> <li>• outdated machines – suitable solely for covering one's own needs</li> <li>• too low a profit margin</li> </ul>	<p><b>How do you evaluate the state in the area of processing and utilization of wood at your home?</b></p> <p>0      <math>\times</math>      10</p> <p><b>Summarized proposals for improvements presented in Table 22</b></p>	<p><b>Why not 0 (advantages)</b></p> <ul style="list-style-type: none"> <li>• covering one's own needs for technical wood</li> <li>• satisfactorily equipped with machines – for covering one's own needs</li> <li>• it enables the selection of wood of corresponding quality – for one's own needs</li> <li>• possibility of the use of branch-wood and wood residue for heating</li> <li>• the use of wood chips for heating</li> <li>• information via internet</li> <li>• experience in wood cutting and sawing – it is a tradition</li> <li>• reduces costs in the household (technical wood, fuelwood or wood chips)</li> </ul>
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After reporting on the work done by individual panels, there followed the method of pairing the comparisons (see Table 22) and the elaboration of the action plan related to the proposal, which was to the largest extent supported by participants during pairing comparisons.

Table 22. *Synthesis of proposals for improving the current state in processing and utilization of wood (H-method) collected from all panels in the first group*

Proposals for improvements of the current state in the field of processing and utilization of wood	Number of votes in pairing comparisons
Uniting	10
Subsidies for machinery and appliances	7
Associating in the marketing procedures	2
Common saw mill	2
Opening up of forests	1
Redirecting into the utilization of wood chips	1
Expert assistance in selection of machinery and boilers	0
Organization of the warehouse for wood chips	0
Improvements in infrastructure (electricity)	0

The majority of participants from the first group believed that the best solution for the improvement in the current state of the processing and utilization of wood was in associating and/or uniting all interested forest owners. Association was of key significance primarily for the common presentation in the market. An important factor was considered also state assistance (non-refundable means given as subsidies) for the purchase of machinery and appliances.

Panels elaborated action plans only for those proposals that were most frequently selected in pairing comparisons. Forest owners from the first group deemed that the most essential prerequisite for improving the processing and utilization of wood in Solčava was uniting and associating. According to the opinion of the expert panel, however, the most significant factor was the encouragement of advanced individual and group systems related to the wood biomass.

**Work results in the second group**

In the second group the participants reflected on the marketing of wood. The overall results of the H-method are represented in Table 23. In this group as well the grades were relatively low, which signified that they were for the most part dissatisfied with the marketing of wood. According to the participants' opinions the most outstanding deficiencies were: buyer's monopoly, low prices and financial indiscipline.

Table 23. *H-method: How do you evaluate the current situation in the marketing of wood*

<p><b>Why not 10 (deficiencies)</b></p> <ul style="list-style-type: none"> <li>• Poor marketing potentials for the sawn wood</li> <li>• Buyer's monopoly – absence of competition</li> <li>• Low prices – average flat price (regardless of quality)</li> <li>• Financial indiscipline</li> <li>• Poor state of the wood processing industry</li> <li>• Poor informing</li> </ul>	<p><b>How do you evaluate the marketing of wood?</b></p> <p style="text-align: center;">0 <span style="margin-left: 100px;">10</span></p> <p style="text-align: center;"><del>X</del></p> <p><b>Summarized proposals for improvements presented in Table 24</b></p>	<p><b>Why not 0 (advantages)</b></p> <ul style="list-style-type: none"> <li>• Ensured sale of wood</li> <li>• Sale of all wood (also of poorer quality)</li> <li>• Regular payment</li> <li>• Regular transport of wood</li> <li>• Sale of wood all year-round</li> </ul>
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Solutions related to improvements in the marketing of wood proposed by participants at the individual panels, were then (see Photo 7) arranged according to their significance (see Table 24).



Photo 7. *Pairing comparisons*

Table 24. *Proposals for improvements in the current situation in wood marketing (H-method) presented by all panels in the second group*

Proposals for improvements in the current situation in wood marketing	Number of votes from the pairing of comparisons
Associating in the marketing – common presentation in the market	8
Organizing their own processing	3
Flow of information on wood buying	2
Marketing of the sawn wood	1
Associating of forest owners	1
Education providing knowledge of bucking	1
Improved bucking of round timber	0
Certifying the wood (common trademark)	0

The second group arrived at a similar result as the first one, since the majority of participants agreed that associating and uniting were a key to improved wood marketing. Enhanced wood marketing, however, should subsequently, to a large extent, contribute also to technological progress and thus also to interrelated increased revenues from the forest.

### Action plans

Participants at each table elaborated their own action plan (see Photo 8) for the selected proposal (for the improvement in the current state).

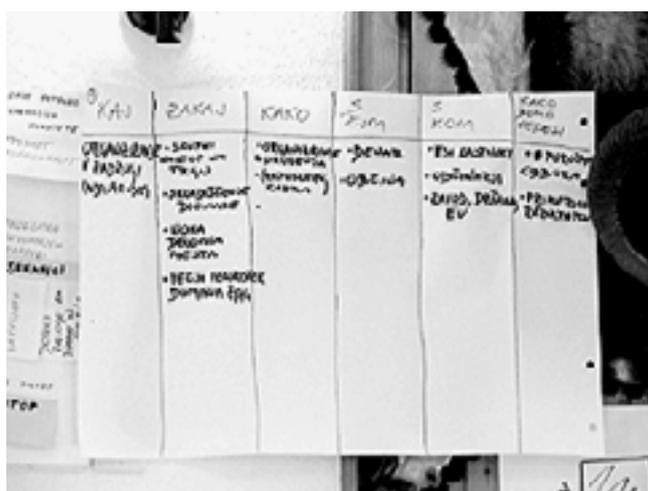


Photo 8. *Action plan – an example*

In the course of the analysis all action plans were united, since common development initiatives in the harvesting, processing, utilization and marketing of wood were the objectives. Seven tables in both groups elaborated action plans for six different initiatives:

- uniting (two panels);
- organizing the cooperative (association);
- combining efforts in wood marketing;
- common presentation of owners in the market;
- encouraging introduction of advanced modern individual and group systems related to wood biomass;
- marketing of non-timber forest products.

The first four action plans were related to uniting or/and associating forest owners in various formal groupings (cooperative, association). The fifth plan was elaborated by one of the expert groups, whereas the sixth one dealt with a subject outside the project's content and will therefore not be represented in any further detail.

The most important reasons for uniting or associating in the action plans were for:

- improved financial efficiency;
- less problems with marketing;
- common presentation in the market;
- purchase of machinery;
- determining common prices;
- informing;
- new work posts;
- larger utilization of domestic saw mills.

Besides the forest owners, among the most important actors in uniting and associating also are the municipality, the SFS and the existing Agricultural Cooperative. The effects of the union should be evident in the financial results, facilitated sales and an unmistakable trademark.

#### 4.3.2 Verification of the initiatives

The objective of the second workshop was: **“Presenting the development initiatives to interested individuals and institutions and encouraging their realization.”** It was held on 25 January 2003 from 14.00 to 17.00 hours and was directed by two moderators from the SFS.

##### Target

At the beginning of the second workshop were presented the results of the work with forest owners from the municipality of Solčava up to the present. After the presentation of the results of the inquiry and of the first workshop, the participants, by “shooting” into a target (see Photo 9), replied to the question: “To what extent have we by the work accomplished thus far pinpointed your problems in harvesting, processing, utilization and marketing of wood?”



Photo 9.

*Target: ‘How well have we pinpointed your problems?’*

The target contained marks from 5 (centre) to 1 (the lowest grade). The average evaluation of participants was 3.7, which signifies that their problems have been satisfactorily identified by the

workshop. Three of the attendants hit the target's centre (the highest grade), only one participant opted for grade 2, whereas the majority indicated 4.

Before verifying the initiatives from the first workshop, the participants were demonstrated some already existing methods of uniting and associating forest owners in Slovenia. For that purpose, three lecturers were invited, who in the second part of the workshop presented activities of the forest owners' association from Mirenska dolina as well as the functions of the machine and study circles.

### Updating the initiative list

Of key importance for further work with forest owners was the presentation of existing forest operations related to initiatives, as well as supplements to the list of initiatives. The list from the first workshop was upgraded, and the final list comprised seven initiatives or proposals for improvements in harvesting, processing, utilization and marketing of wood. Each participant in the second workshop had an opportunity to 'stick' (see Photo 10) his name under all the proposed initiatives according to his intention for an active participation in the realization of the initiative (see Table 25).



Photo 10. Selection of the proposed initiatives according to individual preferences

Table 25. Initiatives for improvements in harvesting, processing, utilization and marketing of wood

Initiatives or proposals for improvements in the field of harvesting, processing, utilization and marketing of wood	Number of attendants, who wanted to participate actively	
	number	share (%)
Associating, uniting	16	73
Education, training	13	59
Marketing and adjusting non-wood forest's functions	11	50
Opening up of forests	5	23
Professional assistance in the selection of machines and boilers	1	4
Organization of wood processing	0	-
Utilization of wood chips	0	-

The expressed interest in a concrete cooperation and active engagement in these fields confirmed results of the first workshop, since the majority of the participants displayed an interest in associating and uniting. An equally important area turned out to be education and training.

Somehow disputable among all seven proposals was the one related to “Marketing non-timber forest products” because it did not refer to harvesting, processing, utilization and marketing of wood. However, according to opinions of the organizers of the workshops and above all also according to those of the participants, this area proved to be of such considerable significance for forest management within the considered local community that it could not be eliminated.

### **Allocating individuals to initiatives**

The final step was an election of the leader for each of the three most supported initiatives. The leader has to be a member of the local community. His duty is to gather those who signed up for the initiative within two months after the workshop for the initiative realization. Without much difficulty individuals were identified who would within the local community, and particularly among the interested forest owners, organize and direct all future activities. Those who were considered decided to accept this responsibility on a voluntary basis.

The second workshop was formally concluded by bestowing symbolic presents to all participants. Unofficially it ended only after additional less formal talks which demonstrated that any reservations and distrust between the participants of the inquiry and the forest owners had been overcome.

## 5. DISCUSSION AND MAIN OBSERVATIONS

### 5.1 POSSIBILITIES FOR IMPROVEMENTS IN FOREST RELATED OPERATIONS IN SOLČAVA

#### **Wood – a strategic natural resource in Solčava**

The local community of Solčava is a fair example of a Central European rural local community, which will in future economically rely on forests (Matk, 2000). Solčava belongs to a group of municipalities with a development level below the Slovenian average. Regarding the number of inhabitants it is the third smallest municipality in Slovenia, whereas geographically it may be ranged among 32 local communities within the Savinjska region. Four-fifths of the municipality's entire area is covered with conifer forests. Eighty-three percent of forests are privately owned by 135 households, which are predominantly full-time or part-time isolated farms. Twenty-three percent of the forest owners have a permanent residence outside the Solčava municipality. The ownership structure of private forests is a favourable one, i.e. the average forest estate is ten times larger than the Slovenian average. Subsequent to denationalization in 1991, the number of owners and co-owners of forests in Solčava has increased almost threefold, whereby the majority of new owners belong to a category of non-farmers. For the most part of those households that own over 4 ha of forests the revenue from forestry and wood sawing represents at least one-third of the household's entire income. Of great importance also is the role of the domestic utilization of wood, which reduces the household's costs especially for heating.

**Revenues from wood sale, which represents for the majority of Solčava households the most important benefit provided by forests, are declining because of an underestimation of the potential benefits from technological progress in timber harvesting/processing and utilization of wood.** On average, forest owners realize only 75 percent of the allowed cut. Forests are managed most intensively on medium and large forest estates, where the annual fell is around 3.3 m<sup>3</sup>/ha. Owners with a forest estate over 100 ha fell less trees, on average 1.9 m<sup>3</sup>/ha per annum. Forests are managed most extensively by owners from outside the local community (1.5 m<sup>3</sup>/ha/year), since these owners are the least dependent on forest related revenues. Wood prices in the market have been stagnating for years. Yet the costs of work and material in timber harvesting are rising, and for this reason owners have felled less trees in the last three years, and in future a further drop in revenues from the forest is expected. Much more than potential cost reductions in the wood production value added chain, forest owners are focusing on a search for solutions in more efficient marketing of wood, as well as in marketing the forest's non-timber products and services. Great emphasis is placed on re-establishing the rights for marketing the hunt within their forests, which however would not represent a realistic alternative to the wood production function of forests in Solčava.

**Marketing landscape values of forests in Solčava does not exclude the exploitation of forests, yet it may intensify strict rules for its sustainable use.** Numerous environmental values in the local community are inseparably linked with forests. Forest owners are well aware of the forest's role in the protection of soil, water resources and in the development of tourism, but for the time being they do not reap any direct economical benefits from this. Further development of the Logarska dolina landscape park will have to take into consideration the rules of timber harvesting, wood construction and use of forest roads, whereas forest owners will have to raise the quality level of work in production procedures through the use of technological progress.

**Technological development in fields related to wood is not solely a problem involving an individual forest owner but represents a strategic orientation of the entire local community of Solčava.** Through the use of technology development, objectives may be achieved in the development of managing forest areas, in tourism and in the protection of nature, and for that reason the municipality of Solčava, as well as the Savinjska Development Agency, represents a key partner

among forest owners in the realization of projects related to technological progress in timber harvesting/processing and utilization of wood.

### **Value added chains – common issues and priorities**

**Wood from Solčava has a low added value – predominantly sold is conifer round timber of average quality.** Owners sell round wood, sawn wood and fuelwood. Ninety-two percent of all round timber are conifers. The extent of sawn timber is fairly small, whereas the extent of the sale of fuelwood is negligible. The sale of round timber is concentrated on a single buyer, which is acceptable from the viewpoint of owners. Full-time and part-time agricultural households that own more than 50 ha of forests represent a majority of the wood sold. Owners do not cooperate in the sale of wood. Larger owners try to find other buyers of wood as well. In their search some started to use internet, which is expected to increase in importance in the future. Round timber is sold by almost every household that owns a forest. Less than one-third of the owners sell sawn wood, whereas wood for heating purposes is sold by only 17 percent of the households. Practically only conifer timber is sawn. Among the interviewed there was no noticeable amount of sawn timber for external customers, and the use of wood in handicraft in Solčava is absent as well. The sawn wood is sold mostly by full-time farmers with an estate over 50 ha – predominantly as construction wood. Sixty percent of all interviewed agree with the idea of setting up a local saw plant in Solčava. The greatest interest for this exists among owners of larger estates, who are also for the most part willing to invest in such a plant. Half of the respondents would agree to sign a long-term contract for supplying the plant with raw material, yet few among them are owners of very large forest estates.

**In the utilization of wood for energy purposes there are still great reserves.** All interviewees heat their premises with wood, whereas 81 percent of the households use wood exclusively. The energy consumption for heating per square metre of residential surfaces is 2.5 times higher than the Slovenian average. Many are interested in the modern heating systems, machinery fired by wood chips and only to a lesser degree also in modern machinery using billets. Respondents are well acquainted with planned projects for central heating systems fired by wood biomass in Solčava and Logarska dolina. The interest to provide a supply of the fuel for such central heating systems is moderate and is estimated to amount for an individual owner to 2 000 m<sup>3</sup> per year. Greater interest for supplying the wood biomass is found among owners of larger forest estates. Sixty-six percent of interviewees would sign a long-term contract for supplying the raw material, which would ensure an approximate amount of 1 400 m<sup>3</sup> per annum. They estimated that a part of the actual potentials related to the wood biomass still remains unexploited within the area and lies in the brushwood.

**Households alone perform half of the work in timber harvesting and the other half is carried out by hired workers who do not possess any formal qualification for such work.** The hiring of various service companies or contractors to carry out felling and skidding is rare in Solčava. Most of it is done by a system of local exchange of services, whereby no one has a formally registered forestry service activity. Payments are made within a system of hired labour or moonlighting, which for the time being is suitable to everyone involved. The increased and strictly defined labour and social-health legislation, however, will create changes. The majority of those who provide a service to others will perform forestry services as a supplementary farm activity. The demand for forestry services is expected to increase in the future. Regarding the fact that in the local community no one presently formally or legally fulfils requirements for performing commercial forestry activity, education certainly will be highly necessary.

**According to interviewee opinions, work qualifications involved for forests is good, whereas consequences of forest accidents reveal a different situation.** Owners of larger forests were more confident in their own knowledge, yet they nevertheless showed greater interest in training than owners of smaller estates. The least qualified are owners residing outside the local community, who also showed the least interest in training. The interviewed owners experienced in the last 10 years 11 accidents with permanent consequences, which is in the range of the Slovenian average but far above

conditions in comparable forest estate structures in Europe. Forestry skills could be taught in courses, study circles and by instructors within their own forests.

**Private forests in the Solčava municipality are not optimally opened up either by forest roads or by forest skid trails.** From the beginning of the transition period, when centralized financing – which provided for the construction of forest roads – was abolished the owners predominantly opted for individual construction of tractor skid trails. Lower investment costs have not solved the basic essential problem: the high cost of skidding at average distances of over 900 m. Poor accessibility of forests is one of the reasons why the wood cut is not greater. It is thus necessary to elaborate a strategic plan of further opening up of forests in the future.

**Wood skidding is done along the ground; the machinery for work in forest is plentiful, yet outdated.** Tree felling is completely carried out by motor saws, which are in abundance on farms but are on average only insufficiently exploited. Wood skidding in the Solčava region is traditionally conducted along the ground, manually and by tractors; despite very demanding and steep terrain, aerial cableways are rarely used. Equipment for timber harvesting ages every year, and tractors and winches are used as long as they function. Owners maintain tractors for forest work, which have, for the most part, not been technically examined.

**Forest owners are not satisfied with the established associations. They were initially interested in associations but became hesitant.** Almost nine-tenths of the interviewees expressed an interest to establish links with other forest owners within the local community. As members of the Mozirje Agricultural Forestry Cooperative and of the Agricultural Forestry Chamber, forest owners have not been entirely satisfied with their methods. The operation of these organizations are too remote to actually meet the concrete needs in everyday living (marketing, consultation, sale, representation of local interests). By the end of 2002 the Solčava Agricultural Cooperative was founded whereby it is intended to also cover timber harvesting and sawing, as well as collection and distribution of wood fuel. In order to make the association of Solčava's forest owners a success story, the voluntary principle of membership and equality of all members will have to be consistently respected.

#### **Forest owner's initiatives – a key to forest operation improvements**

**Forest owners in Slovenia and similarly also those in Solčava in the past were quite indifferent and transmitted the importance for development mostly to state institutions.** With the new forest law (1993) owners were granted an entire new set of rights and responsibilities. For the time being they are making only little use of them, but are adapting very quickly. This became apparent already during the inquiry and to a larger degree in workshops with forest owners.

**Through a simple analysis of the current situation participants of the first workshop proposed development initiatives and ranked their significance.** Participants quickly and easily managed to adopt and also successfully apply methods that they had learned at workshops. Action plans, which were created at the conclusion of the first workshop, revealed various forms of association/integration of forest owners as the most relevant initiative. By the end of group action, participants identified both with the objective and the way to attain it. This target was not imposed upon them by someone outside the local community but resulted from the principle of “from bottom up“. A pleasant atmosphere, a respect for rules of the firm and sound communication further contributed to the fact that participants felt equal and were also able to express details that had not been brought up during interviews.

**At workshops forest owners underestimated the significance of the development in forest technology, where the forestry sector is aiming for an optimal equilibrium between costs and impacts on environment.** This is partly a consequence of the still relatively favourable economic conditions and partly a consequence of work methods, which had excluded the problem of optimizing

production procedures in timber harvesting and construction of forest roads at the very beginning of group activities. Forest owners dedicated a surprisingly minor degree of attention to upgrading their equipment for work in forests, although during the interviews they showed interest in updating machinery and equipment for wood skidding. They believed that each individual should personally solve this and that this did not unite them. With the aid of our inquiry and through group procedures in Solčava we did not detect anyone inclined to invest in the modern technologies of cable yarding and machine felling in the near future.

**According to expectations, 73 percent of the participants in the second workshop have shown interest in cooperating and interest in a voluntary association of forest owners.** An additional topic – which the owners themselves listed among initiatives for improvement of current conditions – came under the heading of “Education and Training”, and the high level of individual awareness (59 percent) of this need has nevertheless, by the end of the second workshop, been surprising. Through much research and also by inquiry in Solčava it was found that owners were previously greatly convinced of their knowledge and experience in wood production and consequently did not show much interest in training. This change in attitude among the workshop participants represents a unique success and a great challenge in the training of forest owners in Solčava, both with respect to educational procedures as well as to its contents.

**As in other sectors, in the field of harvesting, processing, utilization and marketing of wood, human resources are the principal generator of progress.** Knowledge is the most powerful tool for attaining development objectives and for promptly responding to changes, which are brought about by integration procedures in the framework of the European Union. Modern developments in adult education will have to be methodically and carefully introduced also in forestry, which all too often cannot see people for the trees. Forestry increasingly implies an active cooperation with people. If there is no active participation with forest owners, the realization of forest management plans for private forests will be impossible. Positive results emerging from individual cases of such active roles of foresters are an excellent encouragement so that an active involvement of owners through group procedures may provide a new impetus for improved forest management plans. Similarly as forest development is not accomplished by focusing on a single tree but instead on stands, forest management likewise – especially on fragmented forest estates – cannot be handled by an individual owner but by groups of owners. The example of the Solčava local community compels a reflection on how dealing with human resources, forest owners, may indirectly influence the overall result of forest management. Both in dealing with forests as well as working with human resources the positive results become apparent only after some time. This, however, should not be a deterrent to dealing with human resources and developing modern methods for forest owners.

## 5.2 APPROACHES TO PROMOTION OF TECHNOLOGY DEVELOPMENT

### Local approach

**As a result of the present case study it is apparent that one may realistically expect shifts to a positive direction only after a long period involving a few individuals from the local community.** Even in such cases there are, however, many obstacles yet to be overcome before reaching the goal. The awareness that cooperation among forest owners leads to the achievement of desired results is not sufficiently present. Most frequently only during critical situations (e.g. severe storms or marketing competitions) are restraints for cooperation among forest owners lessened.

**The promotion of technological development in the local community requires a complex knowledge of natural, technological and social conditions.** Regarding the case study of the local community, 12 months were required to familiarize with forest owners, organizations, municipality representatives and the general economic, and social conditions – despite the fact that at our disposal were four generations of ten-year forest management plans. Foresters from the Forest Service, particularly both of the district foresters who work in the area of the Solčava local community,

proved to be of invaluable help. Both groups are highly respected by forest owners. They may be considered as veritable 'motors of local development', who are well aware that the promotion of technological development is the correct way for sustainable forest management.

### **Inquiry**

**In preparing the interview methods the procedure followed previous interviews of forest owners on a national level.** The questionnaire was adapted to Slovenian conditions, yet it could also be adjusted for research in other countries. In such cases it is possible to select from the extensive set of questions only those that are most relevant to the community under examination. Moreover, in the promotion of technology development in wood production among private owners it should also be obligatory to be familiar with the extent and type of wood processing; this as well as familiarization with key parameters of utilization of wood biomass for energy purposes within households and in the local community.

**A sampling of forest owners is a prerequisite for a rational realization of the inquiry, whereas the sampling method depends on the population structure and objectives of the inquiry.** Because of the exceptionally large numbers of owners who possess very small estates, the analysis of current conditions, by means of a simple random sampling, proved to be less appropriate. In sampling, the formation of strata was applied (in the case under study, these were size categories of forest estates); thus, in determining the results of the sample units, it was considered that at least 10 percent of the owners refused to answer to the inquiry in each separate class. Whenever feasible, large samples according to strata were used, since in this way it was possible to normalize the distribution of the majority of variables.

**The questionnaire is a fast and simple analysis of conditions that otherwise would be too lengthy.** The extent of the questionnaire is justified when, such as in the present study, examined were the objectives of several other projects. Because of such a comprehensive questionnaire, the interviewing was lengthy, which was also disclosed by some owners. On the other hand, the majority of owners positively evaluated the thoroughness and depth of the research, which are apparent in the contents of the questionnaire.

**An innovation in the questionnaire are perception questions (personal viewpoint) pertaining to the evaluation of conditions and future plans.** Perception questions facilitated the processing of collected data, yet the scales used for answers did not prove to be optimal. Perception questions should be dealt with both within specific chapters as well as on the whole.

### **Workshops**

**Workshops have significantly contributed to reducing the basic obstacle in the promotion of technological development, which is a lack of confidence between forest owners, the forestry sector and professional and administrative services in the local community.** The timing and location of workshops met the requirements of all participants. In future, however, more attention should be devoted to the locally established modes of informing.

**Although all inhabitants were informed on the workshops through the local media, these were actually attended solely by forest owners (besides foresters).** Because forestry is of strategic importance in the studied local community insufficient attention was given to the participation of other interest groups. The regional agency for the development of rural areas did not attend the workshops, which was a great disadvantage.

**Participation methods and group techniques applied during the research were experimented and used for the first time.** Assisting were foresters from SFS, who began to apply various methods in Slovenia in the year 2000. The combination of different methods has yielded satisfactory results. Enough time was also devoted to the preparation of areas and the training of facilitators, yet there was a lack of experience in moderating. The number of workshops was appropriate as well as

the timing of their presentation. Despite doubts about the need for two workshops, it proved to be that both of them were well attended and achieved their aim.

**A significant support in determining the development initiatives during workshops was the pledge by organizers that they would, within limited capacities, cooperate in realizing the most relevant initiatives.** Unlike usual workshops, which ultimately exhaust their topics, the workshops were rather an introduction to the realization of defined initiatives. This awareness was also shared by participants in workshops, and this additionally stimulated their optimism.

**The promotion of technological development among private forest owners proved to be a complex and long-term task, which in its quality and content exceeds individual consultations with owners.** This was recommend for local communities with a prevalence of private forest estates and where the forestry sector has a prominent economic role. The principal actor in the promotion of technological progress in timber harvesting/processing and utilization of wood is the local forester, who is first of all a coordinator. By means of the inquiry, for an expert assessment of development potentials, and by both workshops, the present technological level could not be changed; nevertheless some obstacles were removed that might hinder projects of technological development for the future regarding harvesting, processing and utilization of wood.

## 6. CONCLUSION

Progress in technology in timber harvesting/processing and utilization of wood is not intended for its own sake. It is much more a tool for attaining objectives in forest operation, that is, objectives that are at the present time generally described in terms of sustainable, environment friendly and multi-purpose. Realization of such objectives in privately owned forests is particularly demanding since the private and public interests are in confrontation; moreover there are many and diverse owners with specific life needs.

The present research has once again confirmed that the encouragement of technological progress among private owners is a demanding and long-lasting task. More often than not one would rather not deal with it, and when it is, the national and theoretical level proves to be, as a rule, far less complicated than the practical level. Nevertheless it is precisely the positive shifts at the local level that act as the strongest inducement; this also attracts other forest owners within the same community as well as other local communities in the vicinity and in the wider neighbouring areas.

By means of a study on the significance of timber harvesting/processing and utilization of wood in the municipality of Solčava we analysed the current conditions in the stated area and assessed the development potentials, made available by the production chain in the local community. Through our comparison of advantages and obstacles in areas of equipment, qualification and integration of forest owners we indicated the priorities for encouraging technological development, which should alleviate the trend of a falling economic significance of forestry and at the same time ensure the protection of the natural environment.

According to opinions prevalent in the forestry sector, in Solčava one should above all strengthen interest ties among forest owners, raise the level of qualification and knowledge of modern methods of work in forests and with wood in general, and methodically support the investment in equipment for those owners who are already today semi-professionally performing services in the sector of production and processing of wood.

In our study of development initiatives we looked for those domains and individuals who have a clear vision and sufficient courage to assume a leading role within the local community of Solčava. Such persons are actually not in short supply, but they are rather reticent towards foresters and not accustomed to work collectively. Foresters as well – local ones and researchers – are much more familiar with work in stands and associations than with directing persons to certain goals in domains which are heavily interfering with forest ecosystems and landscape.

Group procedures, conducted among Solčava's forest owners, were an innovative and valuable lesson for all participants. First results indicate that larger blunders or resentment did not occur, whereas it is premature to exult in possible success. Interest groups were formed, the principal actors (facilitators) are known and that which follows is the realization of technological initiatives, which are close to owners and lead to sustainable exploitation of forests and the holistic development within the area of the Solčava municipality.

Through the present research we have not attained a new technological level in timber harvesting/processing and utilization of wood in the analysed local community. We removed some obstacles for realization of concrete projects, which will in the ensuing years surely lead to new, higher quality of work in forests and with wood in Solčava. The case study proved to be a highly enlightening lesson for all those who will tread along similar paths, not so much due to a precise amount, but more so because of the complexity of the approach and the selection and application of methods.

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