Working Papers of the Finnish Forest Research Institute 16

http://www.metla.fi/julkaisut/workingpapers/2005/mwp016.htm
ISBN 951-40-1973-3
ISSN 1795-150X

An Analysis of Logging Companies in the Republic of Karelia

Yuri Gerasimov, Vladimir Siounev, Pavel Chikulaev,
Vladimir Pechorin, Victor Dyakonov, Victor Komkov,
Lauri Sikanen and Timo Karjalainen

METLA www.metla.fi

Working Papers of the Finnish Forest Research Institute publishes preliminary research results and conference proceedings.

The papers published in the series are not peer-reviewed.

The papers are published in pdf format on the Internet only.

http://www.metla.fi/julkaisut/workingpapers/
ISSN 1795-150X

Office
Unioninkatu 40 A
FI-00170 Helsinki
tel. +358 10 2111
fax +358 10 211 2101
e-mail julkaisutoimitus@metla.fi

Publisher
Finnish Forest Research Institute
Unioninkatu 40 A
FI-00170 Helsinki
tel. +358 10 2111
fax +358 10 211 2101
e-mail info@metla.fi
http://www.metla.fi/

Authors

Gerasimov, Yuri, Siounev, Vladimir, Chikulaev, Pavel, Pechorin, Vladimir, Dyakonov, Victor, Komkov, Victor, Sikanen, Lauri & Karjalainen, Timo

Title

An analysis of logging companies in the Republic of Karelia

Year	Pages	ISBN	ISSN
2005	39	951-40-1973-3 (PDF)	1795-150X

Unit / Research programme / Projects

Finnish Forest Research Institute, Joensuu Research Centre / 605379 Intensification of forest management and improvement of wood harvesting in Northwest Russia", 3384 Towards progressive forest sector in Northwest Russia

Accepted by

Jari Parviainen, Head of the Joensuu Research Centre, 12.09.2005

Abstract

Logging in the Republic of Karelia has changed rapidly during the last 10 years. As a result, traditional Russian wood harvesting systems are currently used side-by-side with Nordic ones.

The aim of this study was to collect data on the current state of logging companies in Karelia and to demonstrate how new business environments, and their economic, social and ecological impacts have forced logging companies to up-date technology, machinery and management. Logging companies in Karelia were interviewed by students of the Petrozavodsk State University during 2004. The companies' data were organised into 4 clusters based on the geographical location of the companies. Two to three companies are represented by every cluster. The framework for the questionnaires included technological, social and ecological components. The information and SWOT analysis provided a broad overview of the wood procurement situation for logging companies across Karelia.

The results indicated an acute shortage of forest resources for wood supply development in Karelia. The implementation of both a progressive forest management system and the Nordic cut-to-length method is needed. The social, educational, economic, and environmental challenges faced by logging companies in Karelia should be taken into account.

Keywords

Russia, Karelia, forest resources, forest operations, logging companies, machinery, SWOT

Available at

http://www.metla.fi/julkaisut/workingpapers/2005/mwp016.htm

Replaces

Is replaced by

Contact information

Yuri Gerasimov, Finnish Forest Research Institute, Joensuu Research Centre, Yliopistokatu 6 (P.O.Box 68), FI-80101 Joensuu, Finland. E-mail yuri.gerasimov@metla.fi

Other information

Contents

Preface

Logging in Russia is experiencing large changes due to economical, ecologic and social pressures from both inside and outside of Russia. It results in traditional Russian wood harvesting systems being used side-by-side with Nordic technology. The most rapid changes are taking place in the Russian cross-border regions, such as the Republic of Karelia, where this study was carried out.

Logging companies in Karelia play a key role in the wood procurement of a comparatively developed forest industry in Northwest Russia. They are among the most important suppliers from the Russian regions for the Finnish forest industry, exporting more than 3 million m^3 of industrial round wood annually. The companies are deeply rooted in the local communities and involved in the socio-economic development of rural districts.

Under the auspices of the "Intensification of Forest Management and Improvement of Wood Harvesting in Northwest Russia" project, which belongs to the Academy of Finland research programme "Russia in Flux" (contract number 105379), the impacts of both progressive Nordic and current Russian wood harvesting methods on the ecologically, socially and economically sustainable logging of Karelia have been investigated.

We would like to thank representatives of the logging companies in Karelia who contributed to this study. Their commitment to this study can be seen as a true sign of their willingness to develop the forest to end user chain of forest based products. We would also like to thank Dr. Greg Watson for having checked the English language of this paper.

Joensuu, Petrozavodsk, September 2005

Authors

1 Introduction

1.1 Forest Industries

The Republic of Karelia plays a key role in the Russian forest sector. The total wood stock of Karelia is estimated to be 946 mill m^3 under bark (u. b.), of which 731 mill m^3 are available for wood supply. The dominant species are pine (64%), spruce (25%), birch (10%), and aspen (1 %). The allowable annual cut is 9.3 mill m^3 u. b., of which 7 mill m^3 is softwood and 2.3 mill m^3 hardwood (Ministry of Natural Resources, 2003). Annually, the region produces 7% of the total industrial round wood in Russia, 22% of its pulp and paper, and 7% of its sawn timber. The forest industry is a leading branch of the Karelian economy as well: being responsible for 50% of both the volume of industrial production and the number of employees found in Karelia (Goskomstat, 2003).

The structure of forest industries for this region is shown in Figure 1. There are vertically integrated holdings, including different combinations of pulp and paper mills, sawmills, and logging companies, and there are independent companies, including small and medium sized enterprises (SME), supporting companies and organizations.

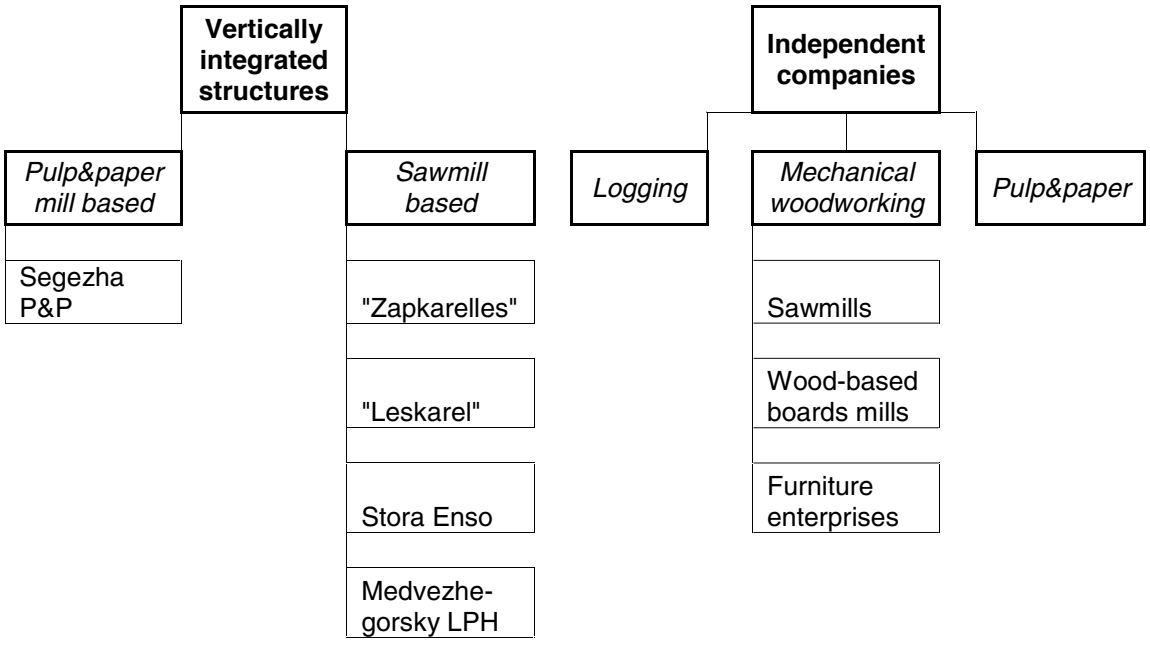


Figure 1. The structure of forest industries in Karelia.

The forest industry experienced crisis in the 1990. We can see from Figures 2-5 various trends which took place between 1990-2003 in logging, sawmilling, pulp and paper production. First, there was the collapse of the forest industry in 1990-1994 after dissolving of the USSR, then there was a period of stabilization during 1995-1998. This was followed by growth in 1998-2000 due to the local currency default but stagnation since 2001.

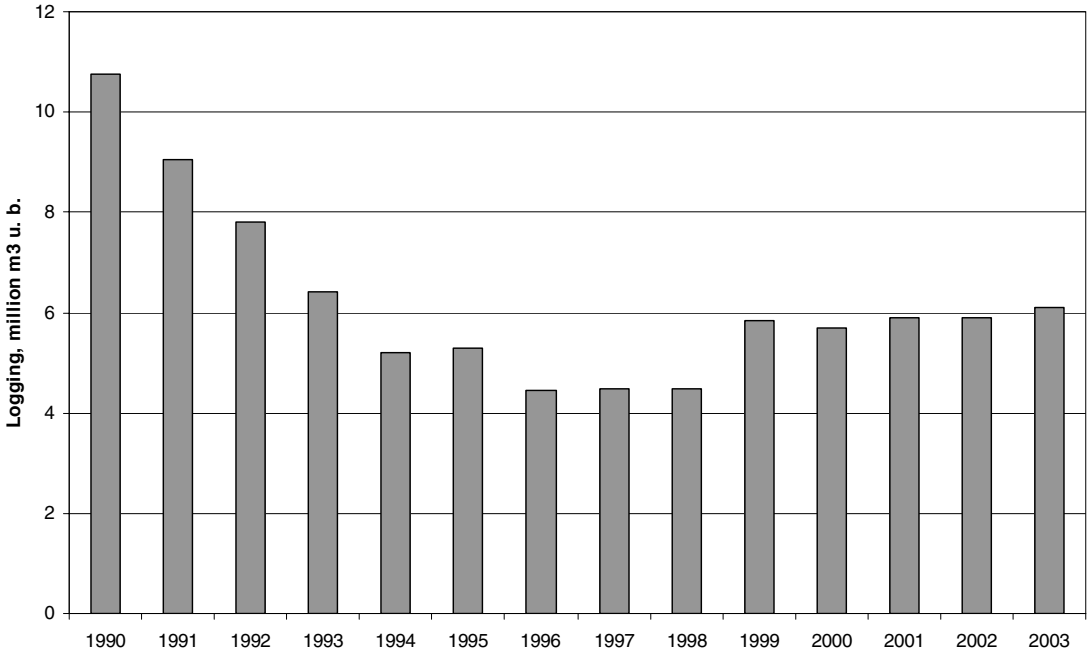


Figure 2. Logging in Karelia between 1990-2003. (Goskomstat 2003)

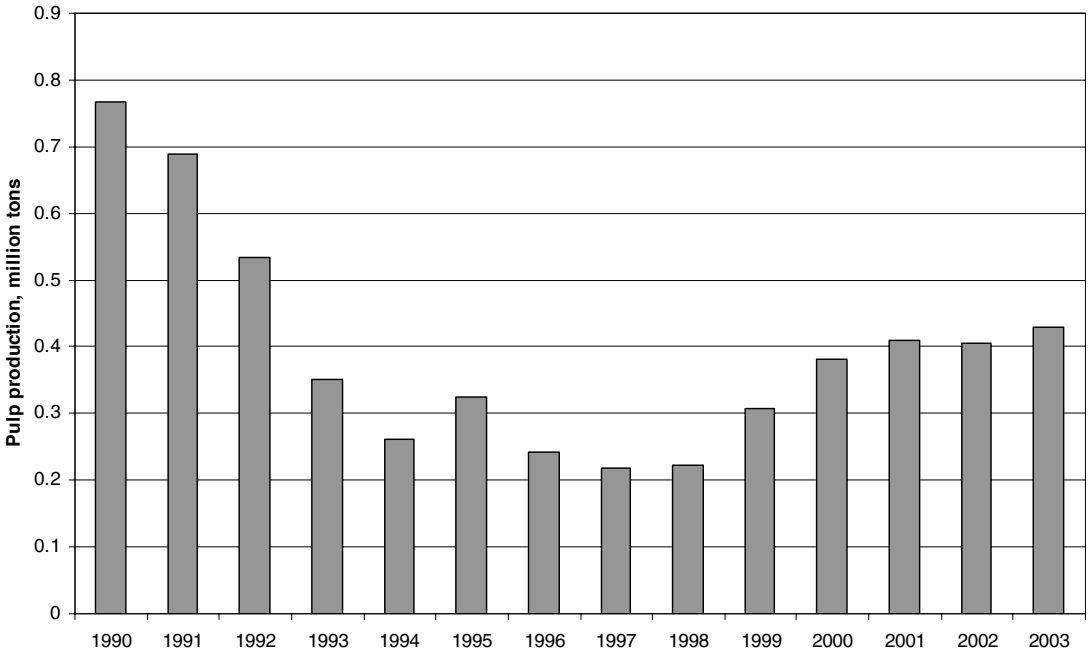


Figure 3. Pulp production in Karelia between 1990-2003. (Goskomstat 2003)

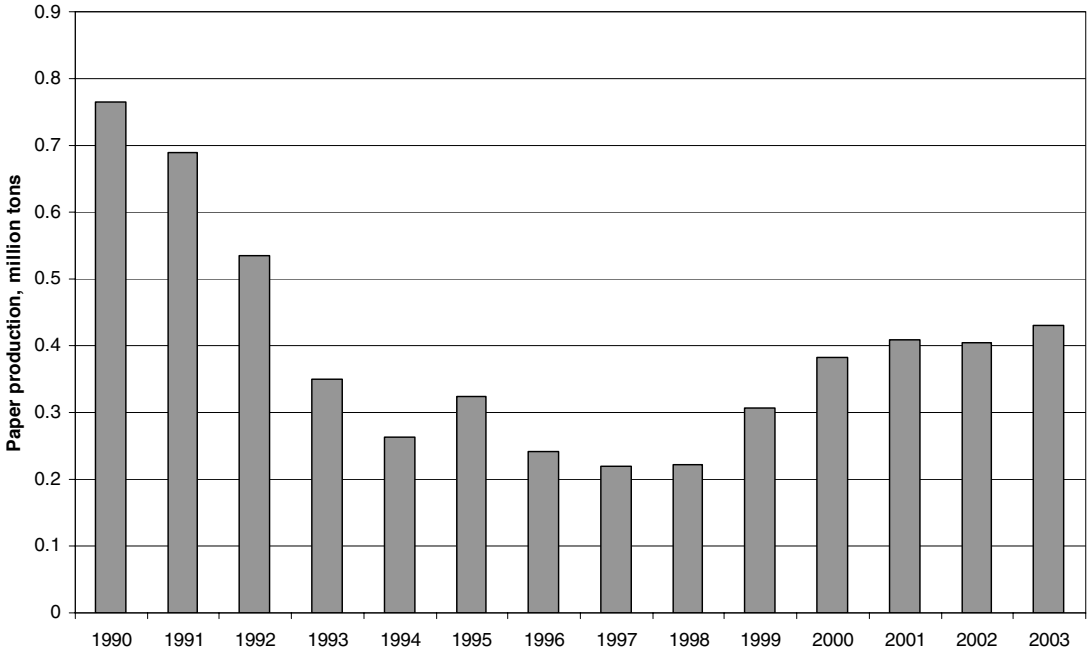


Figure 4. Paper production in Karelia between 1990-2003. (Goskomstat 2003)

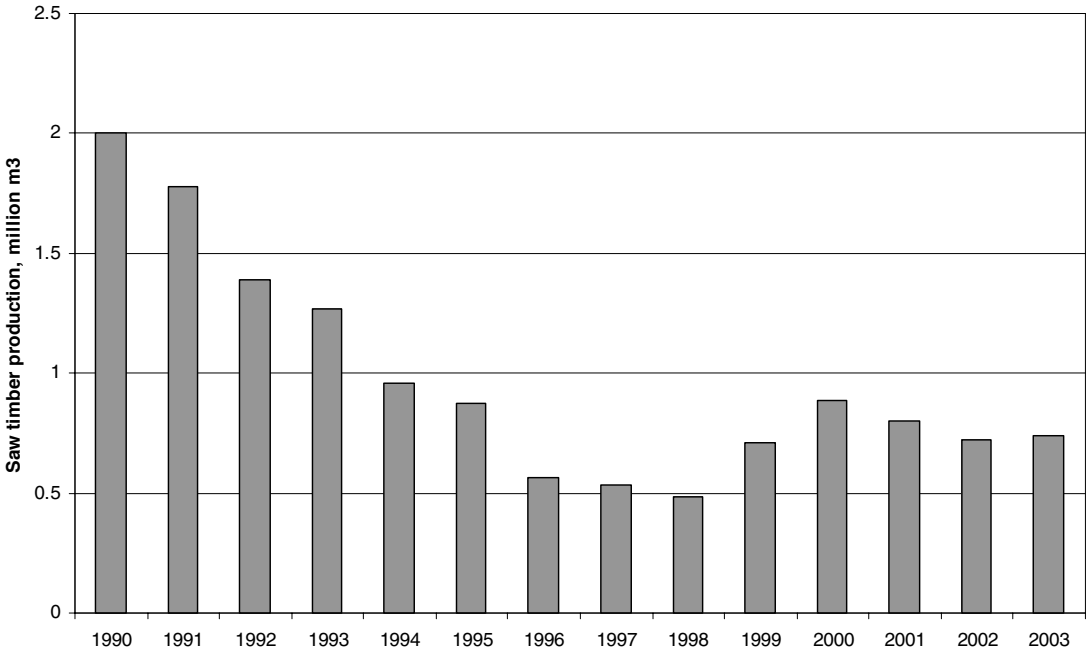


Figure 5. Sawn timber production in Karelia between 1990-2003. (Goskomstat 2003)

Pulp and paper mills are located in Segezha, Kondopoga, Pitkäranta and Läskelä (Figures 6 and 7). Kondopoga P&P consumes 1.5 mill m^3 u. b. of spruce pulpwood, Segezha 1.1 million m^3 u. b. of pine pulpwood, and Pitkäranta pulp mill 0.4 mill pine pulpwood, per year, approximately.

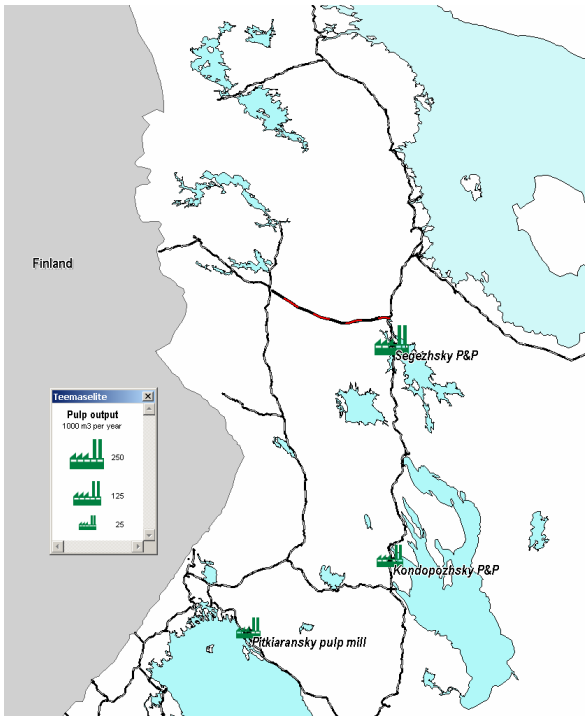


Figure 6. Pulp mills in Karelia.

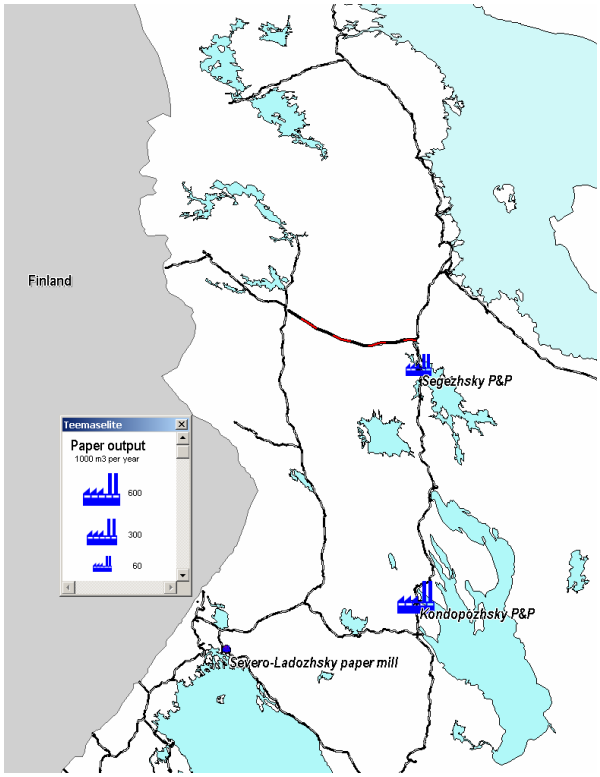


Figure 7. Paper mills in Karelia.

The sawmill industry includes approximately 100 companies, but only 13 of them are significant. These key companies produce 80% of the total sawn timber in Karelia. The most important sawmills are Stora Enso (Impilahti), Segezhsky LDK, AV Invest, Medvezhegorsky LPH, "Zapkarelles", Belomorsky LDK, Pudozhsky LDK, Iljinsky LZD, Kemsky LZD, Porosorersky KLPH, Muezersky LPH, Piaozersky LPH, and Volomsky KLPH.

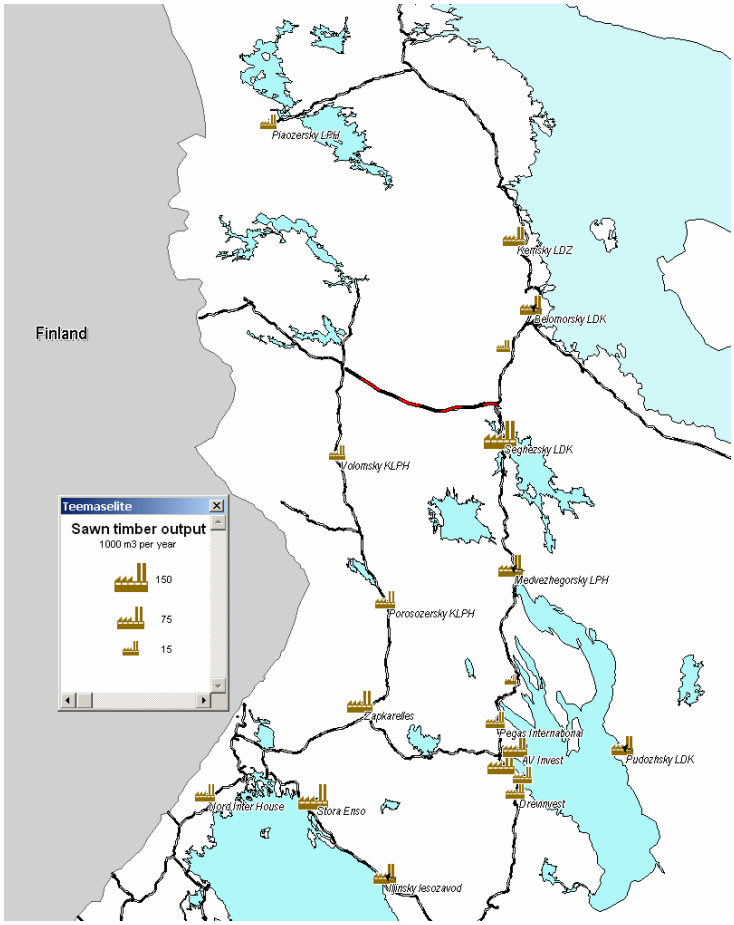


Figure 8. Key sawmills in Karelia.

The wood-based boards industry in Karelia is represented by a plywood mill in Lahdenpohja and a particle-board mill "Karelia DSP" in Pindushi (Figure 9).

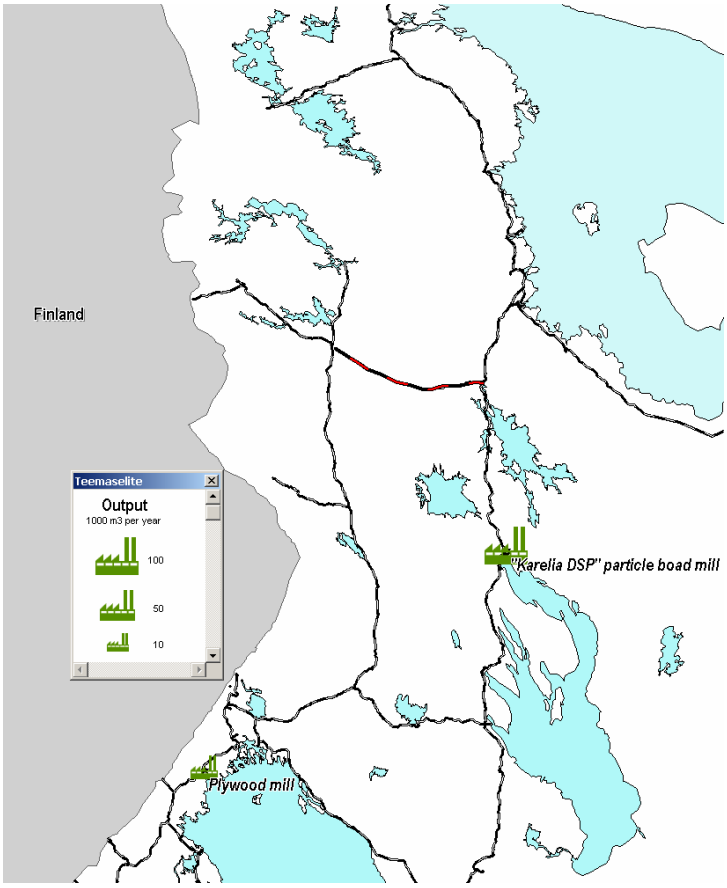


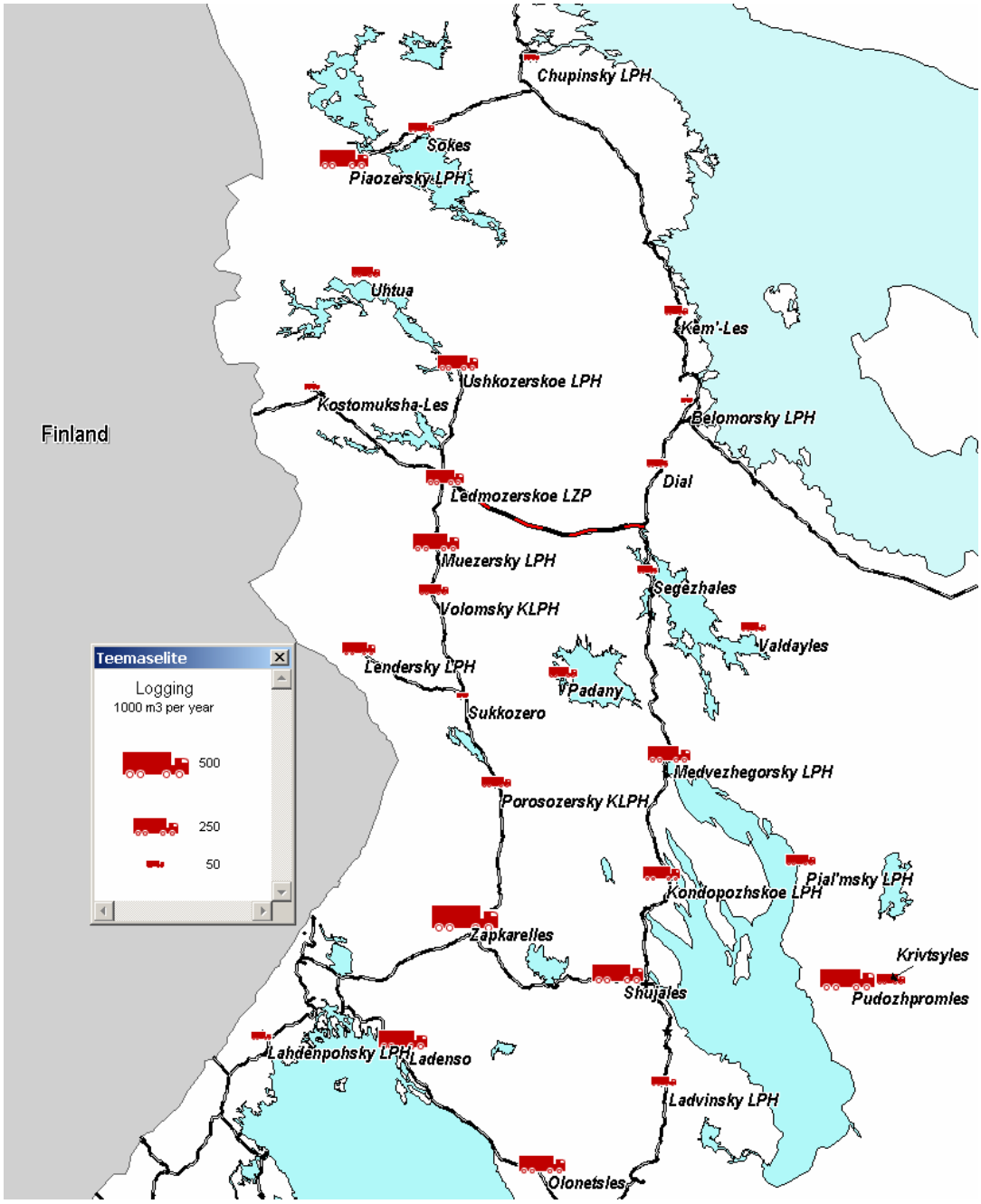
Figure 9. Plywood and particle-board mills in Karelia.

1.2 Logging

Logging is concentrated into large and medium scale logging companies (Figure 10). The 10 largest logging companies with an annual cut of more than 200 000 m^3 ("Zapkarelles", Pudozhsky LPH, Muezersky LPH, "Shujales", "Ladenso", "Olonetsles", Piaozersky LPH, Volomsky KLPH, Medvezhegorsky LPH, and Ledmozerskoe LZH) are logging 60% of the annual volume from Karelia.

After the collapse of the USSR, all 30 large and medium scale state logging companies in Karelia were privatized. Today, the following company types are presented: 4 companies were transfered into close corporations, 19 public corporations, and 7 companies with limited liability. These companies continue to play a key role in Karelia, their share is 85% of the total logging taking place in Karelia at the moment. Every company has its own vision for development of wood harvesting.

Since the 1990s, the logging companies have been developing significantly in order to adopt the new business environment. Economic, social and ecological impacts forced logging companies to adopt latest technology, machinery, and management, and to contribute to local communities.



.

Figure 10. Key logging companies in Karelia.

Companies started to use the Nordic cut-to-length method side-by-side with traditional Russian tree-length technology during the last 10 years. The Nordic cut-to-length method has, as a rule, a higher productivity of labour and better corporate culture. It enables one to recruit young workers, to avoid a deficit of staff, and to use forest resources from thinning etc. The volume of logging using the Nordic cut-to-length method is growing constantly (Figure 11), its share is estimated at 50% at the moment. Only 9 companies used this method in 1994, in 2004 it was already 20 companies (Figure 12).

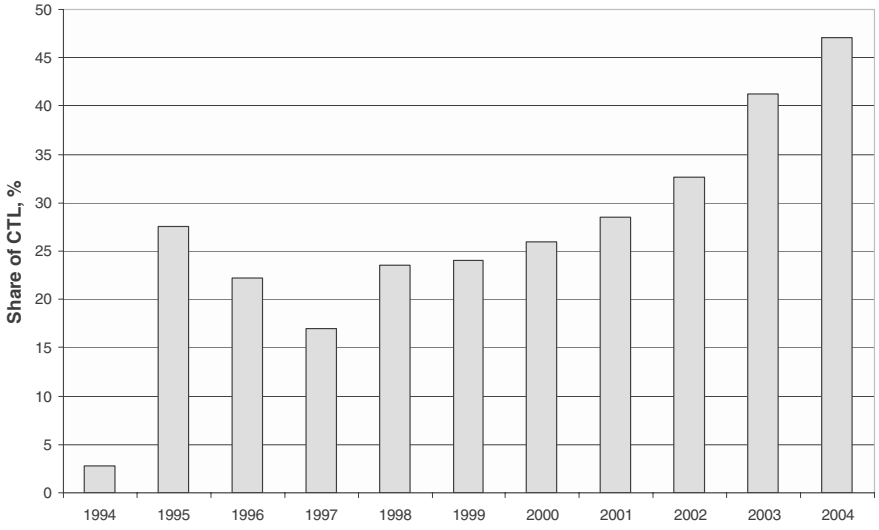


Figure 11. Implementation of the Nordic cut-to-length method (CTL) as a share of the actual annual cut.

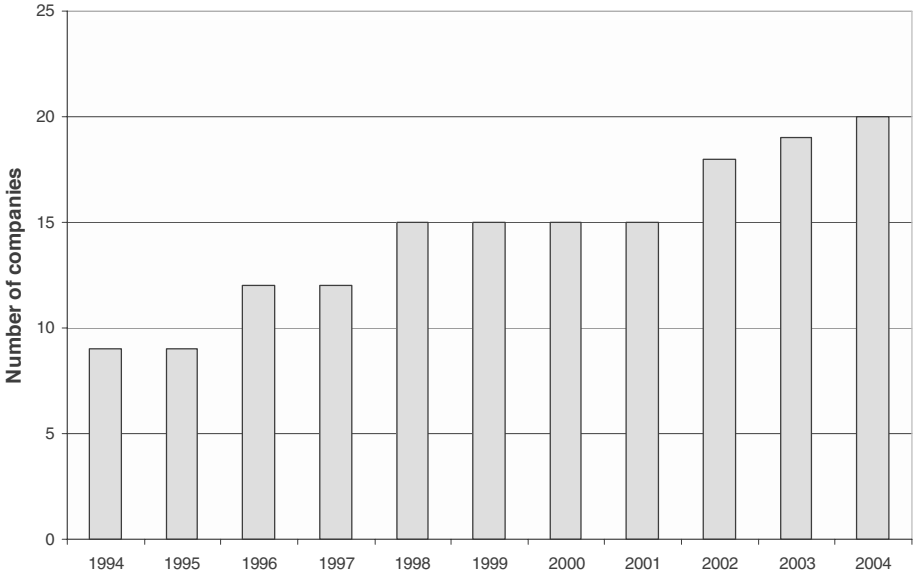


Figure 12. Implementation of the Nordic cut-to-length method by large and medium scale logging companies.

The following logging companies only use the Nordic cut-to-length wood harvesting method: “Ladenso” (since 1994), “Padany” and “Lahdenpohsky LPH” (1995), “Kongopozhskoe LZH” (2002), “Kostomuksha-Les”, and “Volomsky LPH” (2004). The Nordic cut-to-length method dominates the following companies: “Uhtuales” (99%), “Lendersky LPH” (95%), “Ladvinsky LPH” (90%), “Medvezhegorsky LPH” (79%), “Olonetsles” (64%), “Shujales” (58%), and “Pudozhsky LPH” (57%).

The development of cut-to-length technology is based on the increasing number (Figure 13) and capacity of machines.

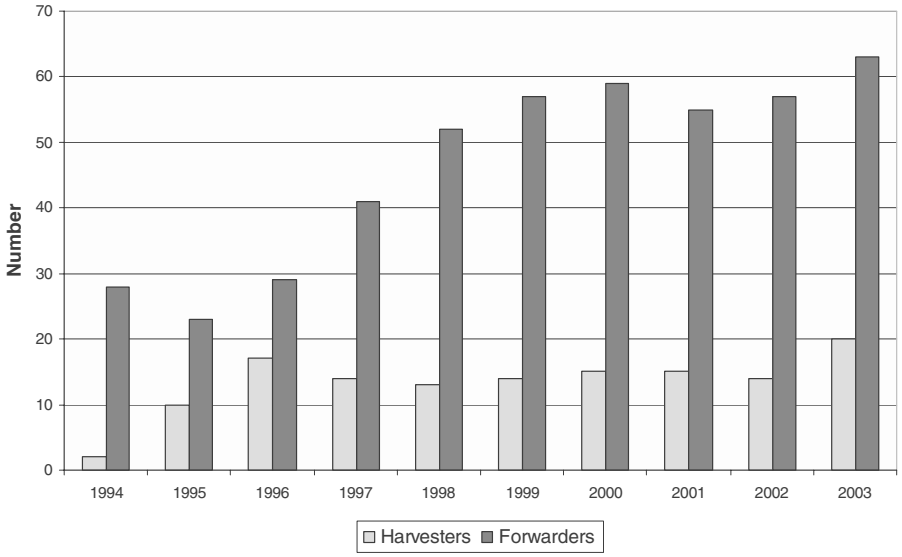
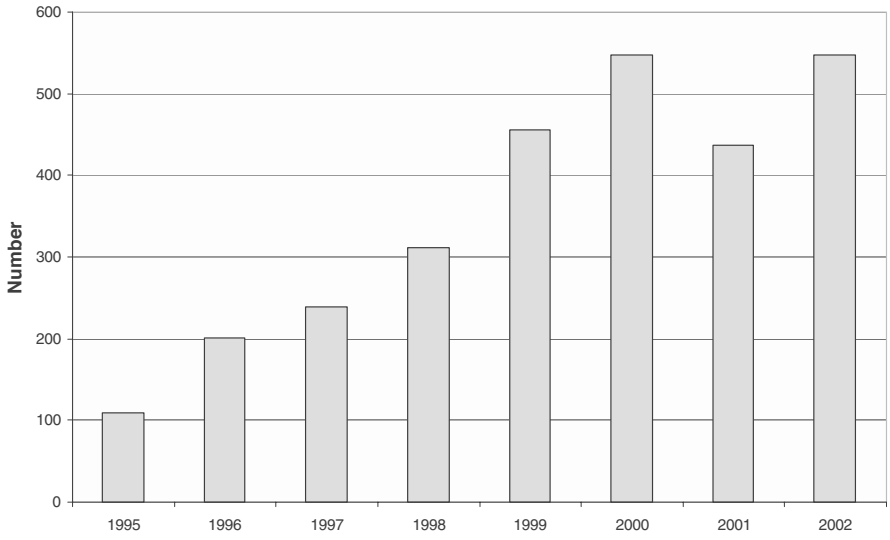


Figure 13. Number of harvesters and forwarders in Karelia.

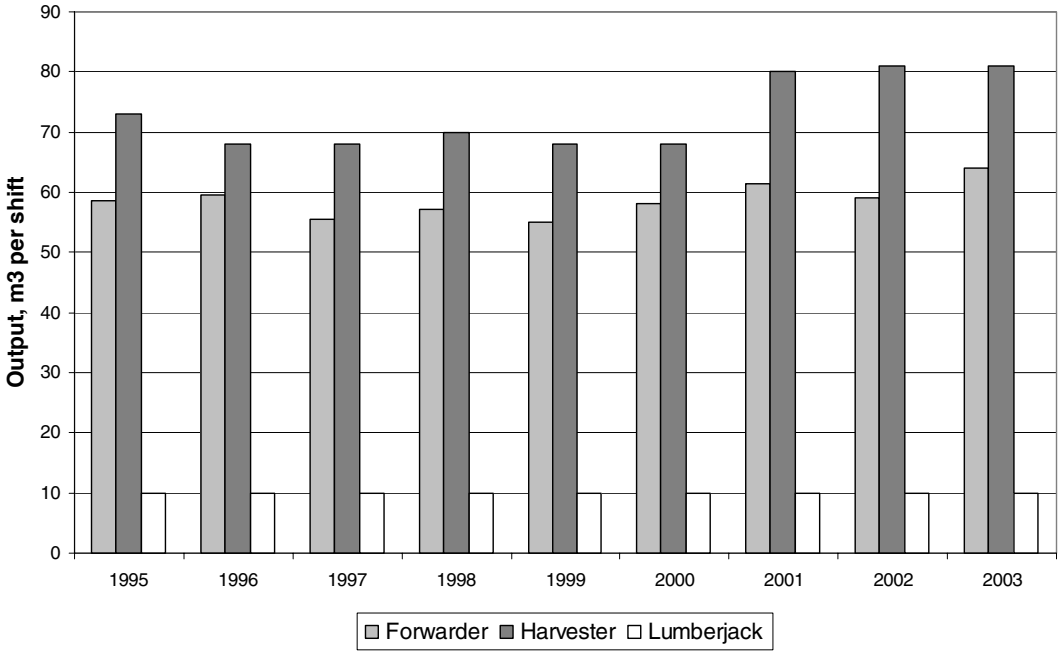
The number of forwarders is higher than the number of harvesters due to the high price of new harvesters. The reliability of the second-hand harvesters is quite low, and the maintainance and repair costs are high. Therefore, because of the reasonable cost of the lumberjack labour companies prefer to use a combination of "lumberjacks + new/second hand forwarder" (Figure 14).



Fugure 14. Number of lumberjacks working according to the Nordic cut-to-length method.

The growing annual machinery output is based on the intensification of machine usage (the number of shifts per day) (Figure 15).

a)



b)

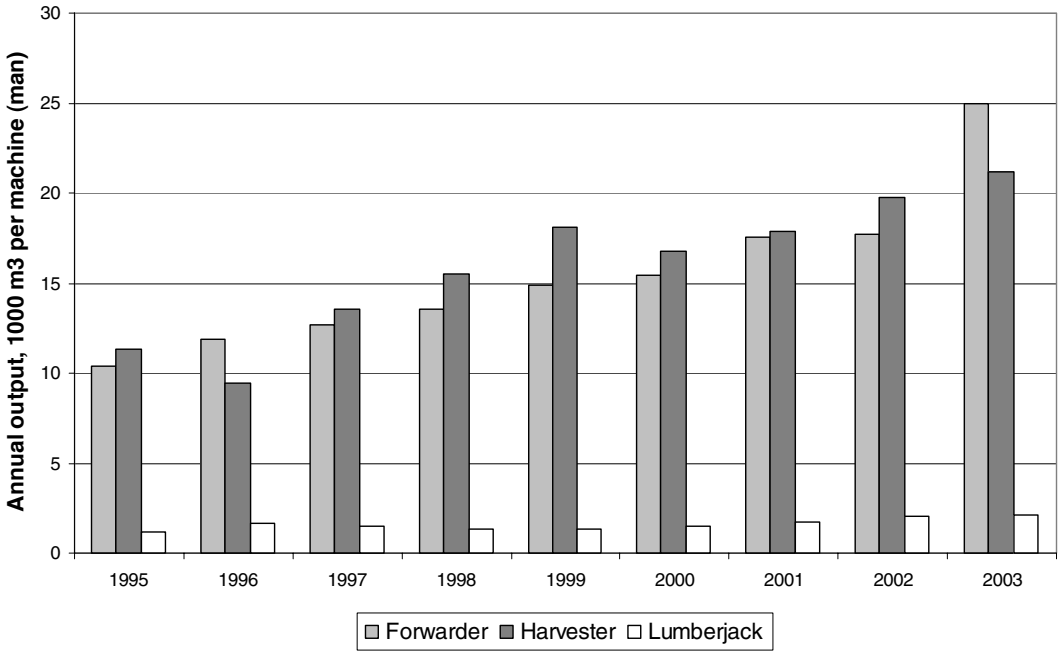


Figure 15. Average output per shift (a) and annual output per one machine and a man (b).

1.3 The Aim of This Study

The aim of this study was to collect data on the current state of the logging companies in Karelia and to analyse how the new bussiness environment, and economic, social and ecological impacts have forced logging companies to up-date their technology, machinery and

management. Logging companies in Karelia were interviewed by students of the Petrozavodsk State University during 2004. The companies' data were then integrated into 4 clusters based on the geographical location of the individual companies. Two to three companies are represented by every cluster. The following clusters were formed (Figure 16):

- East (Pudozhsky district)
- West (Souyarvky district)
- Northwest (Myezerky district)
- Northeast (Kondopozhsky district).

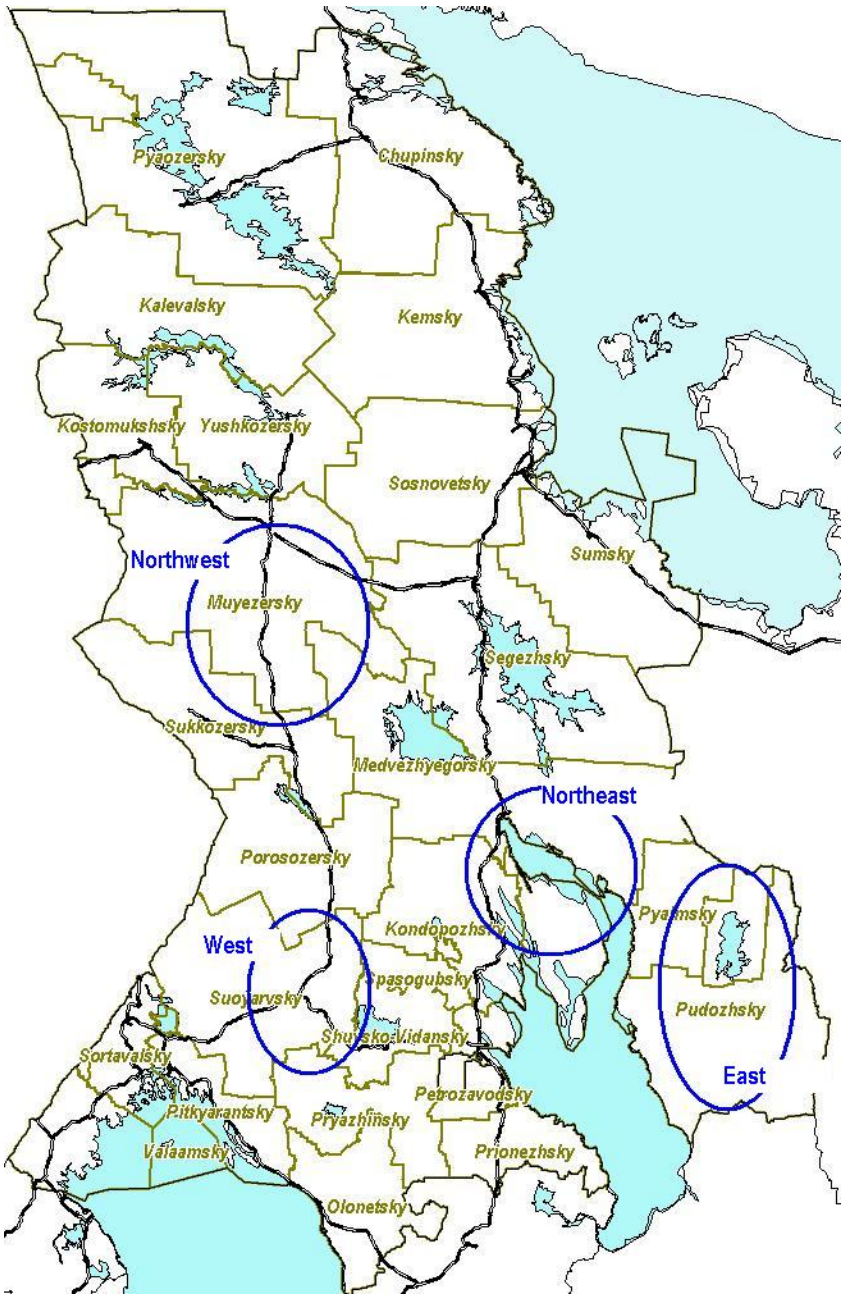


Figure 16. The survey areas of logging companies in Karelia.

The framework for questionnaires included technological, social and ecological components (Table 1).

Table 1. The framework of the study.

Technology	Social issues	Ecology
what type	labour	forestry
productivity	safety	protection of environment
how it is used	population	environmental impacts
logistics	training	
economy	laws and regulation	

Collected data included:

1. **General information**
   Name, year of establishment, turnover, timber unit locations, operation areas by timber units (leskhoz /lesnichestvo), ownership structure, main office location
2. **Forest resources**
   Sizes of the total operation area, the lease area, and the short-term contract areas
   Forest classes in the lease area
   Age class structure in the lease area
   Tree species structure (by dominant species) in the lease area
   Allowable annual cut, total and by assortments
   Actual cut in 2003, total and by assortments
3. **Technology, machinery and infrastructure**
   Current machinery fleet
4. **Silviculture, wood procurement, marketing, export**
   Actual annual harvesting volumes in 2003 by different cutting methods
   Mainly used logging methods and their average unit costs in final felling in 2003
   Road construction by the company in 2000-2003
   Forest regeneration area and the average costs in 2003 by different methods, implemented by the company itself or at the expense of the company by some other organisation
5. **Description of timber flow**
   Location of lower landings
   Average transportation distances
      From logging site to upper landing/storage
      From upper landing/storage to lower landing
      From lower landing/storage to mill/railway/waterway
   Who and where are the customers, problems
   Timber sale and export
   Production of own sawmills

6. **Personnel / human resources**
   Current number of workers in forestry, transport and sawmilling
   Description of education levels (education & training in work) by speciality
7. **Social responsibility (work safety, support to local communities)**
   Work safety and accidents
   Support offered to the local community
8. **Environmental responsibility**
   Year(s) of forest inventory
   Size of protected areas
   Forest certification system (impact on wood procurement and marketing)
   Relationship to environmental NGOs (non-governmental organizations):
   Relationship to customers
   Relationship to leskhoz

2 Forest Resources

2.1 Logging Permits

According to the current Forest Code (1997), forest resources can be rented for a short-term (up to 5 years) or for a long-term period (5-49 years) through open competition or a regional authority's decision. Moreover, logging permissions can be obtained for short-term forest usage (1 year) by auction or by a regional authority's decision.

Most of the surveyed logging companies use a long-term lease (25 or 49 years) as a method for receiving logging permissions and have approximately 3.36 mill ha forests in lease, which is approximately 30% of the total lease area in Karelia (Figure 17).

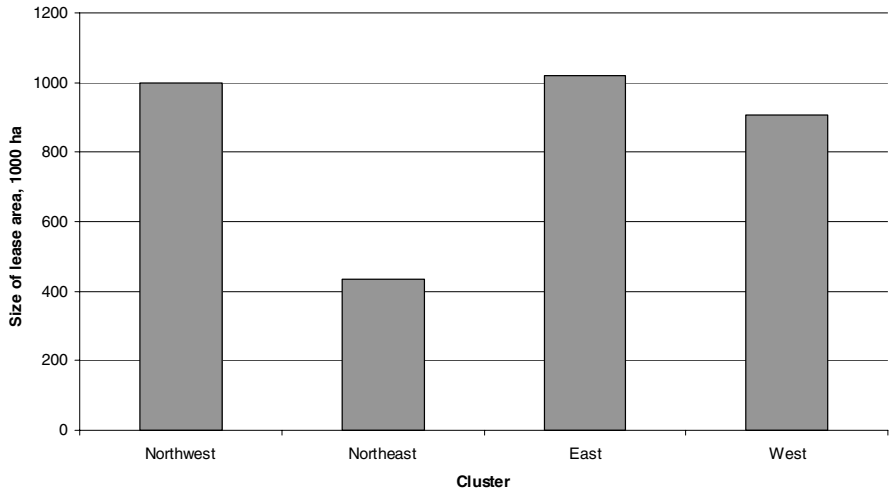


Figure 17. Size of leased forest areas in 2003.

2.2 Structure of Forests under Lease

2.2.1 Forest Groups

In relation to the economic, ecological and social importance of the forests, and their location and functions, the forests are divided into three groups.

The first-group of forests include forests whose main purpose is the fulfilment of water-conservation, protection, sanitation-and-hygiene, health-improvement and other functions, and also forests of specifically protected natural territories. Clear-cutting is not allowed in these forests. Logging can be done only through thinning.

The second-group of forests include forests in areas with a high population density and a ramified network of ground transport routes, forests with water-conservation, shelter, sanitation-and-hygiene, health-improvement and other functions, and with limited importance for exploitation,

and also forests in areas with inadequate forest resources whose protection requires restriction on the regime of forest use.

The third-group of forests mainly include those which are important for exploitation. The protection of the ecological functions of these forests must be ensured in the procurement of wood.

The share of the third-group of forests is estimated to be at 90-95% of all the leased forests in the Northwest, East and West clusters, the others being the first-group of forests (Figure 18). Only the Northeast cluster has all types of forests: the first-group of forests (15%), the second-group of forests (41%), and the third-group of forests (44%).

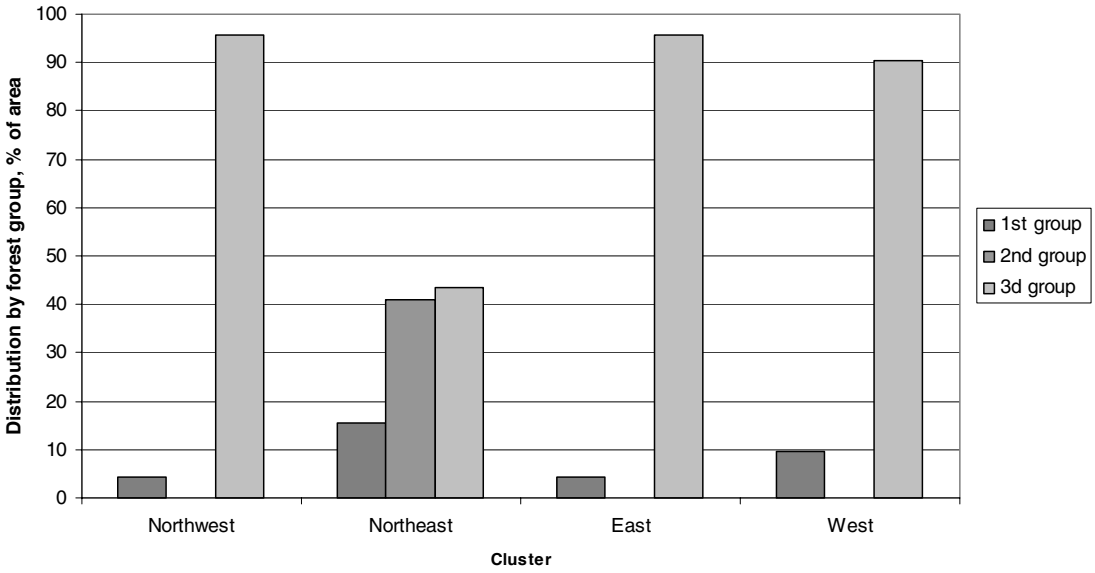


Figure 18. Distribution of leased forests by groups according to area in 2003.

2.2.2 The Age of Forests

The distribution of forest stands by age is quite similar for all clusters (Figure 19). Young and advanced seedling stands dominate (40-50%). The share of mature and overmature stands is quite high, 20-35%. The share of young thinning stands is 8-10%, the share of advanced thinning stands is 3-10%. The best situation is in the Northeast cluster which has a structure closest to even age class distribution. The worse is in the Northwest cluster, which has only 3% of advanced thinning stands.

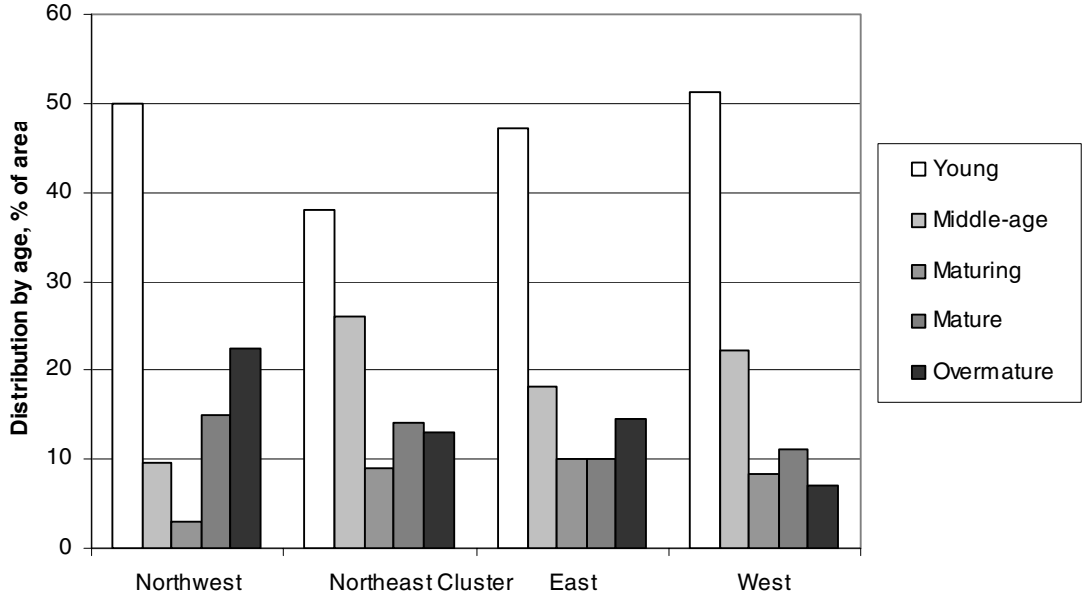


Figure 19. Age class distribution of leased stands in 2003.

2.2.3 Tree Species

The main tree species in the investigated areas of Karelia are pine, spruce and birch (Figure 20). Pine stands dominate in the Northwest, West and Northeast clusters (up to 73%). Spruce is the main species in the East cluster (47%). Birch has a significant share in the East and Northeast clusters (up to 20%). The share of aspen is very low, except in the East cluster (3%).

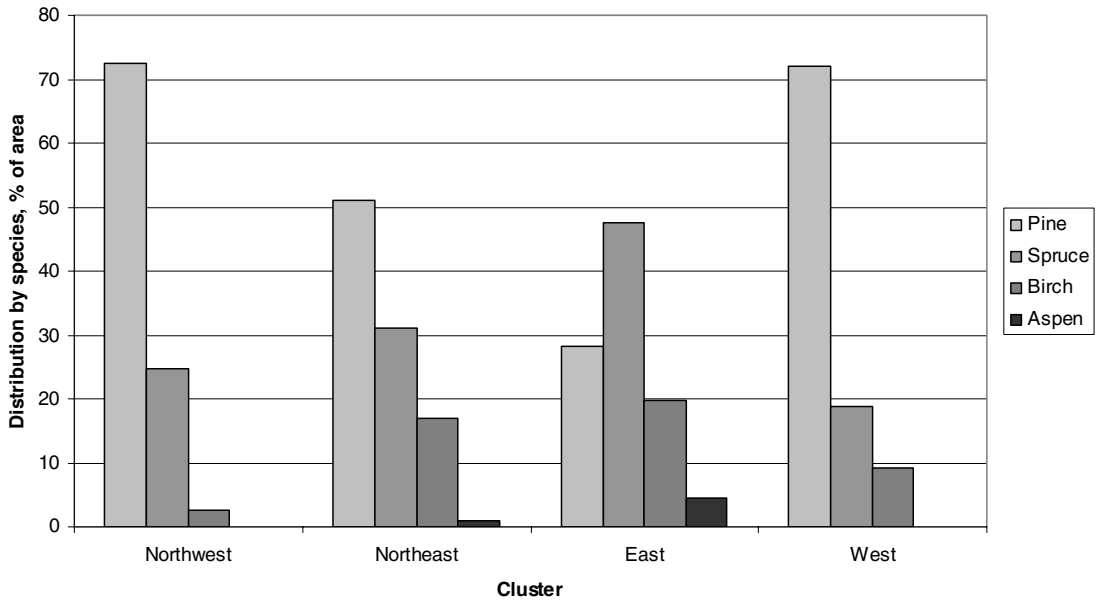


Figure 20. Species distribution of leased stands in 2003.

2.3 Allowable Cut in Leased Stands

2.3.1 The Annual Allowable Cut

The allowable annual cut is separately determined by the Federal Forest Agency for each group of species (coniferous, soft-deciduous and hard-deciduous), within the limits of the forest groups, arising from the principles of sustainable use of the forests. Softwood dominates the allowable annual cut in all clusters (Figure 21). The Northeast cluster has the biggest share of hardwood – more than 30%, mostly birch. The East and the West clusters have approximately 20% of hardwood. The share of hardwood in the Northwest cluster is not significant.

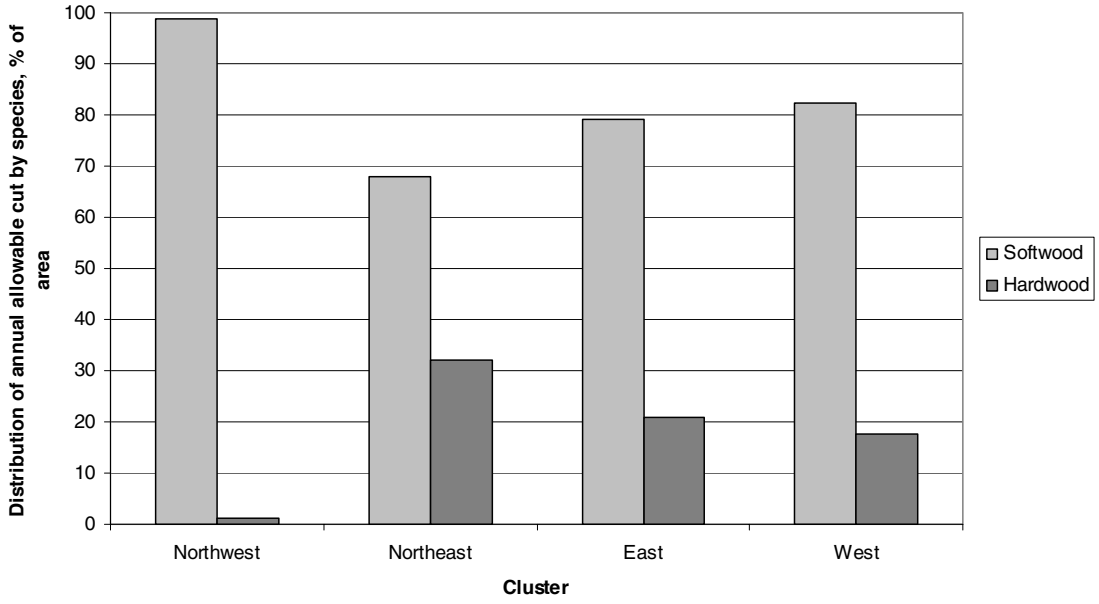


Figure 21. Species distribution of the allowable annual cut in 2003.

2.3.2 Utilisation of the Allowable Annual Cut

The allowable annual cut in the leased forests utilized by the logging companies in the Southern clusters is shown in Figure 22. The utilisation rate of the allowable annual cut in the East and the West clusters is quite high – approximately 80% (23% is an average in Russia). The Northwest and the Northeast clusters do not have enough leased forests, so additional cutting areas for a short-term forest usage are needed.

2.3.3 Assortments

The composition of assortments from the actual cut is presented in Figure 23:

- softwood saw logs 30-45%
- softwood pulpwood 25-35%
- hardwood pulpwood 5-25%

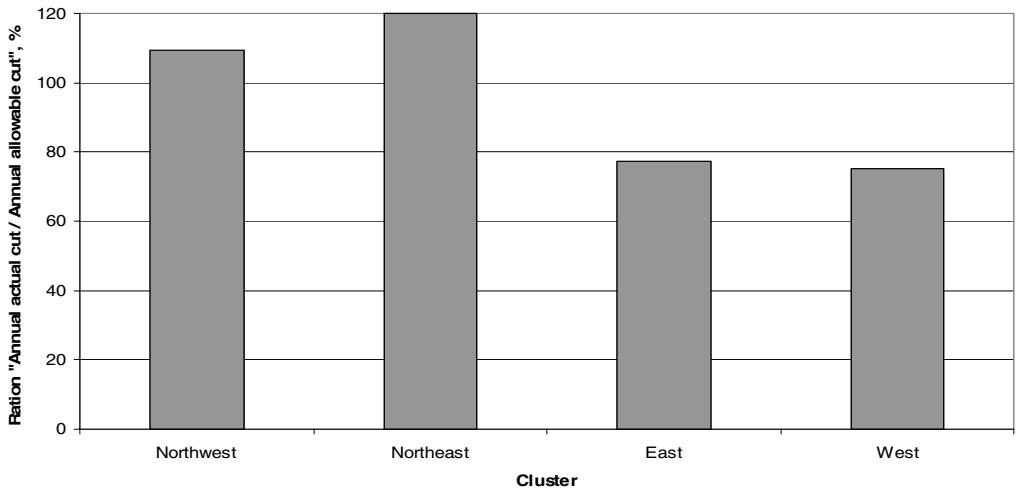


Figure 22. Utilisation of the allowable annual cut in 2003.

- hardwood saw logs less than 1%; this may be due to poor quality of aspen sawlogs and that there is no industry for this
- firewood 10-17%.

All clusters have a low output of softwood saw logs, especially the Northeast cluster – which is only 27% due to the nearby Kondopoga and Segezha pulp and paper mills. The East cluster has a 17% firewood output, which is high compared to the average of 8-13% in the Northwest of Russia.

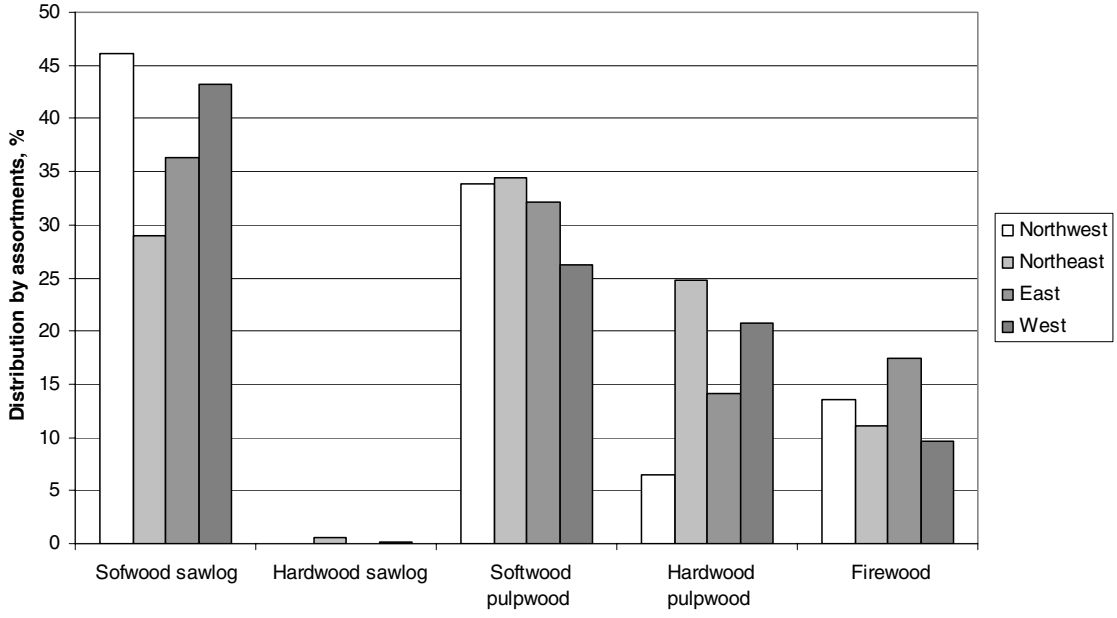


Figure 23. Composition of assortments in 2003.

3 Forest Operations

3.1 Wood Harvesting

Final felling of mature forest stands is the predominant harvesting method in Karelia (Figure 24). Only a small percentage of the trees are thinned (Figure 25). There are three types of final felling which are carried out: clear felling, gradual felling and selective felling (Figure 26). The type of felling permitted depends on the forest group.

Figure 24. Final felling by tree-length technology used in Russian (top photo) and by the full- tree method using western (bottom photos) machinery.

The tree-length or full-tree harvesting methods with the use of Russian machinery is the most commonly used technique today in the West cluster (Figure 24, top photos).

The typical method is that the Russian caterpillar tractor skids manually felled trees to a stacking area. Delimbing can be done at a felling area manually (tree-length method) or at a stacking area by the delimbing machine (full-tree method) prior to transport. Timber trucks then transport the delimbed stems to a centralised and mechanised yard (so-called “lower landing”) where they are cross-cut into different timber assortments. The assortments are then processed on site or loaded to railway wagons for transportation to domestic or export markets.

The Northwest cluster companies use western machinery (Figure 24, bottom photos). A caterpillar feller-buncher fells and bunches trees on a strip-road where they are skidded using a wheel tractor with a clam-shell to a stacking area. A caterpillar harvester can also be used here as a processor for delimbing and cross-cutting.

The rest of the clusters use both traditional tree-length and cut-to-length harvesting methods (Figure 28). The cut-to-length method is not used in the West cluster, while in the Northeast cluster it is the dominant method. In the cut-to-length method, trees are already cross-cut to as-

sortments at the cutting-site with the use of a harvester or a chain-saw. The assortments are then forwarded to a road side with a forwarder for further transportation to domestic or export markets.

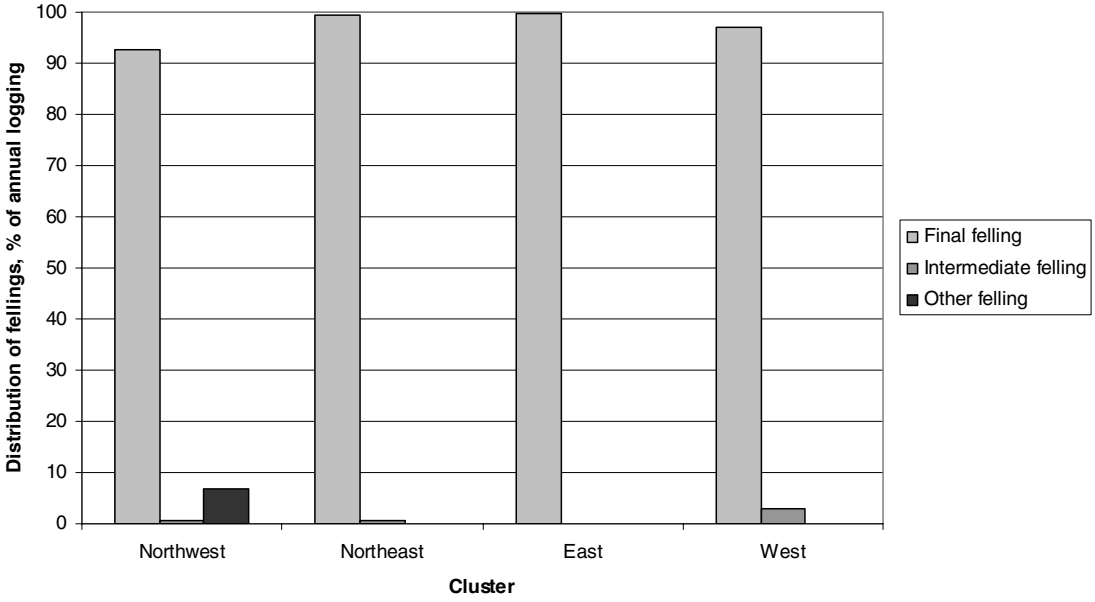


Figure 25. Felling methods in 2003.

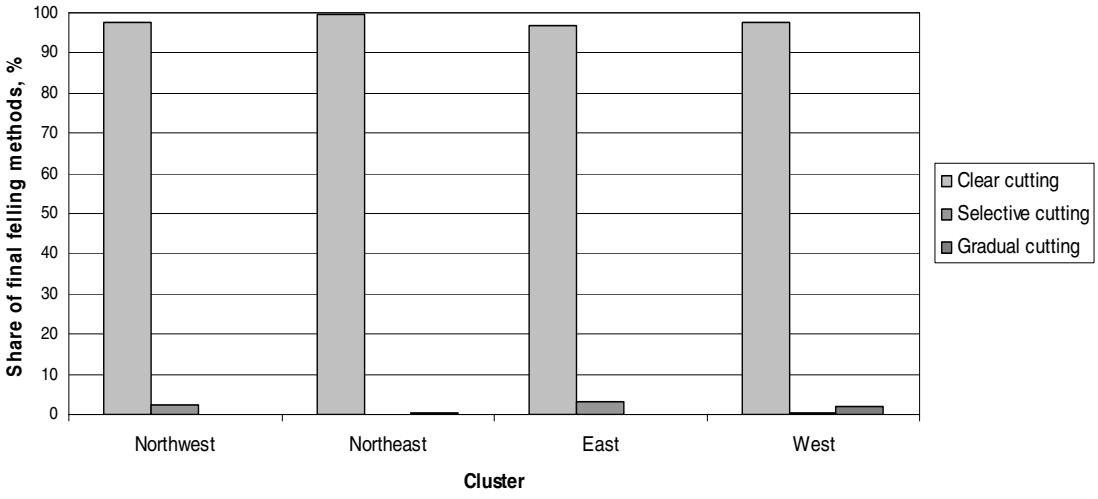


Figure 26. Final felling methods in 2003.

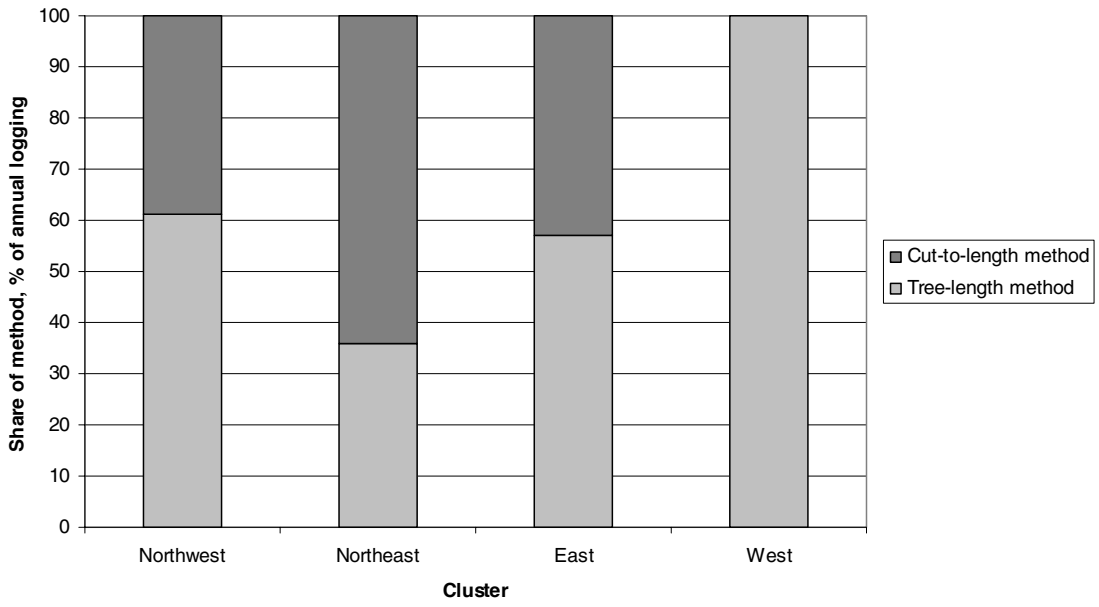


Figure 27. Wood harvesting methods in 2003.

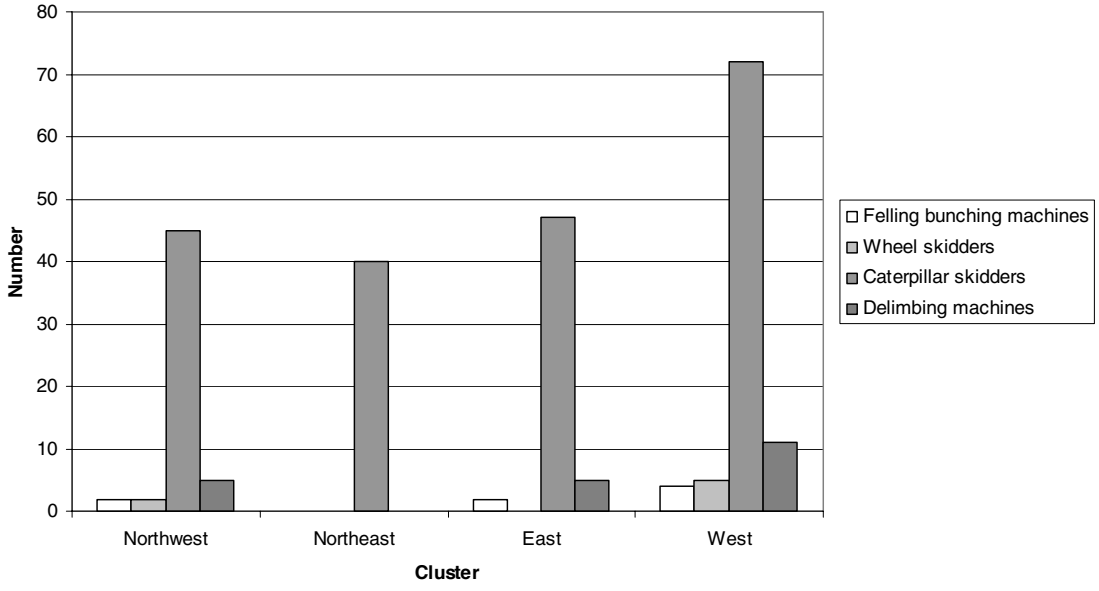


Figure 28. Fleet of machines for tree-length technology in 2003.

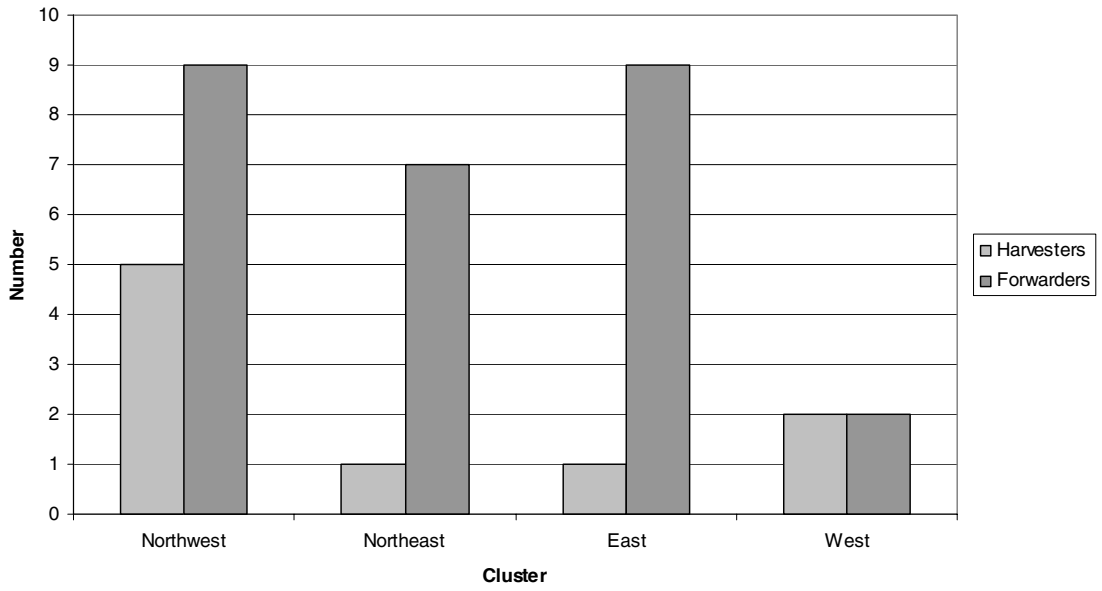


Figure 29. Fleet of machines for cut-to-length technology in 2003.

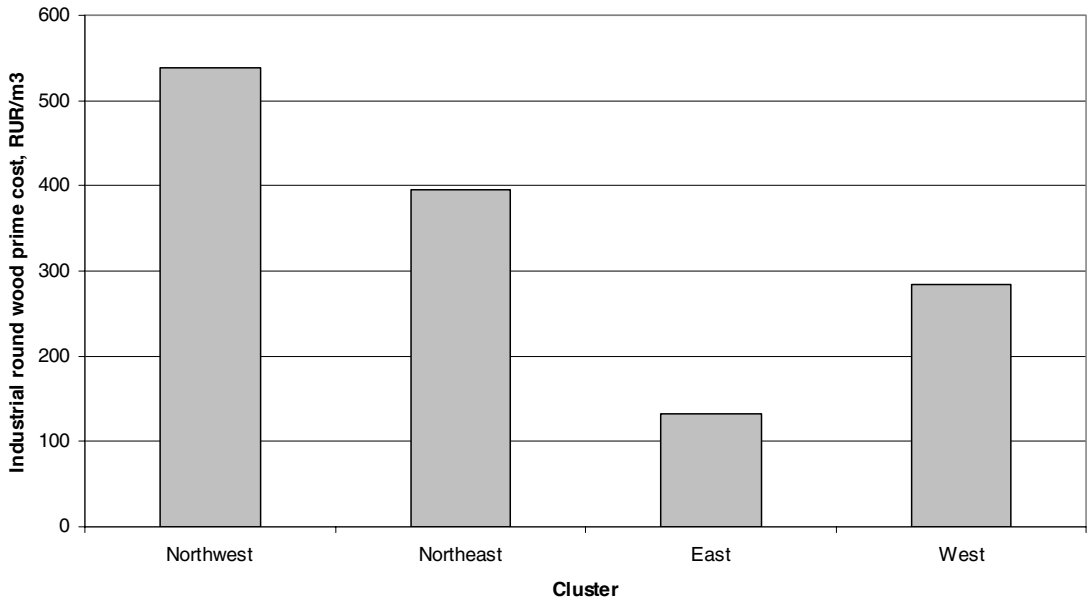


Figure 30. Unit cost for wood harvesting in 2003.

The unit cost for wood harvesting varied from 120 RUR to 530 RUR per m^3 (Figure 30). The high level of the cost price in the Northwest cluster can be explained by recent investments into new cut-to-length technology (Figure 29) and road-building (Figure 31).

3.2 Road-building

The current situation with road-building does not support an increase in economic accessibility to forest resources in Karelia (Figure 32). Logging companies in the Northwest cluster have made investments in the road construction during the last years only due to the developing cut-to-length method.

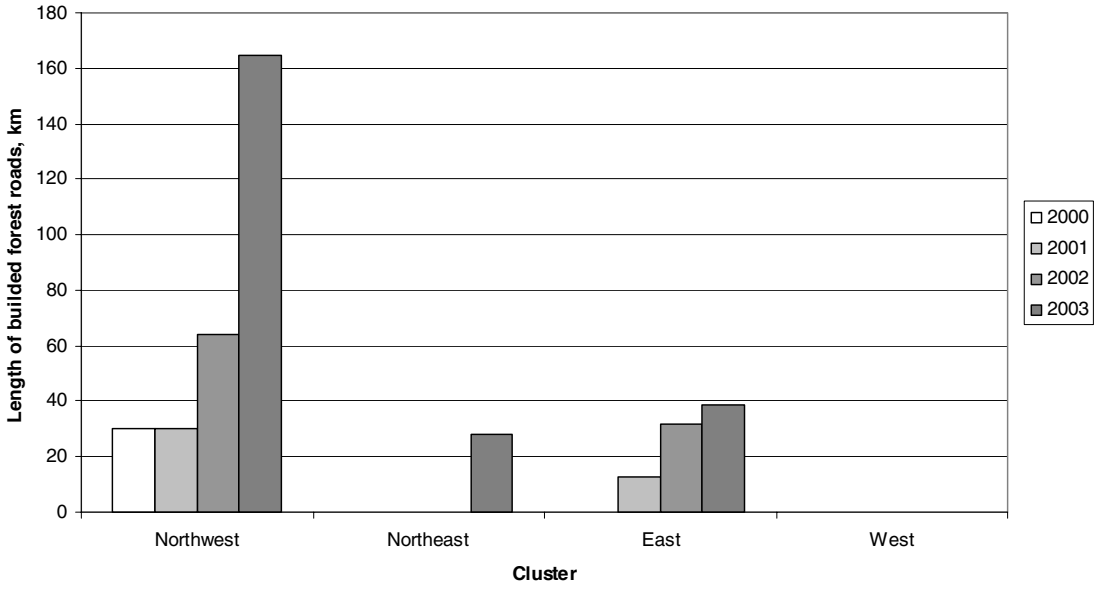


Figure 32. Forest road-building in 2000-2003.

3.3 Reforestation

Forest regeneration is implemented in accordance with a normative act entitled "Basic instructions for forest regeneration in the Russian Federation". There are two main regeneration methods used: natural and artificial (sowing and planting). Artificial regeneration by planting or sowing is applied where natural regeneration with economically valuable species is not possible within a reasonable period of time. Planting or sowing can also be used to compliment natural regeneration where necessary.

Natural regeneration is the most common method used in the East cluster, while artificial regeneration is dominant in the Northwest and Northeast clusters (Figure 33).

The distribution presented in Figure 34 shows that the sowing method is dominant, with the exception of the Northwest cluster.

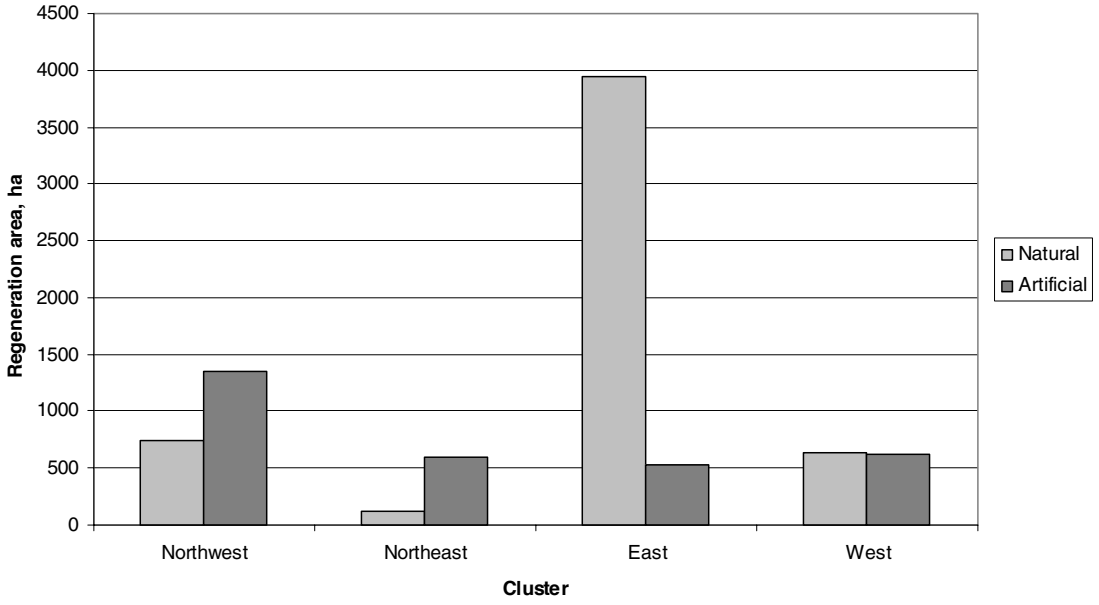


Figure 33. Area of reforestations in 2003.

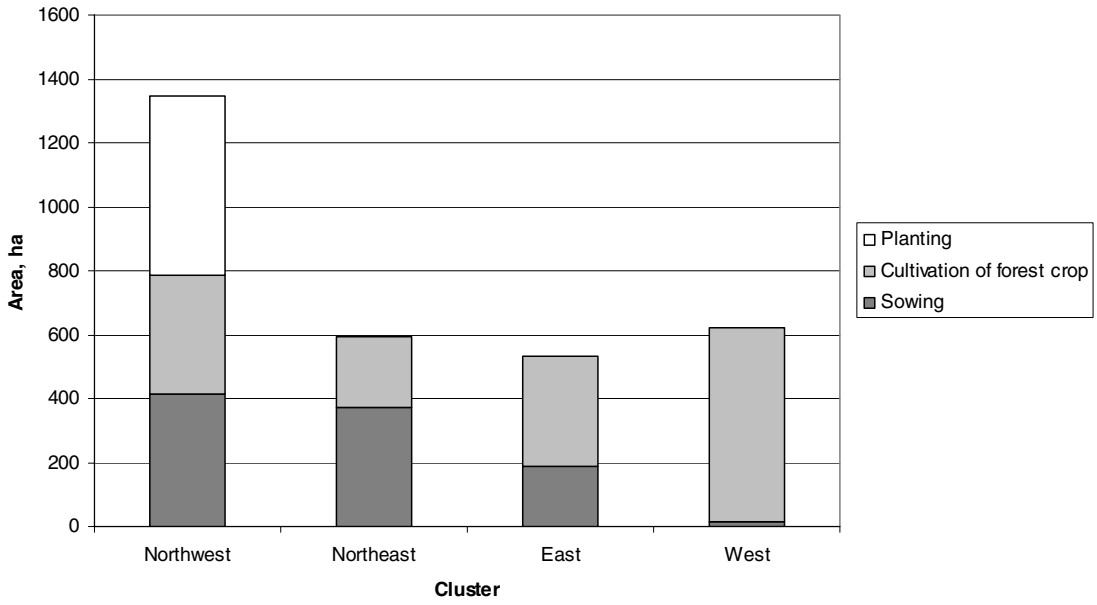


Figure 34. Reforestation by artificial methods in 2003.

3.4 Wood Transportation Distances

The average distance for transportation of wood from a cutting area to a lower landing (traditional technology) or to a customer (or to a railway/water terminal for further long distance transport) varies from 33 km to 45 km (Figure 35). The East cluster has the shortest distance due to the close location of forest resources but then it is vice versa in the Northwest cluster.

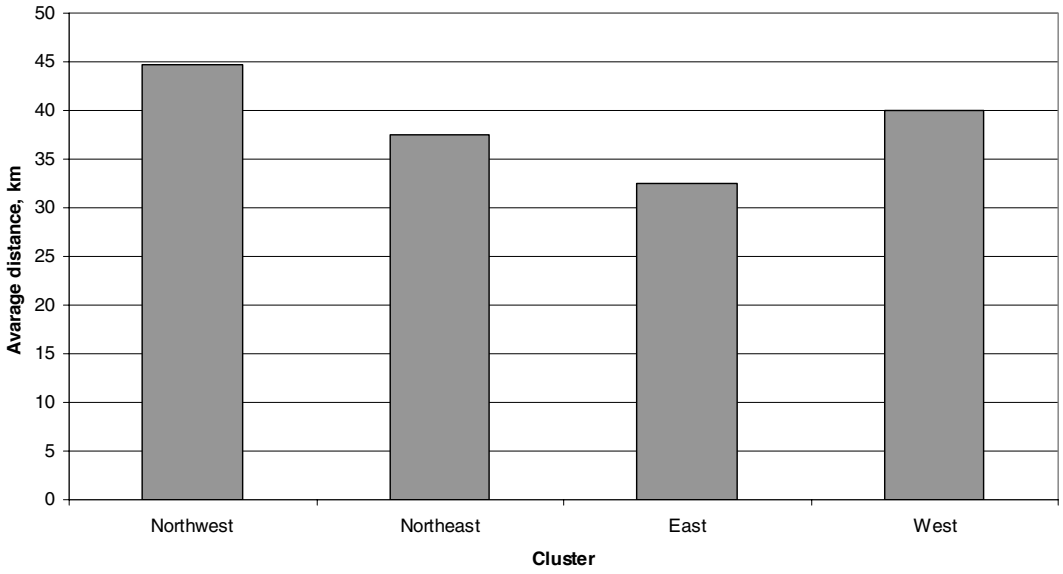


Figure 35. Average distance for transportation of wood in 2003.

3.5 Productivity of Labour

The productivity of labour varies because the logging companies use different wood harvesting technologies and machinery. The West cluster has the lowest level of 550 m^3/man, because of traditional tree-length technology and Russian machinery (Figures 36 and 37). The value is calculated as the ratio of the company's logging (m^3 u. b.) to the average number of logging workers (in the forest, in the lower landing, in wood transportation) in 2003. On the other hand, the Northeast cluster, where logging companies use the Nordic cut-to-length method or western machinery for the traditional method, they achieve double the productivity at 1350 m^3/man. The rest of the clusters, which used using mixed cutting methods and machinery, show intermediate values.

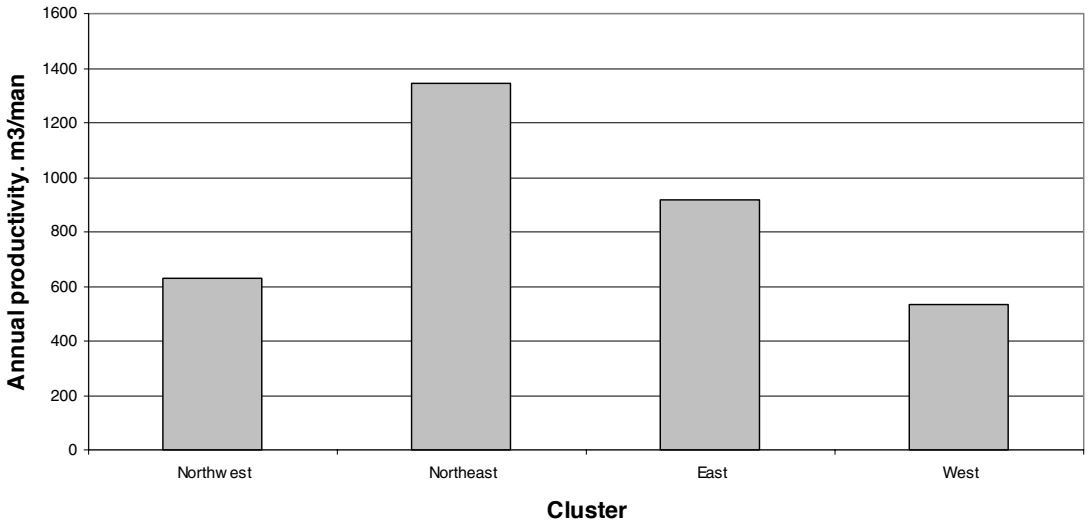


Figure 36. Annual productivity of logging workers, m3 u. b. of cut in 2003.

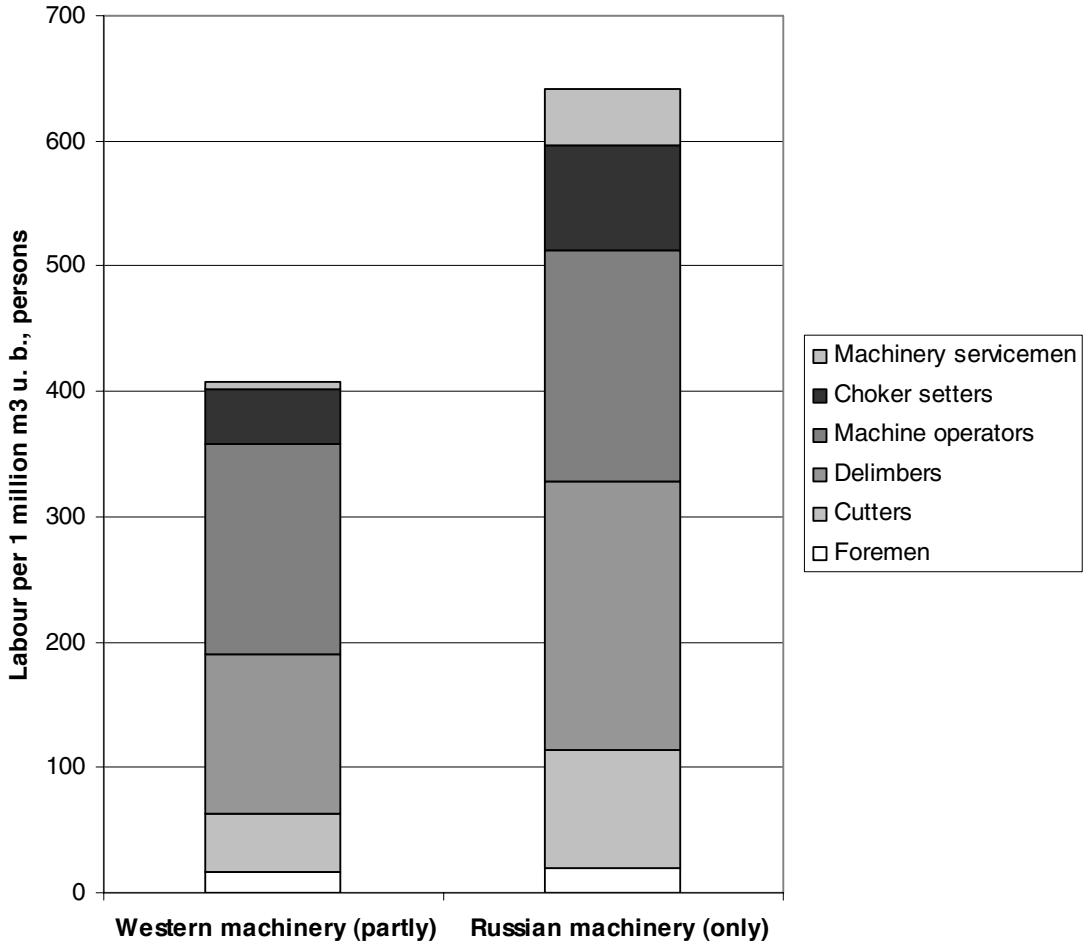


Figure 37. Labour needs for 1 mill m3 u. b. of the annual cut by the tree-length method, using both Russian and western machinery, and only Russian machinery in 2003.

4 Social and Environmental Responsibilities

4.1 Employment and Training

The surveyed companies vary in size from 150 to 2500 persons with an average number of 790 employees. Logging companies have problems in recruiting logging workers, so they need to invite foreigners (Ukraine, Moldova etc). However, the share of local workers is quite high - more than 90%.

Managers have university degrees, foremen – university or college degrees, and workers – special or a general secondary education.

The current change in the cutting method places new demands on the employees and their education. As a result, companies implementing the cut-to-length method spent 300-770 RUR per employee for training in 2003. The training expenses of companies using the traditional tree-length method were 17-180 RUR per employee.

4.2 Work Safety

Logging companies in the Republic of Karelia during the USSR era had developed instructions which controlled procedures and monitored for work safety, and they continue to follow them based on current legislation. According to work safety statistics from 2001-2003 in the North-west cluster, the most serious reasons for accidents (Figures 38 and 39) were carelessness, neglect of work safety instructions and technological processes. The total number of accidents was 43 (no fatal accidents) in 2001, 43 (1 fatal accident) in 2002, and 42 (2 fatal accidents) in 2003. The accident rate is higher than the average rate for logging in Russia, which equals 20 accidents (0.5 fatal accidents) per 1000 employees.

The goal of the current work safety system is to prevent accidents and sickness by improving of of working conditions at the workplace, protective equipment, work discipline etc. The logging companies' support for work safety actions varied from 550 RUR/employee to 2 750 RUR/employee, with the average value being 940 RUR per employee in 2003.

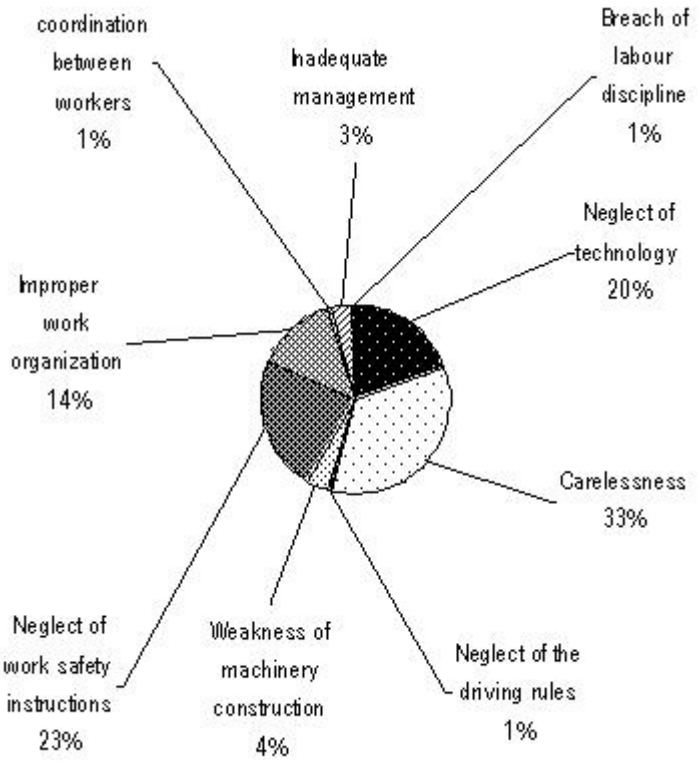


Figure 38. Reasons for accidents, 2001-2003.

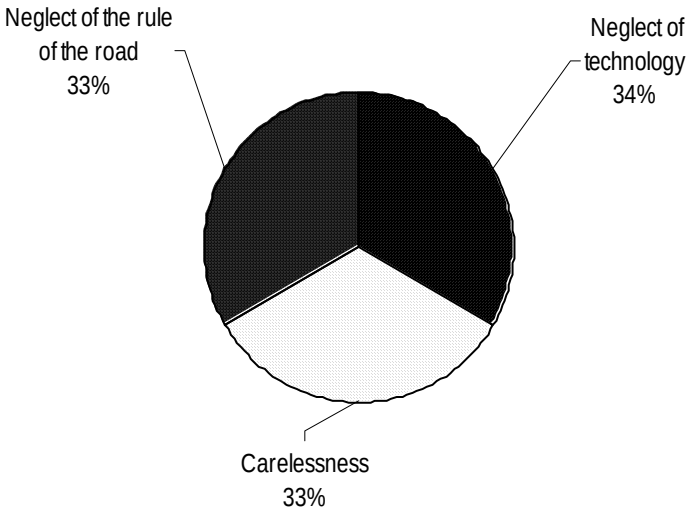


Figure 39. Reasons for fatal accidents, 2001-2003.

4.3 Contributions to the Local Community

All companies have been deeply involved in local community activities and in the development of the districts. Taxes allocated to the local budget contribute to local welfare. Moreover, the forest lease contracts require the following community obligations:

- forest and municipal road construction and maintenance
- fuel wood supply for local community
- support for local schools
- support for local hospitals
- support for pensioners
- support for social development programmes initiated by the local administrations
- scholarship for local university students

The logging companies' contribution to local community support varies widely and can be estimated at 0.03-0.8% of annual turnover.

4.4 Environmental Issues

The last forest inventory with the necessary ecological expert assessment was conducted in 1994 (West and North East clusters), 1998-1999 (North West cluster), and 2003 (East cluster). These corresponded to current forest legislations. Environmental expenses varied from 0 to 0.045% of the annual turnover. Logging companies did not highlight any specific relationships with state leskhozes and non-governmental organizations.

5 SWOT Analysis

Results of the SWOT analysis of the wood procurement system for Northwest Russia are presented in Tables 2-5. This evaluation is based on the analysis of qualitative and qualitative data acquired from questionnaires, and the personal opinions of interviewed managers of the logging companies. The results indicate an acute shortage of forest resources for wood supply development in Karelia, seasonal dependence on work, low productivity of labour, human resource problems and so on.

The preceding framework is presented as a starting point to assist in the development of wood procurement for organizations operating in Karelia. When applying a SWOT analysis, weaknesses and threats should be minimized or avoided. Lastly, strengths and opportunities should be matched so as to develop wood procurement. The implementation of both sustainable forest management and the Nordic cut-to-length method is needed. The social, educational, economic, and environmental challenges faced by logging companies in Karelia should be taken into account.

Table 2. Results of a SWOT analysis of wood procurement in the Northwest cluster.

strengths	weaknesses
Geographical location (Finland's neighbourhood)	Small allowable annual cut
Large lease area, long period of lease	Non-optimal age distribution of leased forests
Third-group forests	No intermediate felling (thinning)
Small share of hardwood	High unit cost in wood harvesting
Good quality wood	No educational and training inputs
Artificial reforestation by seedlings	High average age of the personnel
New machinery	Clay soil
New roads	Old machinery in the lower landing
Permanent customers	Low productivity of labour
Big share of export	High level of accidents
Qualified personnel	
Local workers	
Reasonable social and safety expenses	
Own sawmill construction	
Gradual introduction of cut-to-length method	
Small amount of accidents and no fatal accidents	
opportunities	**threats**
Cut-to-length method	Irregular financing of reforestation by leskhoz
Reduction of production costs	Lack of interested new personnel
Further mechanisation of wood harvesting	

Table 3. Results of a SWOT analysis of wood procurement in the West cluster.

strengths	weaknesses
Geographical location (Finland's neighbourhood)	No cut-to-length technology
Large lease area	Imperfection and incompleteness
Long period of lease	of the Customs and Excise rules
Good quality wood	High unit cost in wood harvesting
Reasonable cost price of wood harvesting	Low productivity of labour
Long-term wood trade contracts	Difficult to realise social activity at the full
Own sawmill construction	scale
Trade-union committee	Low responsibility of the logging workers for
Large social contribution at local and regional levels	the environment
	Seasonal dependence of works
opportunities	threats
Increase in thinning	Unsatisfactory forest legislation
Increase in highly-efficient western engineering	Forest fires
Training of personnel	Fluctuation of the market
State covers reforestation expenses	

Table 4. Results of a SWOT analysis of wood procurement in the East cluster.

strengths	weaknesses
Third-group forests	Marshy area
Steady place on market	Big share of fuel wood
Gradual introduction of the cut-to-length method	Significant share of hardwood
Qualified personnel in management	No intermediate felling (thinning)
Low cost price of wood harvesting	Old equipment
	Out-of-date engineering
	Low educational levels
	No team spirit
	Irresponsible attitude of personnel towards work
	Seasonal dependence on work
	Large share of float
	Low productivity of labour
opportunities	threats
Purchase of modern equipment and engineering	Forest fires
Training of personnel	Strong winds
Increase in wood quality	Poor infrastructure (roads, communications etc)
Improvement of professional skills	Irregular financing of reforestation by leskhoz

Table 5. Results of a SWOT analysis of wood procurement in the Northeast cluster.

strengths	weaknesses
Third-group forests	Small allowable annual cut
New machinery leases	No intermediate felling (thinning)
Long-term contracts	Small share of the cut-to-length method
High productivity of labour	Marshy area
	Significant share of hardwood
	Old machinery
	Seasonal dependence on work
	Large share of float
	High unit cost in wood harvesting
opportunities	threats
Increase in wood quality	Poor infrastructure (roads, communications etc)
State covers reforestation expenses	Forest fires
Delivery by water transport	Changes in legislation
Construction of roads	Irregular financing of reforestation by leskhoz
Development of float	
Construction of wood working processes	
Training of personnel	

6 Conclusions

The technological, economic, social, and environmental states of the logging companies vary greatly. This study describes the situation in 9 logging companies which produce 3 million m^3 under bark of round wood annually, which equals approximately 50 % of the total round wood production for the whole of Karelia. Hence, the statistical, analytical and empirical information provides a broad overview of the wood procurement situation in the Republic of Karelia and, to some extent, the rest of Northwest Russia.

There are several social, economic, and environmental challenges that logging companies in Karelia should pay attention to.

Logging companies in Karelia are becoming a part of vertically integrated structures based on pulp and paper mills or sawmills that can improve the development of logging.

The Nordic cut-to-length method is rapidly being fully established. However, the tree-length method continues to play an important role as long as the old lower landing equipment is in good condition. Moreover, the traditional wood harvesting method is also supported by effective western machinery.

The unit cost in wood harvesting is high and sometimes exceeds harvesting costs in Finland. The productivity of labour in the companies using traditional Russian machinery is extremely low.

The results of SWOT analysis predict a shortage of forest resources for wood supply development in Karelia in the near future. This means that implementation of sustainable forest management based on commercial thinning operations and the Nordic cut-to-length method is needed.

The implementation of the cut-to-length method based on the modernisation of machines or western engineering is an opportunity. Carefully made modernisation and the introduction of new methods could improve the status of forest work among young educated people. This would help to attract more motivated and skilled employees to companies.

References

Act of Government of the Republic of Karelia on 21.11.2001 249-P. Directives of the Government of the Republic of Karelia in Forest Sector development. 96 p. (In Russian)

Goskomstat of Russia. 2003. Regions of Russia. Moscow. 895 p. (In Russian)

Forest Law of Russian Federation. 1997. Moscow. (In Russian)

Ministry of labour and social development of Russia. 2003. Protection of labour in Russia in 2002. National report. Moscow. 118 p. (In Russian)