

Northwest Russian Forestry in a Nutshell

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Yuri Gerasimov

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Abstract <p>The purpose of the paper is to provide a general view of the current state of the forest sector in Northwest Russia. The paper is a translation of the Finnish guidebook on forestry in Northwest Russia "Luoteis-Venäjän metsätalouden taskutieto", which was published at the Finnish Forest Research Institute in spring 2005. Some small updating and alterations have been made since the publishing of the guidebook in Finnish in 2005, but generally the paper presents the most current information available at the time of writing the Finnish version.</p> <p>The paper studies the basics of Russian forestry, covering themes from forest resources to their management and utilisation. The ongoing renewal pertaining to the forest legislation and administration will lead to changes in forest sector, which may deviate greatly from the plans predicted at the time of writing the publication. Thus, the courses of the changes are presented rather briefly.</p> <p>In the chapter about forest utilisation the allowable and actual cuts for different regions of Northwest Russia are given and the guidelines for forest utilisation are described. The logging methods and Russian harvesting technology are presented briefly. In the chapter about forest industry the annual production figures and locations of production plants for sawmill and wood-based panel industry as well as for chemical forest industry are given. In addition, the competitiveness, investments and foreign trade of Russian forest industry are discussed.</p> <p>Further information on topical events may be obtained in Finnish on the internet service of Expertise in Russian Forestry -project at www.idanmetsatieto.info.</p>			
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Preface

The purpose of this paper is to provide a general view of the current state of the forest sector in Northwest Russia. The paper is a translation of the Finnish guidebook on forestry in Northwest Russia "Luoteis-Venäjän metsätalouden taskutieto", which was published at the Finnish Forest Research Institute in spring 2005. Some small updating and alterations have been made since the publishing of the guidebook in Finnish in 2005, but generally the paper presents the most current information available at the time of writing the Finnish version.

The ongoing renewal pertaining to the forest legislation and administration will lead to changes in the forest sector, which may deviate greatly from the plans predicted at the time of writing this publication. Thus, the courses of the changes are presented here rather briefly. Further information on topical events may be obtained in Finnish on the internet service of Expertise in Russian Forestry project at **www.idanmetsatieto.info**.

Despite the uncertainty caused by the numerous changes concerning the Russian forest sector, this publication aims at providing a reliable and quick source for anyone interested in Russian forests and forest sector.

We would like to express our gratitude to the Counsellor on Forestry Affairs at the Embassy of Finland in Moscow, Hannu Kivelä as well as to Professor Timo Karjalainen and researchers of International forestry at the Finnish Forest Research Institute, Joensuu Research Unit, for providing expert assistance and suggestions for improving the contents of this publication.

Joensuu, July 2006

1 Introduction

For years, Russia has been an important collaborator for people operating in the Finnish forest sector and its significance as a partner will not diminish during the coming years. In addition to large-scale enterprises, an ever-increasing number of small and middle-sized companies are contemplating cooperating in the establishment of a production facility in Russia. For making such decisions, information on the current state and future development of the Russian forest sector is needed. In addition, numerous organisations collaborating in the forest sector require information to support their work. Obtaining information on Russia can be difficult and time consuming and additionally, information becomes rapidly outdated. The information service on Russian forestry, “Expertise in Russian Forestry”, was founded to gather scattered information and to convey it to those involved in the Finnish forest sector. This publication aims to provide a comprehensive picture of the current state of the forest sector in Northwest Russia.

The greatest ongoing changes in the forest sector in Russia concern the forest legislation and administration. In addition to the amendments to the existing Forest Code, preparations for compiling an entirely new Forest Code are under way. A number of versions of the new proposal for the Forest Code have been announced, and at the time of publication, the latest version has passed the first reading in the Duma. Because the Code will likely be altered as it goes through the law making process, the Code has been presented only briefly in this publication. The reforming of the forest administration has thus far been enforced only in the central administration but it will take years to conduct the amendments on a regional level.

Obtaining statistical information in Russia has turned out to be a challenging task. As some of the information pertaining to the forest sector is not accessible through the official channels, there may be contradictions in the data presented. Most of the facts in this publication are based on information verified by the Federal State Statistics Service (Rosstat), with the most recent being from 2003. Preliminary information on 2004’s statistics has partly been presented also, but this information may be greatly altered as the confirmed statistics are published. At the regional level, corrections may be done to already confirmed information, and thus official information may be divergent. Most of the data concerning forest utilisation has been collected in reports and books published by the Ministry of Natural Resources of the Russian Federation in 2002 and 2003.

2 Ownership and Administration of Forests

2.1 Legislation Concerning Forests and Their Utilisation

The highest legal document concerning the forests and regulating forest utilisation is the constitution of the Russian Federation. The constitution, among other tasks, ensures every man's rights and distributes the governance and decision making among the Federation and regions. Phrasing and formulation of the constitution enables various interpretations, which has caused confrontation between the Federation, regions and local authorities when attempting to solve administrative issues.

The Forest Code of the Russian Federation (*lesnoy kodeks*) is the main document governing the protection, management and utilisation of forests. The first forest law of the post-Soviet Russia "Principles of the Forestry Legislation of the Russian Federation" was confirmed in 1993, but was reviewed only four years later in 1997. The Forest Code defines issues concerning the ownership, administration, and leasing of forests as well as financing forestry and compiling forest planning and management, to give a few examples. In the past, all the regions, i.e. the subjects to the Russian Federation (republics, *oblasts*, *krays*, etc.), had a right to compile their own regional stipulations as long as they were in line with the federal forest law. However, today, as a consequence of the centralisation of legislation and administration, only the Forest Code is valid, and federal authorities are solely responsible for the management of forest resources. So called former agricultural forests make the only exception, these forests being managed by regional authorities. At the time of writing this publication, the third amendment of Forest Code is under way and it is supposed to be adopted during 2006. The objective of the new Forest Code is to enhance the economic utilisation of forests by promoting investments in forestry related infrastructure and by developing forest utilisation towards long-term leases.

In addition to the Forest Code, also Land Code and Federal Law on Environmental Protection regulate operations in the forests. In all, the collection of stipulations concerning the Russian forests comprises of over 300 documents.

2.2 Administration of Forest Resources

The forest resources are owned by the Russian Federation, which is primarily responsible for organising forest management, protection and rational utilisation. According to the Forest Code, Land Code and Federal Law on Environmental Protection it is possible to pass forest ownership to a regional administrative body. According to an amendment made to the current Forest Code in the end of December 2005, the administration of forest resources will be transferred to federal subjects in the beginning of 2007, except for some densely populated areas. Currently, the private ownership of forests is not possible.

Administratively forest resources are divided into two groups; forest fund (*lesnoy fond*) and forests that do not belong to the forest fund (Figure 1). Forest fund stands for the land area that, according to the Forest Code, could potentially be covered by forests, excluding forests that belong to armed forces or municipalities. However, all forests regardless of their administrative body are bound by stipulations of the Forest Code according to which their utilisation is regulated.

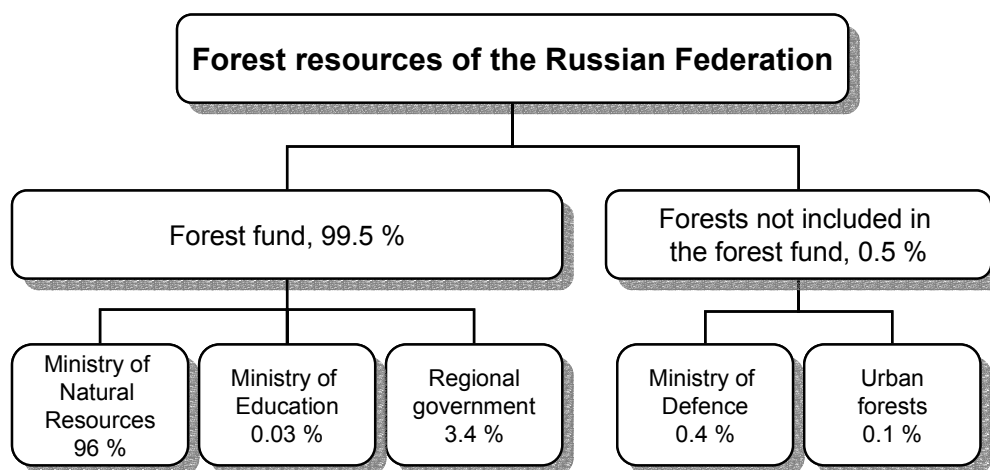


Figure 1. Administrative division of Russian forest resources (as of 1.1.2005).

Forest administration in Russia is the responsibility of the Ministry of Natural Resources and its subordinate Federal Forest Agency with its regional organisations. The subjects of the Federation (republics, *oblasts* etc.) are obliged to govern the formerly entitled agricultural forests, whereas urban forests are governed by the local administration (cities, municipalities). Organisations accountable for administrating the forests are sovereign when it comes to regulating forest protection, regeneration, management as well as organising forest use. The Ministry of Natural Resources possesses about 94% of the forested land in Northwest Russia, which is slightly less than in Russia on average. Depending on the region this share varies from less than 60% to complete ownership (Figure 2).

2.3 Forest Administration

The post-Soviet Russian forestry has gone through several changes and the process is still ongoing. Despite the numerous legislative and administrative reforms, substantive alterations that would update forestry to a market driven system have been slow. Reshaping the forest administration continues as a part of the Federation's large-scale administration reform. The main principles of the reform are the intensification of administration and diminishing the number of tasks that currently are the state's responsibility. In forestry, the main goal has been to disassociate the tasks related to the administration and management of the state property and the control of their use. Furthermore, an attempt to renew the division between public and private sectors has been made by assigning forestry related duties to private enterprises. During 2004, necessary amendments concerning legislation and administrative structure were made at the Federal and the regional administrative levels.

In 2000, most of the tasks of forest administration became the responsibility of the Ministry of Natural Resources of the Russian Federation. In the past, forests were governed by Federal Forest Agency of the Russian Federation, which was administratively an independent organisation and thus not subordinate to any Ministry. In addition to forest resources, the Ministry of Natural Resources is responsible for monitoring mining activities and water resources as well as environmental issues in general.

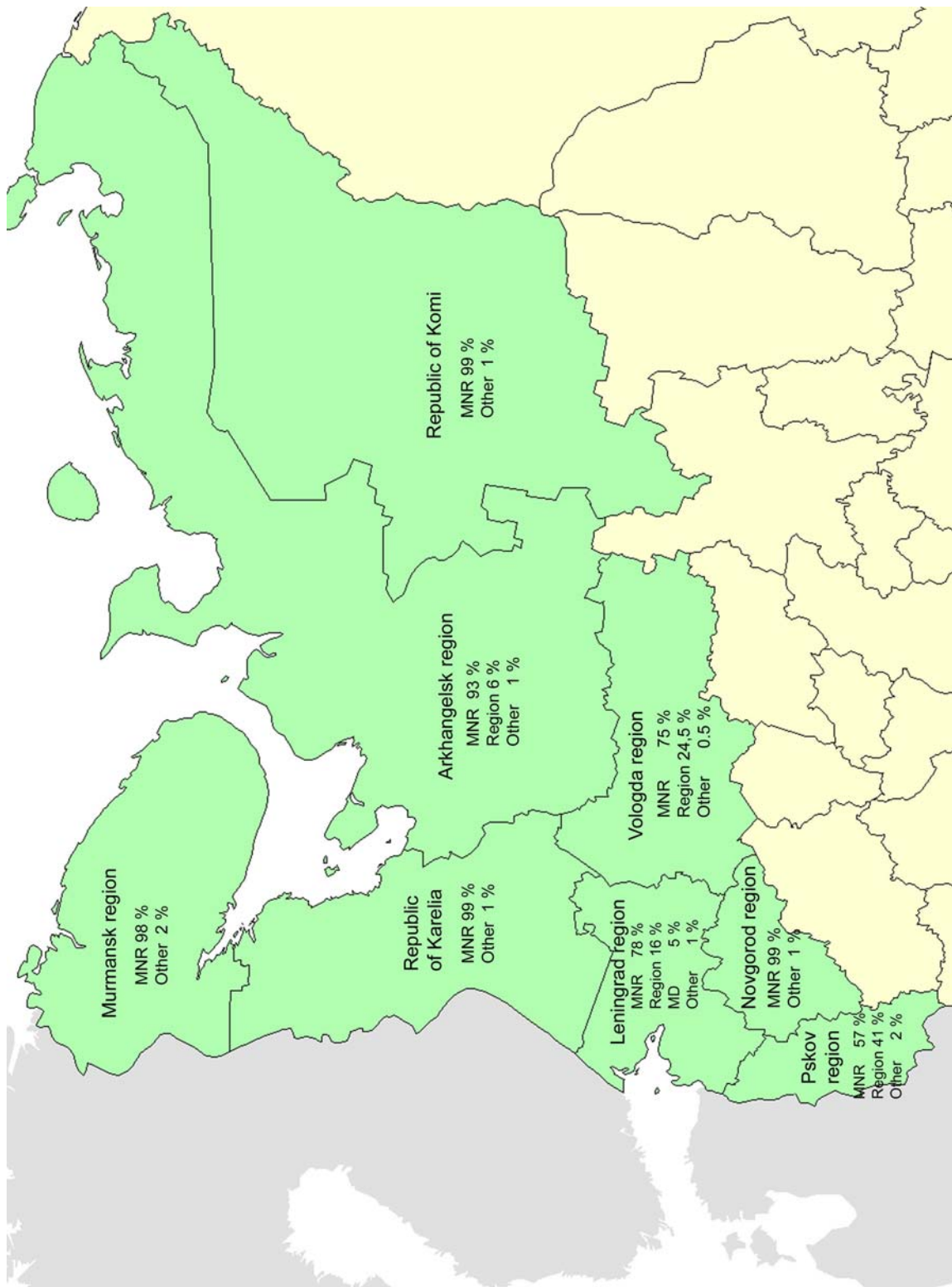


Figure 2. The share of forest land governed by the Ministry of Natural Resources (MNR) in Northwest Russia in 2003 (information on Kaliningrad region is not included in the map).

The main tasks of the Ministry of Natural Resources is the drafting of laws and normatives governing utilisation and inspection of natural resources as well as the performance of functions related to the processes of law-making and law-enforcement. The Ministry consists of six departments, with 370 personnel (Figure 3).

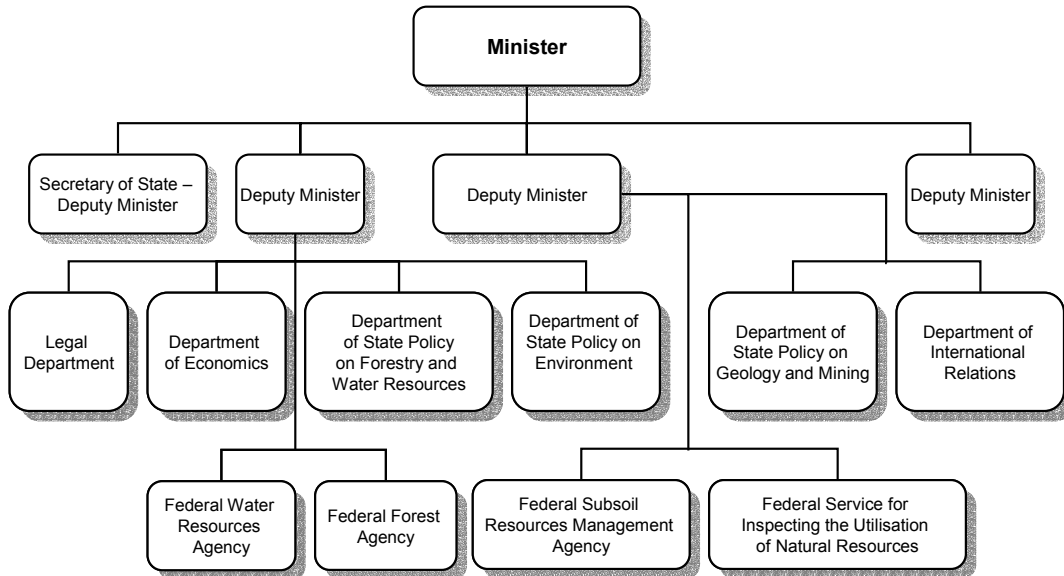


Figure 3. Structure of the Ministry of Natural Resources of the Russian Federation (as of 10.5.2006).

The Federal Forest Agency (*Federalnoe agentstvo lesnogo khozyaistva*) or *Rosleskhoz* is the executive body in forestry at the federal administration level. It provides services, executes legislation and policies as well as governs the state property, i.e. forest resources. Monitoring and controlling of forests is the responsibility of the Federal Service for Inspecting the Utilisation of Natural Resources (*Federalnaya sluzhba po nadzoru v sfere prirodnopolzovaniya*) or *Rosprirodnadzor*, which is subordinate to the Ministry of Natural Resources. Additionally the Federal Forest Agency may, within the limits of its competence, introduce statutes and uphold registers. The central administration of the Federal Forest Agency employs 140 state officials.

At the regional level, the governance of forest resources is the responsibility of the regional organisations, which are subordinate to the Federal Forest Agency. These organisations are fully authorised bodies of the Federation, which plan and determine the utilisation of forest resources in their regions. At the local level, the administration of forestry is passed on to *leskhoz*s, the elementary organisational units of Russian forest administration. In all, there are 1,759 *leskhoz*s in Russia, whose administrated areas vary from a couple of thousand hectares to over a million hectares. A typical land area of a *leskhoz* is about 100,000–400,000 hectares. *Leskhoz*s branch off further into land areas known as *lesnichestvos* (Figure 4). *Lesnichestvos* are districts that are run by one forest field professional, usually a forest engineer. Typically, one *leskhoz* comprises of 3–7 *lesnichestvos*.

In addition to the Federation level forest administration, subjects to the Federation as well as municipalities and cities have bodies that are accountable for governing the forests in their area. In the past, they were also responsible for allocating usufructs in their areas.



Figure 4. *Leskhoz*es of the Republic of Karelia (as in 2002) and *lesnichestvos* of the Pudozhsky *leskhoz*. (FEG Ltd)

Despite the reforms of the 1990s, the composition and functions of *leskhoz*s have remained virtually unaltered ever since the Soviet times. Forest management, protection and monitoring have remained the main tasks of the *leskhoz*s, but as a result of the introduction of the first forest law in 1993, the right to do final fellings was given to forest companies. Furthermore, *leskhoz*s act as a part of the Federal forest administration when forest rental and auctions are being prepared. According to the Forest Code of 1997, *leskhoz*s have a right to perform intermediate fellings, sell this timber and use the proceeds to fund their statutory duties. According to the law, the statutory duties of the *leskhoz*s should be funded from the budgets of the Federation and regions, but frequently the budget funding is insufficient.

The current objective is to conduct a forest administration reform at the local level, which would lead to the abolishment of the *leskhoz*s in their current form. According to the plan, *leskhoz*s would be replaced by a so-called interregional-*lesnichestvo* (*mezhrayonnoe lesnichestvo*), whose function would be to organise forest management and protection in its area. Enforcement of the Forest Code and other forestry related legislation is planned to be the responsibility of the regional administrative body of the Federal Service for Inspecting the Utilisation of Natural Resources. Decisions on allowing state forestry to participate in business activities have not been made thus far. Instead, establishing a state enterprise that would be responsible for managing all the forests, except the ones leased out, is currently regarded as one option.

3 Forest Resources

3.1 Russian Forest Resources

Russia possesses about 20% of all the world's forest resources. The total area of Russian forests is 1.2 billion hectares, of which actual forest land is 883 million hectares (Table 1). The volume of growing stock is 82 billion cubic metres and the average annual increment slightly less than one billion cubic metres. In Russia, the mean annual increment (*srednyj prirost*) is calculated by dividing the volume of stock by its age. In Northwest Russia, the total area of forests is 118 million hectares, of which forest land comprises 76%. The total volume of growing stock is 10 billion cubic metres and its gross annual increment 130 million cubic metres. More than half of the Northwest Russian forest resources are located in the Republic of Komi and the Arkhangelsk region (Figure 5).

Russian forest fund is divided into two categories according to land use; Forest Land (*lesnye zemli*) and Non-Forest Land (*nelesnye zemli*). Forest Land comprises of all the land area allocated for growing forests, i.e. land area that is covered with forests, non-forested forest land such as clear felling sites, forests destroyed by storms or forest fires, sapling stands and nurseries. Non-Forest Land includes the land area that is not used for growing stock but is otherwise used by forestry, such as land area occupied by peat land, roads, power lines, water bodies or pastures.

Table 1. Forest resources of the Russian Federation in 2003.

Region	Forests included in forest fund ¹⁾			Forests not included in forest fund ²⁾			TOTAL		
	Area ^{3a)} , 1,000 ha	Forestland ⁴⁾ , 1,000 ha	Volume, million m ³	Area ^{3b)} , 1,000 ha	Forestland ⁴⁾ , 1,000 ha	Volume, million m ³	Total volume, million m ³	Share of mature and over mature forests, % of the total volume	Mean annual increment ⁵⁾ , million m ³
Russian Federation	1,173,089	878,138	81,538	5,913	4,838	592	82,130	54	994
Northwest Russia	116,866	89,264	9,992	988	695	102	10,093	59	133
Arkhangelsk region ⁶⁾	29,318	22,713	2,488	223	173	34	2,522	69	28
Kaliningrad region	297	263	41	29	22	4	44	14	1
Republic of Karelia	14,833	9,737	940	75	60	6	946	45	14
Republic of Komi	38,891	30,635	2,965	10	10	1	2,966	73	30
Leningrad region	5,595	4,593	790	303	234	35	825	42	14
Murmansk region	9,831	5,372	229	217	92	2	231	62	2
Novgorod region	4,102	3,574	612	11	9	2	614	44	11
Pskov region	2,409	2,112	334	58	49	8	342	27	7
Vologda region	11,590	10,266	1,594	63	48	8	1,602	49	26

(Source: Lesnoy fond Rossii 2003)

¹⁾ *Lesnoy fond*

²⁾ *Lesnaja, ne vhodjaschie v lesnoy fond*

^{3a)} *Zemli lesnogo fonda*

^{3b)} *Zemli, ne vhodjaschie v lesnoy fond*

⁴⁾ *Lesnye zemli*

⁵⁾ The mean annual increment (*obschij srednyj prirost*) is calculated by adding the average annual growth (*srednyj prirost*) according to age-classes.

Srednyj prirost = volume of the stand / age of the stand

⁶⁾ Includes the Nenets Autonomous Area

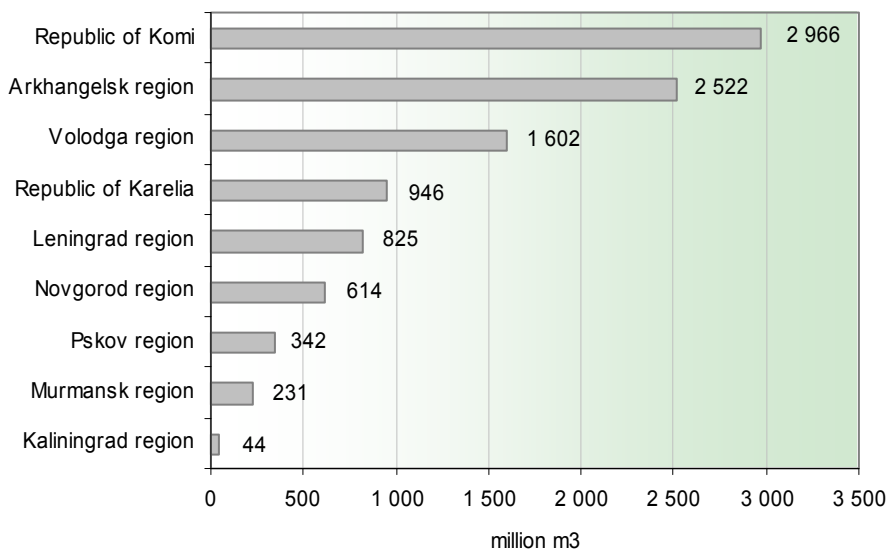


Figure 5. Volume of forests in the Northwest Russia in 2003. (Source: Lesnoy fond Rossii 2003)

3.2 Forest Management Groups

Russian forests are divided into three management groups according to their usage and importance to ecology and the national economy. Each of the management groups is set with limitations in forest use. The majorities of forests, 69%, is for commercial purposes and thus belong to the management group III. In Northwest Russia, management group III forests comprise 51% of all the forests (Figure 6).

- I forest management group
 - Shore zones of rivers and lakes
 - Shelterbelts by roads and railways
 - Conservation areas and other forests outside economic use
 - Clear fellings are partly forbidden
 - Selection and sanitary fellings are allowed with certain restrictions
- II forest management group
 - Forests in densely populated or industrial areas
 - Volume of annual fellings may not exceed annual increment
 - Forest regeneration is obligatory after performing fellings
- III forest management group
 - The main source of raw material for forest industry
 - Clear felling areas may not be larger than 50 hectares

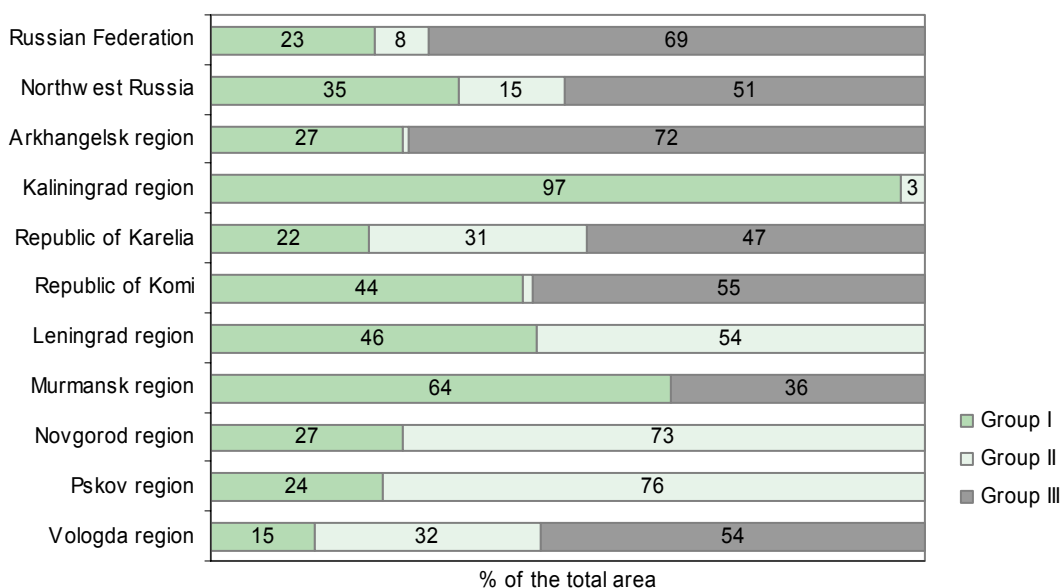


Figure 6. Distribution of Russian forests into management groups in 2003. (Source: Lesnoy fond Rossii 2003)

3.3 Tree species

According to the established practice in Russia, tree species are divided into three categories: coniferous (*khvoinye*), soft deciduous (*mjahkolistvennye*) and hard deciduous (*tvjordolistvennye*). Dominance of coniferous species is characteristic to the Northwest Russian forests. In the areas governed by the Ministry of Natural Resources, coniferous forests cover 75% of the forest land as well as of the volume of the stock (Figure 7). Vologda, Novgorod and Pskov regions stand out from the other regions of Northwest Russia due to the large share of deciduous species in their forests (Table 2).

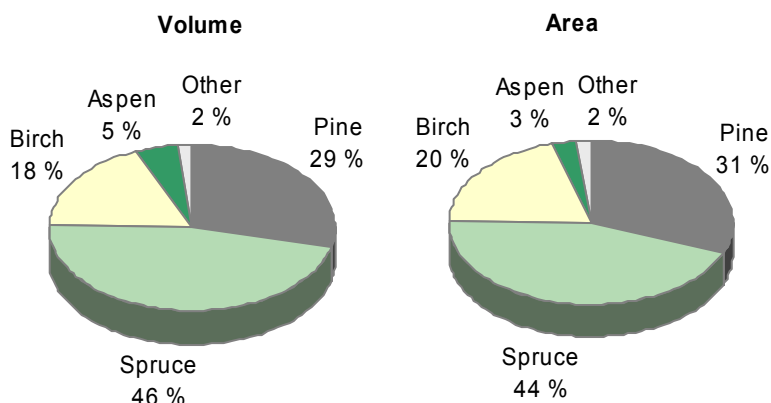


Figure 7. Tree species composition in the forests governed by the Ministry of Natural Resources in Northwest Russia. Left: of the total volume of growing stock, right: of the total land area. (Source: Lesnoy Fond Rossii 2003)

Table 2. Tree species composition of forests managed by the Ministry of Natural Resources in 2003.

Region	Volume of growing stock	Dominant tree species				
		Pine (<i>Pinus spp.</i>)	Spruce (<i>Abies spp.</i>)	Larch (<i>Larix spp.</i>)	Birch (<i>Betula spp.</i>)	Aspen (<i>Populus spp.</i>)
million m ³						
Russian Federation	76,060	15,006	10,009	23,108	9,883	3,086
Northwest Russia	8,831	2,537	4,138	33	1,594	407
Arkhangelsk region	2,227	556	1,382	9	246	34
Kaliningrad region	40	7	6	0,04	10	1
Republic of Karelia	940	545	285	0,07	98	10
Republic of Komi	2,948	666	1,765	23	363	97
Leningrad region	622	216	187	0,11	154	58
Murmansk region	229	111	86	0,01	32	0,03
Novgorod region	606	110	113	0,08	249	86
Pskov region	174	73	21	0,02	53	18
Vologda region	1,045	254	292	0,12	390	103

(Source: Lesnoy fond Rossii 2003)

3.4 Development Classes and Age-Class Distribution

The Northwest Russian forests are categorised into ten age-classes marked by Roman numerals I–X. Each age-class covers 20 years for coniferous trees (and some deciduous trees such as oak) and 10 years for most of the deciduous trees. Development classes are divided into five classes: young, middle-age, maturing, mature and over-mature stands (Table 3).

Table 3. Average age of a stand with regard the development classes

Development class	Average age of a stand, years	
	Coniferous	Deciduous
Young	0 - 40	0 - 20
Middle-age	41 - 80	21 - 40
Maturing	81 - 100	41 - 50
Mature	101 - 160	51 - 80
Over-mature	> 161	> 81

The rotation periods in Northwest Russian forestry are long. On the same latitudes where rotation period for coniferous forests in Finland is 80–100 years, the Russian period is commonly 120–140 years. In Russia, the rotation period is determined according to biological facts, not according to economical aspects. Although local differences in development-class distribution occur, over half of the Northwest Russian forests belong to the mature or over-mature classes (Figure 8, Table 4).

Except for specifically protected forests and forest zones with felling restrictions, all the mature and over-mature forests of all the three management groups that allow final fellings, are counted as exploitable forests (*lesa, vozmozhnye dlja ekspluatatsii*). Exploitable forests do not include areas where forest utilisation is economically not profitable, such as sparsely wooded forests (less than 40 m³/ha in European parts of Russia and the Urals, less than 50 m³/ha in Asian parts of Russia) and reserve forests (*reservnye lesa*). Reserve forests refer to remote areas located mostly in North-Siberia and roadless territories, where forestry is not practiced today nor are there aspirations to do so in the near future.

Only a part of the Russian forests are considered to be exploitable and with regard all the Russian forests under the administration of the Ministry of Natural Resources, the share is 53%. In Northwest Russia, the share of exploitable forests is 70%, though Murmansk region is an exception where the share is only 40%.

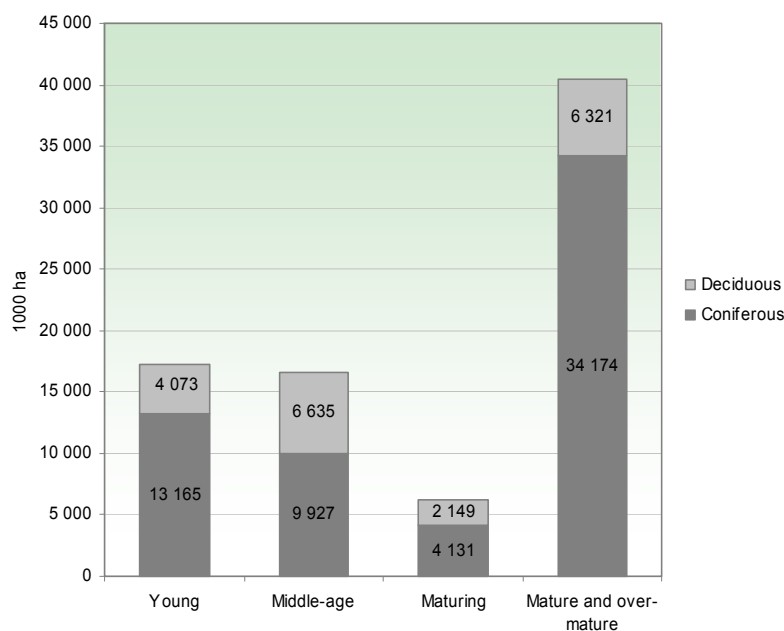


Figure 8. Age-class distribution in forests governed by the Ministry of Natural Resources in Northwest Russia in 2003. (Source: Lesnoy fond Rossii 2003)

Table 4. Development-class structure and share of exploitable forests in forests managed by the Ministry of Natural Resources in 2003.

Region	Young	Middle-age	Maturing	Mature and over mature	Total	Exploitable forests		
						Total	Coniferous	Deciduous
million m ³								
Russian Federation	3,635	18,323	10,379	42,154	76,060	39,630	28,302	11,185
Northwest Russia	491	1,809	1,055	5,475	8,830	6,384	4,685	1,700
Arkhangelsk region	100	377	135	1,616	2,227	1,611	1,386	225
Kaliningrad region	6	23	6	5	40	32	10	22
Republic of Karelia	126	258	132	424	940	731	649	83
Republic of Komi	104	458	239	2,146	2,948	1,943	1,584	359
Leningrad region	40	152	164	265	622	452	281	170
Murmansk region	18	57	13	141	229	90	81	10
Novgorod region	29	157	154	266	606	479	166	313
Pskov region	13	57	48	56	174	136	70	66
Vologda region	57	269	163	556	1,045	911	457	453

(Source: Lesnoy fond Rossii 2003)

4 Forest Certification

4.1 Forest Certification Schemes

In Russia, two forest certification systems based on voluntary membership are being developed in parallel. In the past, forest administration pursued a system where all forests must be certified, but the programme was abandoned due to its failures in meeting international requirements as well as because of lack of resources.

The National Council of Forest Certification in Russia, founded in 2003 by an initiative group under the Ministry of Natural Resources, and the National System of Voluntary Forest Management Certification in Russia, founded in 2000 by the Union of Timber Merchants and Timber Exporters of Russia have been preparing forest certification standards independently from one another. In April 2005, the leaders of the councils signed up an agreement for founding a joint coordination centre. The objective of the centre is to represent Russia in PEFC (Programme for the Endorsement of Forest Certification schemes), where each nation may be represented by one organisation only. Establishing a joint representation organisation may hasten the process of completing the forest certification system in Russia as well as the process of getting the standards internationally accepted.

The slow progress in the creation of the national certification system has partly been due to the uncertainty regarding the generally approved requirements and standards for voluntary systems, and whether Russian exporters of timber and wooden products will benefit more from certification standards based on FSC (Forest Stewardship Council) or PEFC system. The FSC certification scheme system is being supported by WWF International and Greenpeace in co-operation with local NGO's from several regions (for example in Komi, Pskov and Krasnoyarsk). Altogether 27 certificates, covering 8.92 million hectares, have been awarded in Russia (situation as of the 1st of June 2006). In each case the certifications process has been conducted by a foreign certification enterprise and in all of them a standard based on FSC's principles on sustainable forestry has been applied. Certificates have mostly been sought by *leskhoz*es and logging enterprises.

4.2 Verification of Wood Origin

The objective of verification is to reliably track the origin of timber throughout the different stages of timber production, transportation and processing. In June 2006, 36 Russian enterprises possess a FSC chain-of-custody certificate and as a result, they are entitled to use the FSC trademark on products that are produced of timber harvested in their certified forests.

Additionally Russia has been in close collaboration with both the EU and the World Bank to fight against illegal logging and its associated trade. Co-operation with the EU is mostly linked with the Forest Law Enforcement, Governance and Trade (FLEGT) Action Plan that contains a proposal for a voluntary licensing scheme for imported timber by which the chain-of-custody can be verified by the EU.

5 Education and Research

5.1 Education on the Field of Forestry

Vocational education is provided by technical schools of secondary level and other similar institutions (*lesotekhnicheskaya shkola*). This education prepares students for tasks typical of specific occupational titles and pupils graduate as forest workers or logging machine operators, for example. Currently two forest-technical schools are in operation in Northwest Russia; one in Chalna in the Republic of Karelia and the other in Obozersk in Arkhangelsk region (Table 5).

Table 5. Educational establishments in Northwest Russia.

Vocational schools	Obozersk Forest Technical School, Arkhangelsk region Shuisko-Vidansky Forest Technical School, Republic of Karelia
Intermediate vocational schools	Arkhangelsk Forest Technical College, Arkhangelsk region Cherepovets Forest Mechanical Institute, Vologda region Lisino Forest College and Training Leskhoz, Leningrad region Petrozavodsk Forest Technical Institute, Republic of Karelia Uhta Forest College of Industry and Economics, Republic of Komi Velikie Luki Institute of Forestry, Pskov region Vytegorsky Forest Technical College, Vologda
Higher education establishments	Arkhangelsk State Technical University, Arkhangelsk region Forest Engineering Faculty of the Petrozavodsk State University, Republic of Karelia St. Petersburg Forest Technical Academy, St. Petersburg Syktyvkar Forest Institute, Republic of Komi (branch of FTA in St. Petersburg) Ukhta State Technical University, Republic of Komi

Intermediate occupational institutions (*college* or *tekhnikum*) educate technicians majoring in timber harvesting and timber processing technologies, as well as in fields of forestry and management of park woodlands. Additionally, intermediate education is provided by polytechnic institutions. One may apply for an intermediate occupational institution after completing elementary school, vocational school or upper secondary school. Those that pass either the vocational or the upper secondary school may complete the intermediate studies in less time than the ones who have completed elementary school only. Intermediate education prepares for occupational tasks of an expert and in Northwest Russia seven institutions provide forestry related intermediate education under the Ministry of Education and Federal Forest Agency.

Highest level education is provided by universities and academies, which educate experts for the needs of both the public and the private sector. Currently a typical title for a university graduate is engineer. However, Russian occupational titles are slowly being changed to correspond with the European titles and the St. Petersburg Forest Technical Academy has been the first forestry field university in Russia to implement Bachelor's and Master's degree titles.

Further education is provided by vocational schools, centres of continuing education and institutes that have obtained the necessary licence. Further education of employed professionals is the responsibility of the employer.

5.2 Research on the Field of Forestry

Organisations engaged in forest research may be divided into three categories:

- Research institutes subordinate to the Ministry of Natural Resources
- Research institutes of the Russian Academy of Sciences
- Universities

In Northwest Russia research institutes subordinate to the Ministry of Natural Resources are the Northern Research Institute for Forestry (SevNIILH) in Arkhangelsk and the St. Petersburg Forest Research Institute (SPbNIILH). Research in these institutes is often concentrated on solving certain tangible forest sector related problems according to profiles assigned by the Ministry. The Northern Research Institute for Forestry is the leading applied research institution in European North of Russia and its objective is to enhance the production and utilisation of northern forests by, for example, investigating forest regeneration and intensified forest utilisation. The St. Petersburg Forest Research Institute, on the other hand, is specialised in southern taiga forests and its main fields in research include forest fire suppression, forest land draining and landscape management.

The Russian Academy of Sciences has traditionally been the leading institution for conducting basic research in natural sciences. Although only one institute in Northwest Russia, the Forest Research Institute of Karelian Research Centre, concentrates purely on forests, forestry related research is also carried out in other institutions such as the Institute of Biology in the Komi Research Centre, the Northern Institute of Ecological Problems in Industry (IPES) in Apatity and in the Komarov Botanical Institute in St. Petersburg. The Forest Research Institute of Karelian Research Centre is specialised in studying the structure and dynamics of forest ecosystems, tree physiology and forest soil sciences. Economic forestry related research is practiced in the Institute of Economics in the Karelian Research Centre, for example.

In recent years, universities' contribution to research has been minor with the exception of producing theses. Russian universities have traditionally emphasised tuition, instead of research, more than their counterparts in Western Europe and the recent economic hardship has strengthened this trend. Remuneration received from tuition is significantly greater compared to that of research, which makes research work financially unattractive for teachers.

Ever since the collapse of the Soviet Union, Russian forest research has struggled as a result of severe financial restrictions, which has led to a decay in the physical infrastructure, a decrease in the number of scientists and decline in quantity and quality of research. Currently a reorganisation of research institutes is under way and it may affect the total number of them.

6 Forest Regeneration

6.1 Natural and Artificial Regeneration

Of annually regenerated forest land, 70–80% is done by employing methods to encourage natural regeneration. Natural regeneration may be achieved by retaining undergrowth or second tree storey, leaving seed-trees on the felling site, or by using strip, increment or selection felling. In case no viable undergrowth occupies the felling site, natural regeneration is preceded by soil preparation.

Five years after felling or soil preparation, the site is checked for successful regeneration. Both possible undergrowth and all viable saplings that are 2 years of age or older and that have been naturally generated, are taken into consideration in an inventory. In a naturally generated sapling pine stand, the recommended number of saplings is 3 000–4 000 stems per hectare. Areas are considered regenerated if they hold a sufficient amount of viable saplings that fulfil the quality requirements. If the restocking has been found to be inadequate, then the area is degraded to a category of ‘area to be regenerated’.

In the areas where generating an economically valuable naturally born seedling stand is not possible, artificial regeneration is performed either by planting or sowing. The amount of planted and sowed sites varies significantly from region to region, but it has never exceeded 30% of the total harvested area, not even during the most intense years of artificial regeneration. Although the results of artificial regeneration are greatly dependent on the natural conditions of the area as well as the methods chosen, a strong correlation between a successful regeneration and the economic state of the zone has also been found.

Artificially regenerated sites are inspected by conducting a field inventory in one-year-old and three-year-old seedling stands. During the inventory the land area of the viable seedling stand in comparison to regenerated land area as well as the percentage of living saplings of all planted saplings are being defined. Additionally, well stocked areas are being categorised as regenerated and reasons for possible failure in regeneration are being defined. Two-year-old stands are inspected for their condition and possible need for supplementary planting.

In 2002, 890 000 hectares of Russian forest were regenerated naturally or artificially, whereas, during the same year, the land area of clear fellings comprised of 610 000 hectares. In 2003, the regenerated land area was 830 000 hectares (Table 6). In Northwest Russia, one quarter of annually regenerated land area is regenerated by planting or sowing and the remaining three quarters of the area is left to be regenerated naturally (Figure 9). Regional variation, however, is significant and in Leningrad and Pskov regions, for example, the share of artificial regeneration is greater than that of natural regeneration (Table 6).

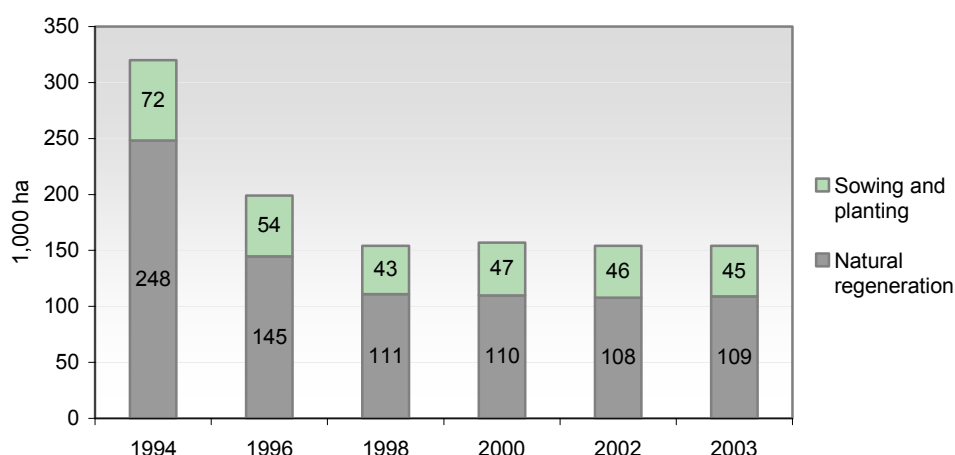


Figure 9. Forest regeneration in forests governed by the Ministry of Natural Resources in Northwest Russia in 1994 - 2003. (Source: Ministry of Natural Resources)

Table 6. Forest regeneration in 2003.

Region	Forest regeneration in total	Natural regeneration	Artificial regeneration
	1,000 ha		
Russian Federation	834	601	233
of which			
Ministry of Natural Resources	769	563	206
Northwest Russia	154	109	45
Arkhangelsk region	42	34	8
Kaliningrad region	0,7	0	0,7
Republic of Karelia	22	12	10
Republic of Komi	37	35	2
Leningrad region	14	5	9
Murmansk region	3	2	1
Novgorod region	11	6	5
Pskov region	2,5	0,5	2
Vologda region	21	15	6

(Source: Ministry of Natural Resources)

During recent years, ever since the decline in annually regenerated land area in the early 1990s, the area of forest regeneration has stayed roughly the same. Although regeneration is currently one of the *leskhoz*'s duties, the new Forest Code, currently being compiled, would delegate this obligation to the forest users.

Although ever since the 1970s the area of forest regeneration has regularly exceeded the area of annual clear felling, forest regeneration in Russia is problematic. Of the Russian forest land, 12%, i.e. 100 million hectares is treeless and of which over three quarters is deforested regeneration areas that are either waiting to be regenerated or where regeneration has been unsuccessful. In Northwest Russia, the share of treeless forest land is only 2%, i.e. 1.7 million hectares.

Currently the greatest obstacle for conducting silvicultural operations and especially forest regeneration is insufficient funding. In the past, the federal subjects were responsible for

financing silvicultural operations, but due to amendments to the Forest Code in early 2005, the funding for silviculture is now to be covered by the federal budget. In 2002, the budget requirement was 4.8 billion roubles of which only 2.4 billion was acquired; 45% of which came from the subjects to the Federation, 1% from the federal budget, 2% from the municipalities and 52% from outside the public sector such as income from intermediate fellings performed by the *leskhoz*es.

6.2 Production of Seeds and Seedling Plants

In Russia, collecting seeds is the responsibility of the *leskhoz*es. Annually about 700 tonnes of seeds are collected from over one hundred tree and shrub species (Figure 10). Over 11% of the seeds are collected from permanent plots that include plus trees¹, inspected seed orchards and resorts established for preserving genetically rare stands. In 2003, the seed reserves of the main tree species were sufficient to meet the demand for the whole of Russia.

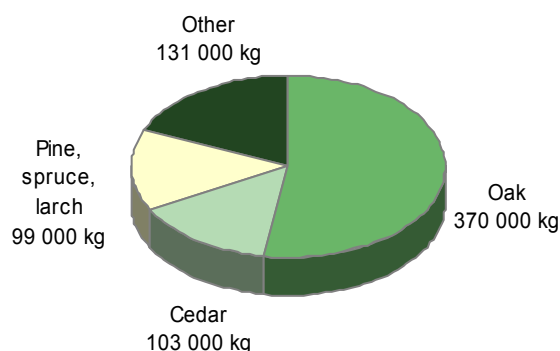


Figure 10. Seed collection with regard the tree species in Russia in 2002. (Source: VNIILM)

In Russia, seed collection is coordinated by Tsentrlessem, a state owned organisation that prepares seed forecasts, gives instructions on collecting, handling and storing seeds as well as is responsible for the necessary supervision. Throughout Russia, 34 seed stations operate subordinate to Tsentrlessem. In addition, there are five seed breeding centres and 25 *leskhoz*es specialised in seed production.

For seedling plant production there are 1 300 permanent nurseries in Russia, but additional temporary nurseries are, if required, established to fulfil the demand of remote and/or vast regeneration sites. The total acreage of the seedling plant nurseries is about 23 000 hectares. The nurseries are either owned by the *leskhoz*es, or they may be independent enterprises, in which case they usually provide material for several *leskhoz*es.

Annually in Russia, 1 300–1 500 million tree or shrub seedling plants, of which the majority is pine (*Pinus sylvestris*), are produced to meet the demand of forest regeneration. Despite the decreasing trend in seedling plant production, the volume has been sufficient for annual plantings (Figure 11). In Northwest Russia the seedling plants are mostly produced in the Republic of Karelia and in the Leningrad and Arkhangelsk regions (Figure 12).

¹ A phenotype judged (but not proved by test) to be unusually superior in some quality or quantity, e.g. exceptional growth-rate, desirable growth habit, high wood density, exceptional apparent resistance to disease and insect attack or to other adverse environmental factors.

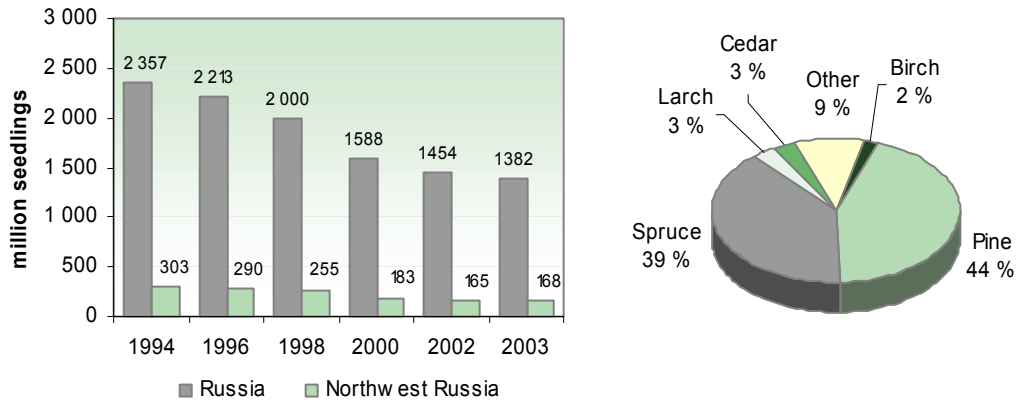


Figure 11. Tree sapling production in 1994 – 2003 (left) and production with regard the tree species in 2002 (right). (Source: Ministry of Natural Resources)

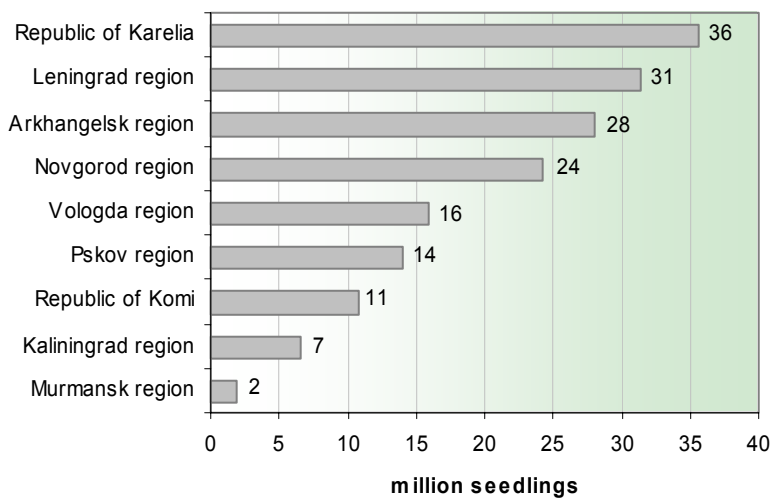


Figure 12. Seedling production in Northwest Russia in 2003. (Source: Ministry of Natural Resources)

7 Silviculture

The objectives of the silvicultural actions (*ukhod za lesom*) are to improve forest productivity, manipulate tree species composition and to prevent diseases from spreading. In Russia, silviculture includes intermediate fellings, tending of saplings, forest fertilisation, draining and pre-emptive actions taken towards forest fire prevention. All actions aiming at improving seedling stands or forests belong to the state.

7.1 Seedling Stand Management

In 2002, the tending of seedling stands covered about 596 000 hectares of Russian forest land. Of all the tended seedling stands 93% (555 000 hectares) belonged to forests subordinate to the Ministry of Natural Resources (Figure 13). In Russia manual clearing with brush knives and axes is still the most common practice to tend seedling stands and for example in 2002, only 42% of seedling stand management was performed by powered clearing saws. The recommended number of saplings after seedling stand management is, depending on the tree species, 2 500–3 000 stems per hectare.

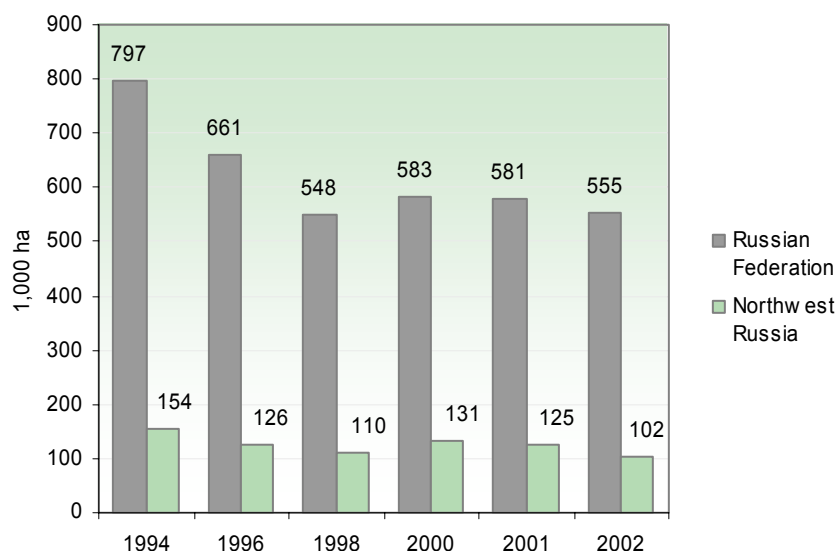


Figure 13. Tending of seedling stands in forests governed by the Ministry of Natural Resources in 1994 - 2002. (Source: Ministry of Natural Resources)

Seedling stand management is divided into two parts; cleaning (*osvetlenie*) and thinning of the sapling stand (*prochistka*). Cleaning aims at manipulating the tree species composition as well as improving the growing conditions and quality of the main tree species. Cleaning is conducted, depending on the tree species, site factors and natural conditions, before the stand is 5-, 10-, or 20-years of age. Thinning of the sapling stand is performed after the cleaning but before the stand turns 10-, 20- or 40 years of age. Recommended yield in seedling stand management depends on the tree species composition and site factors being at the maximum 25–40% of the original density of the stand. The objectives are to improve the stem form of individual trees by regulating the growing conditions and the stand density as well as to manipulate the tree species composition.

7.2 Forest Fertilisation and Drainage

Although a great deal of research on the impacts of forest fertilisers in forest growth has been conducted in Russia, in practice the utilisation of fertilisers has been relatively limited.

According to the national forest inventory, over 3.2 million hectares of Russia's forest land has been drained. The most intensive period for forest draining was from the 1950s until the 1970s, when draining was mostly conducted in the European parts of Russia and to some extent also in West-Siberia. The most common targets for draining were paludified coniferous forests on the area of intensive forest utilisation, boggy clear-felling sites and surroundings of population centres. The Republic of Karelia has been effective, even when measured on the Russian scale, in draining its forests; 20% of the Russian drained forest land is located in Karelia.

Due to the economical distress after the collapse of the Soviet Union, forest draining projects have not received any funding. Any drainage carried out has almost solely been aimed at maintaining the already existing drainage systems and they have been funded mostly by the *leskhoz*'s own budget. Lack of sufficient funding has led to a situation where, according to estimates, 900 000 hectares of forest land are threatened again by paludification. Furthermore, forest draining has not been taken into account in the Concept for Future Development of Forestry, and thus the prevailing situation is not expected to improve in the near future.

7.3 Intermediate Fellings

In Russian forestry a division between final fellings (*glavnye rubki*) and intermediate fellings (*promezhutochnye rubki*) is made and the latter includes tending of seedling stands. Depending on the age of the stand and the objectives of the forest management, intermediate fellings are categorised as follows:

Seedling stand management (*osvetlenie i prochistka*): See chapter 7.1.

Thinning of young stands (*prorezhivanie*): The objective is to create optimal conditions for the growth of the best trees in a stand. Underdeveloped trees and deciduous trees that interfere with the development of valuable coniferous individuals are removed. Thinning of young stands is carried out in coniferous and mixed forests of the central taiga when the stand is 20–40 years of age and in the northern taiga forests when the stand is 31–50 years old. The recommended maximum yield, which depends on the tree species composition and site factors, is 25–40% of the stand density.

Thinning of maturing stands (*prokhodnaya rubka*): The objective is to choose the individual trees that are to be grown until the final felling, and by doing this create the best possible conditions for their development. In coniferous and deciduous forests thinnings may be performed as late as 20 years or 10 years prior to final felling, respectively. The recommended maximum yield is 25–30% of the stand density.

Sanitary fellings (*sanitarnaya rubka*): The objective is to remove trees infected by fungi or affected by insects. Sanitary fellings are also performed in forests damaged by storms or snow. In stands over 40-years of age, sanitary fellings may be performed only if felling exceeds 25% of the stock volume and sanitary felling may not be combined with any other type of felling during the next 2–3 years.

Renewal thinning (*rubka obnovleniya*): The objective is to rejuvenate the stand and to improve its sanitary condition while maintaining and emphasising its function as giving shelter and protection, especially to water sheds. Renewal thinnings are performed in middle-age, mature and over-mature forests where final fellings are not allowed. The main emphasis is in removing over-matured, damaged and infected trees. The recommended maximum yield depends on various factors such as the tree species composition as well as the density and age structure of the stand. Among water-body shelterbelt forests the yield in renewal thinnings varies between 20–35% of the density.

Reformation felling (*rubka pereformirovaniya*): The objective is to radically alter the composition of tree species in the stand. Reformation felling is used when transforming deciduous forests with coniferous undergrowth or other tree storey to coniferous forests.

In 2002, final fellings and intermediate fellings were performed on an area equal to two million hectares (Table 7). Intermediate fellings are mostly conducted in group I and II forests, where limitations are set for forest utilisation. Intermediate fellings, excluding seedling stand management, comprise 45% of the land area and 18% of the volume of all the fellings performed in Russia. In Northwest Russia, the figures are 23% and 9%, respectively. During the past ten years, the annual average yield from intermediate fellings has remained at the same level; in 2003, 27 million cubic metres in the whole of Russia and four million cubic metres in Northwest Russia (Figure 14). Thinnings comprise about one third of all the intermediate fellings (Figure 15) and their profitability varies between regions.

Table 7. Final and intermediate fellings in Russia in 2002.

	Russian Federation	Northwest Russia
	1,000 ha	
Final fellings	743	233
Seedling stand management	596	108
Thinning of young and maturing stands	247	36
Sanitary fellings	273	16
Renewal and reformation fellings	112	17

(Source: Ministry of Natural Resources)

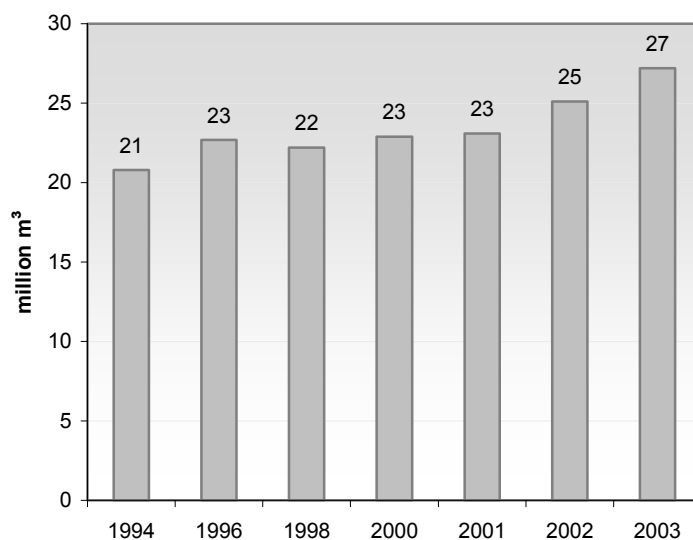


Figure 14. Trends in removals from intermediate fellings in Russia in 1994 - 2003. (Source: Ministry of Natural Resources)

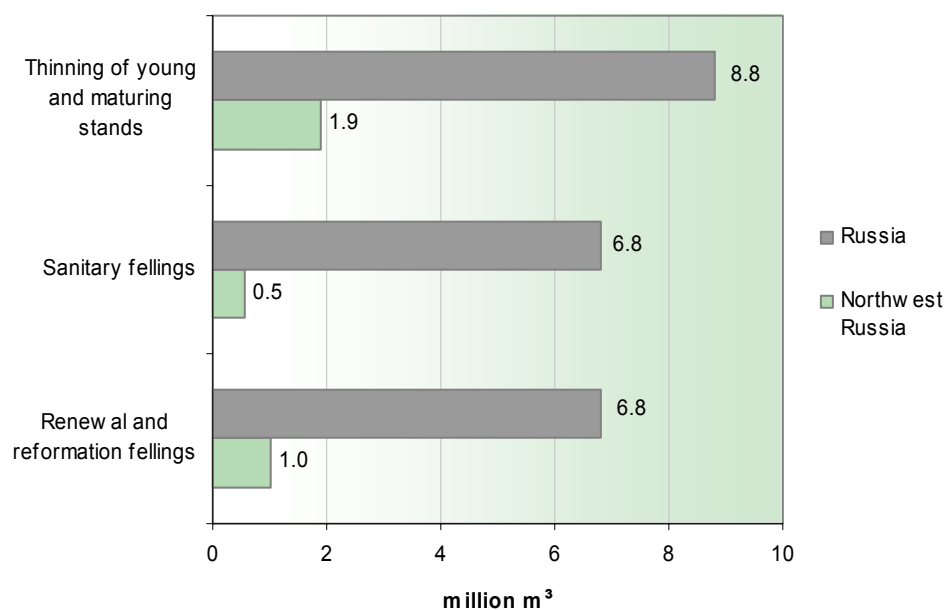


Figure 15. Intermediate fellings in Russia in 2002. (Source: Ministry of Natural Resources)

Traditionally intermediate fellings have been performed by the *leskhoz*es, which, according to the Forest Code, are not allowed to conduct final fellings. Income acquired from the intermediate fellings is an important addition to the funding the *leskhoz*es receive from the Federation. During recent years, the interest towards thinnings has increased among the logging companies as well, and as Scandinavian technology is becoming ever more common, the logging machinery gradually improves the efficiency of the thinning process. However, not only technical aspects but also the lack of adequate domestic market and high harvesting costs in comparison with final fellings has hindered performing commercial thinnings.

8 Nature Conservation

8.1 Organising Nature Conservation

Conservation areas play an important role in nature protection in Russia. In the early 1900s, the development of a nature conservation scheme was started and currently its core is specifically protected areas (*osobo okhranyayemye prirodnye territorii*). According to Russian terminology, protected areas are in a natural state and they have special features from the standpoint of nature conservation. Such features are, for example, protection of forest site types, protection of forests that belong to different protection categories, water protection zones, areas protecting drinking water, wild animal protection areas and erosion prevention.

In accordance with the structure of the Russian Federation, legislation concerning the establishment and management of nature conservation areas is distributed on two levels of the administrative structure. The Federation and regions are jointly responsible for taking care of environmental issues and nature conservation. Thus, legislation concerning nature conservation may be prescribed not only by the Federation but also by regions. However, regional stipulations must be in harmony with the federal legislation.

In Russia, information on threatened fauna and flora as well as their habitats is collected in so-called Red books where the protection level of listed species and their habitats is scientifically justified. Red books are usually published jointly by research institutes and the regional administration. The Red book becomes a legal document in Federal administration right after it has been approved by the administration of the region in question. After the Red book has been approved, the recommendations mentioned in the Red book for protecting threatened species and their habitats, must be taken into consideration by the authorities that plan land use. Red books have been published ever since Soviet times in the 1970s.

8.2 Nature Conservation Areas

In the beginning of 2003, Russia had 230 federal nature conservation areas covering 2.6% of the total land area. When all the regional and local level conservation areas are taken into account the number of conservation areas is over 15,000 and their share of the total land area 11%. The most significant of the Russian nature conservation areas are nature reserves and national parks. Nature reserves have a long tradition in Russia and they are the most strictly protected nature conservation areas. The nature reserve network has been developed for over 80 years and currently it comprises of 100 nature reserves. National parks, however, are a relatively new phenomenon in Russia and the first of them was established fairly recently, in 1983. The protection areas of Northwest Russia are presented in Table 8.

Nature conservation areas may be categorised according to their administrative bodies as federal, regional or local level protection areas. The federal statute on specially protected conservation areas is as follows:

Nature reserves (*gosudarstvennye prirodnye zapovedniki*): Nature reserves are completely outside commercial utilisation. The objectives are to protect original ecosystems and genetic diversity of flora and fauna that is typical to the area or is otherwise rare.

National parks (*natsionalnye parki*): National parks are territories with ecological, historical or aesthetic values. They are established to serve the purposes of nature protection, education, research, culture and regulated tourism. With regard to utilising natural resources, national parks are restricted with various limitations.

Nature parks (*prirodnye parki*): Nature parks are provincial equivalents of national parks. They are territories that are intended for educational or recreational purposes or preserving nature values, and that embody ecological or aesthetic features or precious landscape.

Wildlife reserves (*gosudarstvennye prirodnye zakazniki*): Federal wildlife reserves are valuable land or water areas where human interference has been restricted in order to protect an ecosystem, a natural habitat or a specific plant or animal species. Wildlife reserves are divided into categories such as game protection areas, geological areas and plant protection areas.

Natural monuments (*pamyatniki prirody*): Natural monuments are unique and irreplaceable objects of either biotic or abiotic nature (e.g. a landscape), that deserve to be protected due to their scientific, cultural or historical importance.

Arboretums and botanical gardens (*dendrologicheskie parki i botanicheskie sady*)

Land areas with remedying and health promoting qualities (*lechebno-ozdorovitelnye mestnosti i kurorty*): Soil resources or mineral water springs that are believed to have health promoting features are included in this category.

Table 8. Conservation areas in Northwest Russia.

Conservation area	Location	Year of founding	Area, 1,000 ha
NATURE RESERVES (<i>zapavednik</i>)			
Darvinsky	Vologda region, Jaroslavsk region	1945	113
Kandalakshsky	Murmansk region, Republic of Karelia	1932	71
Kivach	Republic of Karelia	1931	11
Kostomukhshsky	Republic of Karelia	1983	48
Laplandsky	Murmansk region	1930	278
Nenetsky	Nenets Autonomous Area	1997	313
Nizhne-Svirsky	Leningrad region	1980	42
Pasvik	Murmansk region	1992	15
Pechoro-Ilychsky	Republic of Komi	1930	721
Pinezhsky	Arkhangelsk region	1974	52
Polistovsky	Pskov region	1994	38
Rdeysky	Novgorod region	1994	37
NATIONAL PARKS			
Kenozersky	Arkhangelsk region	1991	140
Kurshskaya Kosa	Kaliningrad region	1987	7
Paanajarvi	Republic of Karelia	1992	105
Russky Sever	Vologda region	1992	166
Sebezhsky	Pskov region	1996	50
Valdaisky	Novgorod region	1990	159
Vodlozersky	Arkhangelsk region, Republic of Karelia	1991	468
Yugyd Va	Republic of Komi	1994	1,892
STATE WILDLIFE RESERVES (<i>zakaznik</i>)			
Franz Joseph land	Arkhangelsk region	1994	4,200
Kanozersky	Murmansk region	1989	66
Kizhsky	Republic of Karelia	1989	50
Swamp "Mshinskoe boloto"	Leningrad region	1982	61
Murmansky Tundrovyy	Murmansk region	1988	295
Nenetsky	Nenets Autonomous Area	1985	309
Olonetsky	Republic of Karelia	1986	27
Remdovsky	Pskov region	1985	65
Siysky	Arkhangelsk region	1988	43
Tulomsky	Murmansk region	1987	34

(Source: Protected Areas in Russia, 2003)

9 Multiple-use of Forests

9.1 Utilisation of Non-wood Forest Products

The Forest Code of the Russian Federation ensures every Russian citizen a free access to forests. Citizens are allowed to collect, excluding threatened species, wild fruit, berries, nuts, mushrooms, herbal remedies and resin for personal consumption. The Forest Code also guarantees a right to hunt and fish, but to practice these activities one must obtain the necessary permits. In Russia, the multiple-use of forests has a significant role and an essential part play the non-wood forest products (hereafter NWFP's) such as nutritional and medicinal plants, raw-material for chemical industry (tanning agents, dyeing pigments), fodder and honey.

In Russia collecting, researching, utilising and industrial processing of useful plants is more popular than in the Western countries. In the Kostroma region, for example, breeding experiments for cranberries (*Vaccinium oxycoccos*) and lingonberries (*Vaccinium vitis-idaea*) have been conducted for over 20 years. The most productive varieties have been registered and research is being done concerning their industrial cultivation. The core research institute in this field is the All-Russia Institute for Silviculture and Mechanisation (VNIILM) and in addition to conducting research on productivity; it studies also the domestic and international demand for collected products. Furthermore, VNIILM compiles maps on NWFP's. During the period 1967–1990, in order to enhance collecting NWFP's, the *leskhoz*s were entitled to acquire money from collecting and processing NWFP's and use the revenue for their own purposes. As a result, an increase in volumes of annually collected and processed berries was seen in, for example, Vologda region and to some extent, in Arkhangelsk and Murmansk regions. Mushrooms, on the other hand, were collected most in the Republic of Komi. During recent years, the situation with regard the *leskhoz*s has changed dramatically (Table 9) as the volumes of collected and processed products have decreased due to lack of financial resources, high interest rates, transportation tariffs and consumers' poor buying capacity.

Table 9. Collection and processing of non-wood forest products in Russian *leskhoz*s.

	1993	2002
	tonnes	
Berries	2,442	223
Mushrooms	383	38
Nuts	244	23
Birch sap	4,360	255
Medicinal herbs and raw material for chemical industry	982	428

(Source: Ministry of Natural Resources)

9.2 Berries, Mushrooms and Birch Sap

Although collecting berries and mushrooms for personal consumption and for sale is common, most of the annual crop is left in the forests. The total weight of the crop of most common berries; cranberry, lingonberry and blueberry are estimated to be over 7 million tonnes and mushrooms' 4 million tonnes (Table 10). According to Russian experts, the exploitable yield of berries and mushrooms is about 50% of the total crop, of which, according to estimations, only 10–40%, depending on the area, is collected.

Table 10. Gross yield of non-wood forest products in 2002.

	Russian Federation	Northwest Russia
	1,000 tonnes	
Berries	8,840	924
Lingon berry	3,010	163
Blue berry	2,619	346
Cranberry	1,600	308
Bog blueberry	1,014	41
Cloudberry	454	49
Raspberry	144	16
Mushrooms	4,325	497
Nuts	3,593	0,8
Birch sap	875,505	118,540

(Source: Ministry of Natural Resources)

For many Russians, wild berries and mushrooms are a significant supplement to their diet and, especially during the winter time, an important source of vitamins. Furthermore, at present, offering NWFP's for sale is an important source of additional income. However, hardly any statistics are available on products collected for private consumption or direct sale. In addition to unofficial trade between private citizens, competition between enterprises selling NWFP's occur also. During the peak season, numerous small and medium sized enterprises come up with trading points, where products from gatherers are bought and sold. However, there is no centralised purchasing system and thus the gatherers themselves take care of bringing their products to market. The volume of NWFP's in the market is dependent on the crop yield and thus varies annually; naturally the gatherers first satisfy their own consumption needs.

In addition to enterprises that collect berries and mushrooms, there are also enterprises that process and preserve the pickings. Such enterprises have a developed infrastructure and regular suppliers. Their high quality products are either sold domestically or exported. However, the majority of the enterprises operates without established network and focus on trading without processing the products, or processing is done on a small-scale. Semi-finished products are produced in only a few enterprises, instead collected products are mostly sold directly to the food supply, alcohol and medicine producers that process the products further. A number of foreign enterprises operate in Russia buying products for export.

Collecting birch sap is common in Russia. In addition to private consumption, sap is sold in industrially packed containers and further used as raw material for producing various drinks. Furthermore, sap is used as raw material by the cosmetic industry.

9.3 Medicinal Herbs and Raw-material for Chemical Industry

In Russia, over 600 plant species with medicinal significance are known. In allopathic medicine, 150 medicinal plants are used and registered in the governmental registration system. Of all the collected medicinal raw material as much as 70% are natural plants. The most important are currants (*Ribes spp*), raspberry (*Rubus idaeus*), buckthorn (*Hippophaë rhamnoides*) and rosehip (*Rosa spp*). The utilisation of medicinal plants is common in Russia (in comparison to Finland, for example) and public health service recommends medicine made of them as a supplement to synthetically produced drugs. Many of the plants used in traditional medicine grow in forests and therefore 65 conservation areas (*zakazniki*), where all the actions that might damage the

plant population are forbidden, have been established. In addition, regional registers on endangered species have been compiled.

The raw material collected in Russian forests for utilisation by the chemical industry is mostly tanning agents and dyeing pigments. In addition, pine forests are a source of resin, which is used in producing rosin and turpentine chemically. In the past, collecting resin was done on an industrial scale and thus forest areas were assigned for this purpose, however today the significance of resin collection has diminished. Resin is drawn from the stems of trees 5–15 years before felling.

9.4 Recreational Use of Forests

The recreational use of forests is mentioned in the Forest Code as one form of forest utilisation and it is being taken into consideration when forests are categorised into management groups. Forests surrounding cities and parks, for example, belong to group I, which is the most restricted of the forest management groups concerning forest utilisation. Recreational zones may be adjacent to nature conservation areas and various natural environments.

Traditionally, the recreational use of nature has been through the workers' holiday camps as well as children's and teenagers' resorts. Nowadays nature tourism is arranged by commercial agencies and it is closely related to services provided by nature conservation areas. The Republic of Karelia is one of the first regions in Russia where developing nature tourism is becoming a part of regional economy. Successful examples are the national parks of Paanajarvi and Vodlajarvi as well as Kostomukshsky nature reserve, where trekking trips and canoeing expeditions are arranged. An interest towards so-called ecological nature camps is also increasing. However, the amount of visitors in parks and reserves is restricted.

Regarding the demand, the options for mass tourism in nature resorts are limited. The demand for nature tourism in Northwest and North Russia has increased but the services and infrastructure have not kept pace with this demand. Furthermore, prices of the services are high compared to citizens' income level. In addition to traditional nature tourism, numerous Russian and foreign enterprises arrange fishing and hunting trips for wealthy customers.

10 Forest Planning and Inventory

10.1 Assessment System of Forest Resources

The assessment of the condition of the forests is based on the Forest State Account, Forest Resource Register, observation of forests, forest inventory and various surveys (Figure 16). Ever since 2002, the forest inventory based Forest State Account (*uchet lesnogo fonda*) has been conducted annually, prior to this the interval was five years. The Forest Resource Register (*lesnoy kadastr*) contains information such as the ecological and economical state of forests. Surveillance of the condition of forests includes monitoring: forest resources, forest sites, forest fires, areas contaminated by industry, radioactive material, etc.

The outcome of the inventory and planning is a forest management plan for a certain area and is thus the foundation for all the operations done in the forest. Conducting forest inventory and compiling forest management plans are the responsibility of the federal forest inventory and planning enterprises (*gosudarstvennoe lesoustroitelnoe predpriyatie*) that are financed and monitored by the Federal Forest Agency.

10.2 Forest Inventory

Forest inventory serves the following purposes:

- Collecting information on forests and their condition
- Creating and renewing information systems on forest resources
- Ascertaining the quality of silvicultural operations
- Documentation of forest inventory and the Forest State Account as well as production of forest maps
- Determining the volume of exploitable forest resources
- Compiling forestry plans for forest leaseholders
- Controlling illegal fellings

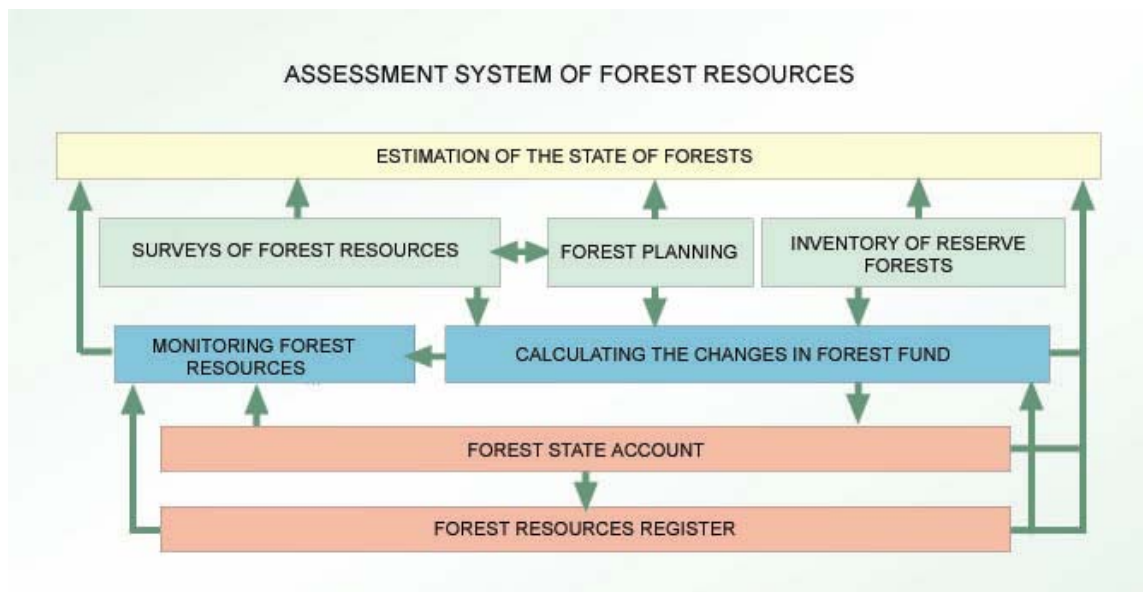


Figure 16. Russian system for the assessment of forest resources. (Source: Sevzaplesproekt)

Several methods are used for inventorying the forest. Remote sensing methods, which are based on image interpretation done in an office, are used only in inventorying reserve and inaccessible forests. This method, based on aerial and satellite photographs, is widely used in the northern parts of Russia, Siberia and Far-East where forest areas are homogenous. All the other methods, which were developed in the 1980s and 1990s, are combinations of remote sensing techniques and field inventory and are currently widely used in forest inventory. Methods based on satellite and aerial photographs were developed for inventorying young and mature stands, respectively. This method enables an analysis in comparison with previous satellite or aerial photography based inventory.

Most often, the inventory is started by marking out the stands with the help of aerial photographs. After this, the acquired information is supplemented by on-field ocular estimation. 60% of the Russian forest resources have been inventoried on-field, whereas the remaining area has been inventoried by using less precise methods such as the aerial or satellite photographs only or by ocular inventory taken from the air, a method popular in the 1950s and 1960s. These simple methods have traditionally been used in remote and inaccessible areas that have no significant commercial value. Annually, over 37 million hectares of forests are inventoried in Russia as a whole.

Data on forest inventories are kept in the *leskhoz*s and enterprises conducting the inventories. The *leskhoz*s are able to update the inventory data, which is stored in databases, digital maps and on paper (Figure 17). In principal, all the inventory data produced after 1998 may be found in digital format.

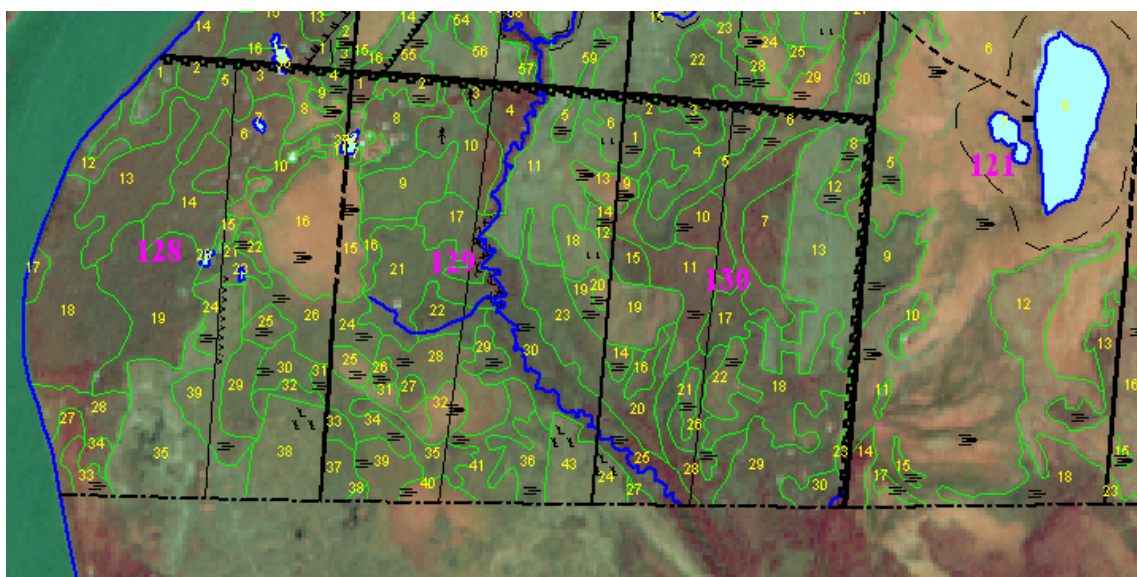


Figure 17. Digital forest inventory map placed on a satellite image. (Arkhangelsk Branch of the Northern State Forest Inventory and Planning Enterprise)

Every administrative unit in forestry (usually a *leskhoz*) is inventoried once every 10–12 or 15–20 years depending on its inventory category. The smallest forest management unit is a tree stand (*vydel*), which is comprised of homogenous forest with regard stand structure, age, density and other essential indicators. Stands form planning compartments (*kvartal*), which are rectangular and the length of the longer side varies from 0.5–4.0 kilometres. Borders of the planning compartments do not usually follow the borders of the stands and therefore a stand can belong to two or more planning compartments. The *kvartals* are segregated from one another by

lines running usually from north to south and from east to west. In remote areas, lines are marked by a marking hammer and no boundary lines are cut open. In order to be able to ascertain each kvartal, a pole with a number is erected in the crossing points of kvartal lines. The boundary lines of the *kvartals* serve as transportation routes and make mapping easier. The *kvartals* are parts of *lesnichestvos* that form the *leskhozoes*.

The most important indicators that are determined in the forest inventory are stand volume, age, site factors, basal area, mean stem diameter, mean height, number of stems per hectare as well as absolute and relative density of the stand. Except for the relative density (*otnositelnaya polnota*), which is the basal area of the stand in proportion to the basal area of an ideal stand (density 1.0), the Russian indicators correlate well with the system used in Finland. When calculating the stand density, all the living stems over 6.1 centimetres in diameter at breast height are included.

There are three inventory classes according to the required accuracy in inventories (Table 11). The first class comprises mostly of the group I forests as well as group II forests in the regions of intensive forest utilisation. The rest of the group II forests and protection zone forests where forest utilisation is less intensive belong to the second class. The third class comprises of group III forests and tundra forests.

Table 11. Inventory classes.

	I Class	II Class	III Class
Mean size of stand	3 - 6 ha	7 - 15 ha	16 - 35 ha
Size of kvartal	0.5 x 0.5 km	1.0 x 1.0 km	2.0 x 2.0 km
	1.0 x 0.5 km	1.0 x 2.0 km	4.0 x 2.0 km
	1.0 x 1.0 km		

According to previous studies, the currently used inventory methods in Russia underestimate the volume of growing stock in mature and over-mature forests by between 5–15%. On the other hand, the methods that were used in the past in the northern regions have overestimated the volume of stock by 30–50%. During recent years, the standard error on the aforementioned areas has decreased due to method development, being currently about 3%.

The forest maps based on aerial and satellite photographs (maps over tree stands and forest areas as well as thematic maps and forest inventory maps) are drawn from the basis of topographical maps, whose scales are 1:10 000–1:100 000 depending on the availability of the maps. Usually the aerial photographs are taken a year before the actual field inventory and, depending on the intended accuracy of the inventory, the photographing is conducted in scale 1:15 000, 1:25 000, 1:40 000 or 1:50 000 by using either monochrome or colour film.

10.3 Forest planning

Based on information acquired from forest inventories, the forest planning organisation compiles a 10–20 year plan (*lesoustroitelnyi proekt*) for each administrative unit in forestry such as *leskhoz*, national park, etc. According to the present Forest Code, the forest management plan is required for all the forestry related actions and their funding, without which all forest utilisation is forbidden.

Forest management plan includes sections such as:

- Description of the current condition of growing stock
- List of needed silvicultural measures
- Action plan for executing silvicultural operations
- Thematic maps

The *leskhoz*es execute the compiled plans and update their information in GIS-system whenever silvicultural measures are undertaken, fellings have taken place or natural disasters like forest fires occur. Federal forest inventory and planning enterprises monitor the execution of the plan and the quality of the actions taken by carrying out inspection visits in the *leskhoz*es.

Inventoried Russian forests and compiling forest management plans is the responsibility of thirteen state owned forest inventory and planning enterprises and their regional subdivisions. Nine of the enterprises operate in the European parts of Russia. The enterprises are funded by the Federal Forest Agency, which also defines

their duties. Forest planning enterprises most often operate in more than one administrative region (*oblast, republic*); for example the Northwest Russian planning enterprise operates in the Leningrad, Novgorod, Pskov and Murmansk regions. During the past five years, the Northwest Russian planning enterprise has inventoried about 3 million hectares per annum.

Forest inventory and planning enterprises in Northwest Russia:

Arkhangelsk Branch of the Northern Forest Inventory and Planning Enterprise (*Arkhangelskaya ekspeditsiya*), in Arkhangelsk

Karelian Forest Inventory and Planning Enterprise (*Karelesproekt*), in Petrozavodsk

Northwest Russian Forest Inventory and Planning Enterprise (*Sevzaplesproekt*), in St. Petersburg

Northern Forest Inventory and Planning Enterprise (*Sevlesproekt*), in Vologda

10.4 Assessment of the Inventory and Planning Systems

In 1997, the methods of National Forest State Account were improved as a result of reviewing the Forest Code. Despite the reviewing, criticism has been expressed especially regarding the method of implementation as both the forest inventory and the forest planning are the responsibility of the state owned enterprises, whereas no organisation is overseeing the quality of their work. According to some estimates, most of the recently compiled forest management plans do not fulfil the quality requirements. The effects of post inventory occurring natural processes, such as growth or tree mortality is not taken into account in the inventory. Neither is map archives utilised sufficiently.

Due to the aforementioned reasons, it has been envisioned that the traditional forest management plan would not remain as the only document directing the forestry related actions. It is likely that, as the forest leasing periods get longer, forest users will need more accurate and customer orientated forest planning thus creating a market for new forest planning enterprises.

11 Forest Utilisation

11.1 Allocating the Forest Use Rights

The right to utilise forest land may be given to a private person, physical or juridical, by the organisation responsible for administering forest resources (federal or regional administration). Currently, the length of the leasing period is up to 99 years. Forest utilisation may be categorised in short-term use rights (less than 1 year) and leasing. According to the current Forest Code, the rights to utilise forest land are allocated through competition. Currently approximately half of leases are made for long-term.

Short-term use rights refer to felling permits, which are issued through auctions. Short-term use rights and short-term leases are merely rights to perform logging, thus not binding the forest users to any silvicultural actions. The forest user has a right to harvest the forests according to the felling plan. In a case of misuse, the Federal Service for Inspecting the Utilisation of Natural Resources that monitors the forest management has a right to commence a process for cancelling the use rights or lease.

According to the new Forest Code, currently being formulated, the main form of forest use would be long-term leasing (10-99 years) and the leaseholders would be obliged to perform silvicultural duties such as forest regeneration. With regard to foreign enterprises, the new Forest Code will likely set limitations concerning the length of leasing periods.

11.2 Determining Forest Fees

Since spring 2005, setting forest fees (*lesnye podaty*) for stumpage sale timber has been the right of the Federal Forest Agency. In the past, forest fees (stumpage prices) were determined by the subjects' authorities according to minimum fees set by the Federation. Russia is divided into 86 forest fee zones, as setting one uniform stumpage price covering the whole of Russia is an impossible task due to variations in climate conditions, regional economy and forest management practices.

In determining the forest fees, an effort has been made to take into account the regional conditions of forest management, the demand and supply for timber products as well as the profitability of forestry. In addition to these factors, the tree species composition, timber quality and transportation distance affect the formulation of the stumpage price. Forest fees are used as a basis for determining the rent for leased forest land, initial prices in auctions and when selling timber for public utility associations such as educational institutions or for private citizens. From intermediate fellings, the fees are collected with discount. An example of a forest fee: a price for a cubic metre of spruce logs (top diameter > 25 cm) when transportation distance is 60.1–80 kilometres is 72.34 roubles in the Republic of Karelia, 72.40 roubles in Arkhangelsk, 54.10 roubles in Vologda and 97.22 roubles in Leningrad region (According to 1.4.2005 statute of the Ministry of Natural Resources).

11.3 Allowable Cut and Utilisation of Forest Resources

Of all the industrial round timber, 60% is logged in the forests situated in the European parts of Russia due to their better accessibility. Of all the Russian administrative districts, logging operations are concentrated especially in Northwest Russia, where over 50% of forest resources of European part Russia and two thirds of boreal forests are located. Northwest Russia produces over one third of all the industrial round timber in Russia (Figure 18). Thus far, the Arkhangelsk region has been the greatest logger in the administrative district of Northwest Russia and in 2003 it produced about 6% of all the Russian round wood.

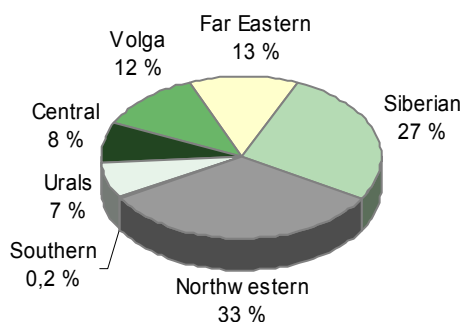


Figure 18. Production of merchantable wood in 2003 with regard the Russian federal districts. (Source: Calculated from the Rosstat statistics)

During recent years, the sustainable annual allowable cut (*raschetnaya lesoseka*) in Russia as a whole has been 560 million cubic metres. The volume of final fellings is determined by the allowable cut, which is the basis for planning forest management. The federal forest planning enterprises calculate the annual allowable cut (AAC) separately for each *leskhoz* and further for their forest groups and tree species. The AAC is determined according to principles of sustainable and economical forest utilisation and the volumes presented in it are not to be exceeded. Only final fellings are included in the AAC, whereas the annual allowable yields from intermediate and other fellings are calculated separately. The yield from annually executed final fellings in Russia is about 125 million cubic metres, which is only 23% of the AAC (Figure 19). In Northwest Russia 40% of the volume of AAC is harvested and the most intensive region is the Republic of Karelia where the rate is over 60% (Figure 20).

In addition to final fellings, 40–50 million cubic metres of timber is harvested in Russia (7 million in Northwest Russia) through intermediate and other fellings, such as clearing building sites, road areas or firebreaks (Table 12). The intermediate fellings include, in addition to thinnings, fellings that manipulate the stand composition. The share of intermediate and other fellings of all the fellings varies significantly from one region to another, for example in the Republic of Komi and Vologda region their share is rather small, whereas in Leningrad region it is significant (Figure 21).

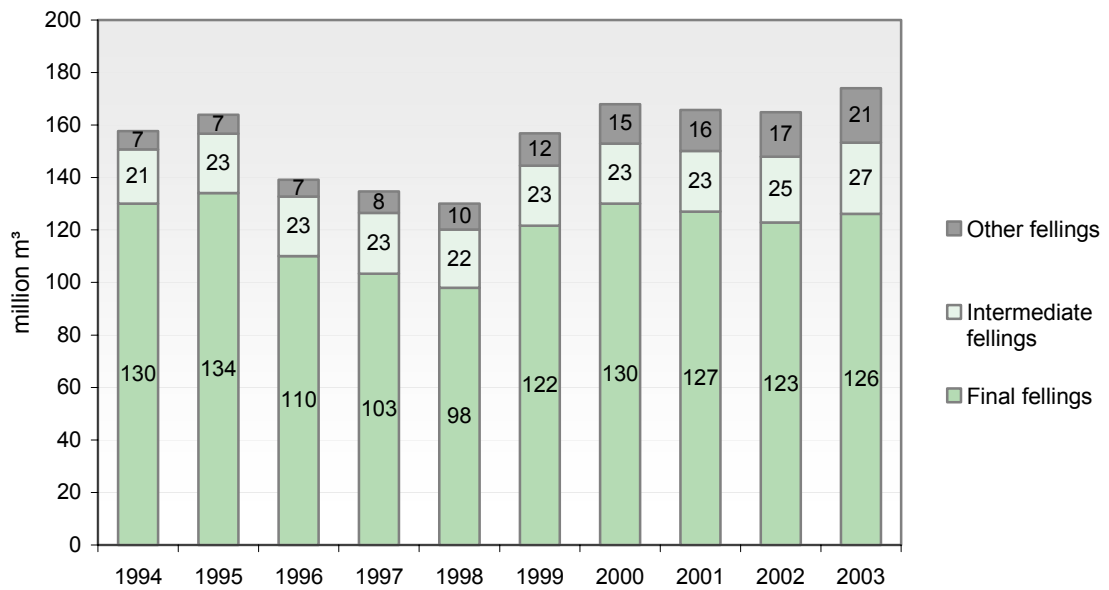


Figure 19. The trend in realised fellings in Russia in 1994–2003. (Source: Ministry of Natural Resources)

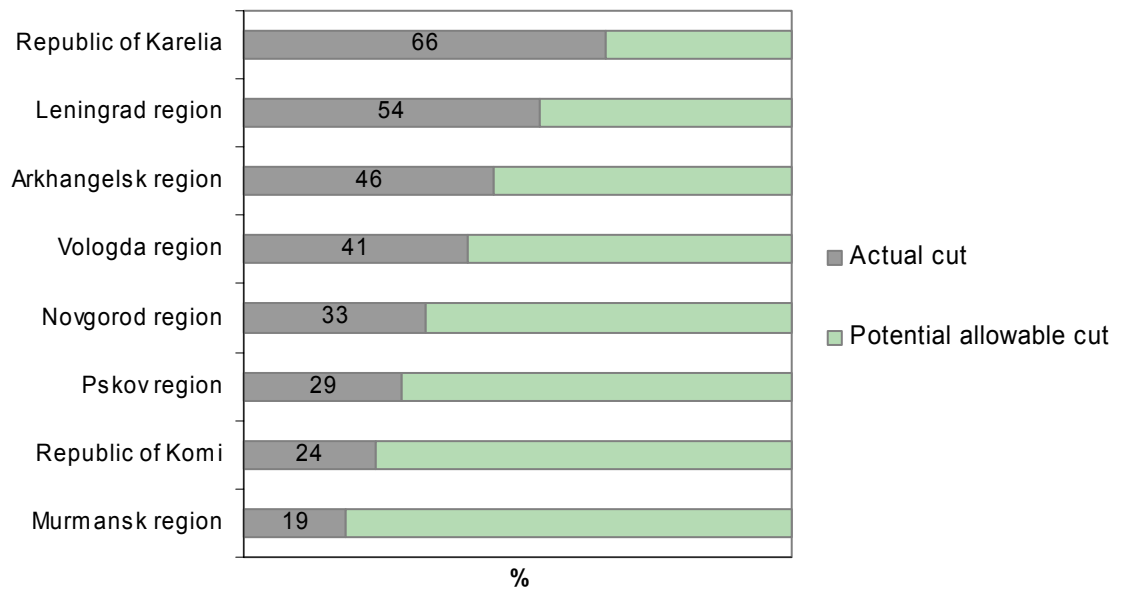


Figure 20. Actual cut in Northwest Russian forests that are governed by the Ministry of Natural Resources in 2003. (Source: Ministry of Natural Resources)

Table 12. Forest use in Russia in 2003.

Region	Final fellings		Intermediate fellings	Other fellings	Total
	Planned harvesting	Realised harvesting			
	million m ³				
Russian Federation *	559.2	126.1	27.2	20.8	174.1
of which					
Ministry of Natural Resources	515.9	112.7	21.6	18.3	152.6
Northwest Russia	89.7	35.5	3.6	3	42.1
Arkhangelsk region	19.7	9	0.9	0.2	10.1
Kaliningrad region	0.2	0.1	0.1	0.2	0.4
Republic of Karelia	9.2	6.1	0.6	0.4	7.1
Republic of Komi	26.1	6.3	0.3	0.2	6.8
Leningrad region	7.5	4	1.1	1.2	6.3
Murmansk region	0.7	0.1	0.04	0	0.1
Novgorod region	8.8	2.9	0.2	0.4	3.5
Pskov region	2.3	0.7	0.1	0.2	1
Vologda region	15.3	6.2	0.2	0.2	6.6

(Source: Ministry of Natural Resources)

*) The figures with regard the Russian Federation include the fellings performed in the forests governed by the Ministry of Natural Resources (96%) as well as fellings performed in the formerly entitled agricultural forests (3%). Forests formerly entitled as agricultural forests are currently governed by the regional administration (see Chapter 2.2). The volumes of timber harvesting, mentioned in Russian publicity, refer usually to the final fellings performed in forests governed by the Ministry of Natural Resources. Because of unambiguous definitions, the volumes of timber harvested may be divergent depending on the source of statistics (for example statistics published by various ministries).

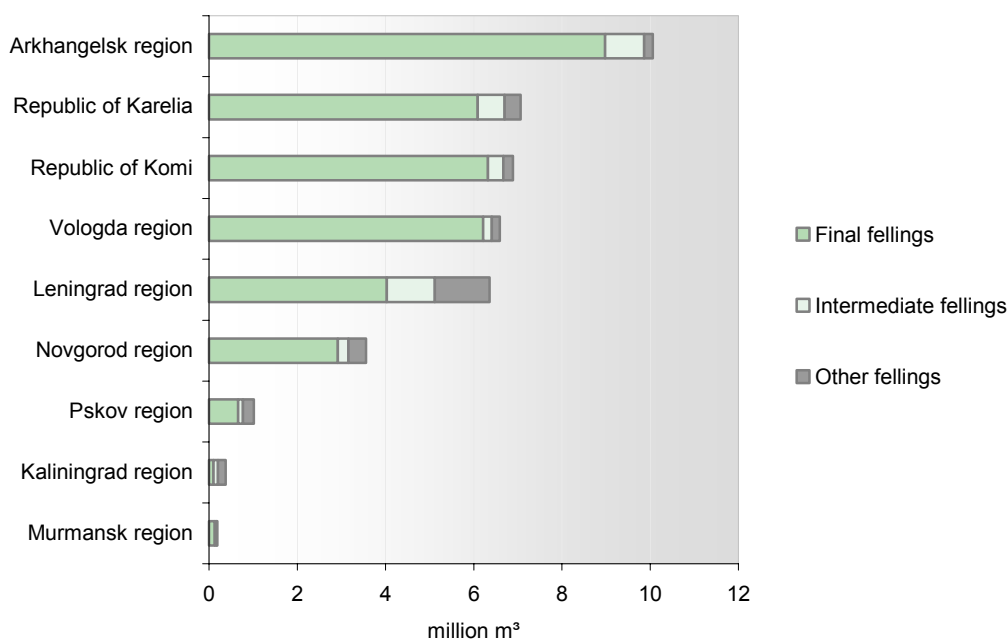


Figure 21. Actual harvest volume in forests managed by the Ministry of Natural Resources in Northwest Russia in 2003. (Source: Ministry of Natural Resources)

The volume of illegal logging, which has drawn the attention of the authorities both in Russia and abroad, is mainly not included in the statistics. According to estimates, illegal logging comprises 5–30% of all fellings in Russia. The lack of unambiguous definition concerning

illegal logging has made discussion on the subject difficult; to draw a line between illegal logging and minor violations of legislation in cases such as performing logging in protected areas, logging without official permit, exceeding the AAC, neglecting the logging instructions, using an obsolete forestry plan, etc. Illegal logging is especially a problem in the Russian Far East. Various actions against illegal logging have been taken by the Russian authorities. Such measures include satellite and aerial surveillance of felling sites, monitoring timber transportation, voluntary forest certification schemes and keeping a register on logging permits.

Forest leasing has become the most important way of forest utilisation. The area of leased forests is about 93 million hectares and about half of all the harvested timber in Russia comes from these forests. The major problem from the forest users' point of view has been the short leasing periods, which hinder developing operational preconditions in the long run. In the beginning of 2005, the maximum leasing period was extended from 49 to 99 years.

11.4 Monitoring Forest Use

In Russia, the state owns all the forests and thus controls forest utilisation. Fellings are regulated by federal statutes that are used as a basis for compiling detailed instructions for large areas such as the European part of Russia. In addition, regional regulations occur. Separate regulations are compiled for evaluating final fellings and felling site inspections. Furthermore, issues related to timber procurement are dealt with in stipulations for growing stock as well as in instructions for outlining and evaluating felling sites.

The *leskhoz*s, subordinate to the Ministry of Natural Resources, allocate the annual logging permits (*lesorubochnyj bilet*) to the forest users. The felling plan (*plan rubok*) is compiled for a forest area that has been leased out for a long period. Two years prior to planned fellings, a logging company presents the *leskhoz* a felling plan based application on occupying and vacating the felling site (see chapter 11.5). After outlining and evaluating the felling sites, *leskhoz*s allocate the logging permits one year before the intended timber harvest. Forest user is obliged to present a forestry plan (chapter 11.6) to the authorities if the leasing period exceeds five years.

The logging permit provides information on the volume of the stock, logging method to be used, trees to be left growing, temporary storages, etc. (Appendix 1). In addition, it provides information on the price of the timber, which is based either on fixed rates or auction prices. The price of the timber determined in the forest lease is not mentioned. Prior to logging, a permit may be given to perform preparatory actions such as felling trees in order to build a road. Compiling a harvesting plan, which is also called the technological chart (*tekhnologicheskaya karta*), is a precondition for acquiring a logging permit (Appendix 2).

The forest user is obliged to follow the Forest Code, forest utilisation instructions, regulations concerning growing stock, stipulations set by authorities as well as the terms of the long-term forest lease. A logging permit may be cancelled if frequent malpractice occurs. Trees must be felled and timber must be transported out of the forest within 12 months of the logging permit being awarded. An exception can be made allowing the leaseholder a 6-month delay in transporting the timber, in which case the leaseholder must pay a monthly delay fee, which is worth 1.5% of the market value of the timber.

After the logging permit has expired, the *leskhoz*, together with the forest user, performs a logging site inspection (*osvidetelstvovanie mest rubok*). The inspection consists of comparing

the volumes of harvested timber to the volumes stated in the permit, counting the amount of trees in undergrowth and saplings in the seedling stand, evaluation of fire-safety and nature conservation measures taken in accordance with the relevant regulations, measuring the height of the stumps, etc. If the regulations have been violated, the leaseholder may be required to take reconstructive measures or to pay a fine. All the logging residue must be cleared from the forest site. The logging residue may be piled on the tracks, chipped or burned. Fellings must be performed in such a way that it minimises the damage to the possible undergrowth and saplings and thus diminishes the workload needed for regeneration.

The new proposal for the Forest Code does not include the logging permit system that is currently in use. Most likely the logging permit will be replaced by a forest-use notification.

11.5 Allocation and Evaluation of Logging Sites

Assigning the forest utilisation permits is based on allocation and evaluation of the logging sites (*otvod i taksatsiya lesosek*) conducted by a *leskhoz*. The allocation refers to parcelling out and designating areas where logging may be performed and non-wood forest products (NWFP) may be collected. In addition, the expected volume and the monetary value of timber and non-wood forest products are estimated in the allocation.

An allocation plan of logging sites (*plan otvoda lesosek*), which is derived from the forest management plan, is made for each *lesnichestvo*. A preliminary inventory of forest areas to be allocated is done in the field. If the stand indicators, according to which the area has been allocated, differ greatly from the information in the forest management plan, the area will be removed from the allocation plan and replaced by another area.

Defining and marking off the logging site is done two years prior to the final felling, one year prior to intermediate felling and prior to sanitary fellings whenever necessary. Marking off is always done during the snowless season. The logging site may be, if necessary, divided further into stands marked for cutting (*delyanki*). This method is used if, for example, the logging site is occupied by more than one logger, various evaluation methods are being used within the site or a part of the site consists of undergrowth or seedling stand to be spared. Furthermore, if the forest is heterogeneous, the logging site or stand marked for cutting is divided into compartments (*vydely*).

A site map (*polevoj abris*) is created prior to occupying the logging site. The site map includes information on lines, tree stands that may not be logged, compartment numbers and boundaries, location of sample plots and survey lines, total area of compartments to be logged and spared, as well as location and total area of seed-tree stands and sapling stands. The site map is used as a basis for compiling a map on the logging site (*chertezh lesoseki*).

After marking off the forest area to be logged, the stands marked for cutting are measured. Choosing the mensuration method depends on the forest group in question, calculation method, area of the logging site and characteristics of the tree stand. In addition to stand characteristics, the viable undergrowth consisting of commercially valuable tree species is evaluated regardless the mensuration method chosen.

In order to calculate the monetary value of the logging site it is necessary to divide the total volume of timber into merchantable wood and firewood. In addition, the average stem size is

determined. Defining the monetary value of the standing trees and NWFP's of the forest is based on the forest fees in force.

11.6 Forestry Plan

Within a year of signing the long-term forest lease, the leaseholder must present a forestry plan that consists of plans for final fellings and silvicultural actions (*proekt organizatsii rubok glavnogo polzovaniya i vedeniya lesnogo khozyaistva*) to the regional authority of the federal forest administration for approval. The plan is compiled by a licensed forest planning organisation. The forestry plan must include a 5–10 year schedule for final fellings, which is broken down to annual descriptions on stands to be clear felled and felling sites to be regenerated as well as precautions taken to prevent forest fire. Additionally, the forestry plan may include a voluntary action plan for performing intermediate fellings, in which the stands to be thinned are listed.

For leased areas less than 200 hectares, as well as the areas leased on a short-term basis (1–5 years) the forestry plan does not need to include the plan for silvicultural actions whereas the plan for final fellings is always obligatory regardless the size of the leased area or the length of the leasing period.

The aims of compiling final felling plans are to ensure rational selection of logging sites and their utilisation in logical order, to retain the protective characteristics of the forests and to ensure the right timing for performing forest regeneration. If a plan for final fellings is compiled simultaneously with the forest management plan, which is based on the forest inventory data, all the required information may be taken from the forest management plan. If, on the other hand, the final felling plan is made after compiling the forest management plan, the information is updated with regard changes caused by timber harvesting and natural occurrences. In a case, when the forest management plan has been compiled more than five years ago, information concerning the growing stock is updated with regard the forest compartments that are to be clear felled or where intermediate fellings will be performed. Usually plans for final fellings are made for a period of ten years or more at the time, after which they are updated according to the national forest inventory data.

Prior to determining the order in which the sites will be logged, the licensed forest planning organisation must, together with the leaseholder, draw a plan for building forest roads. The selection of logging sites must be adjusted to the schedule of building forest roads. Additionally, the leaseholder must take into account the forest site factors that determine the harvesting method to be used, maximum width and area of the logging site, logging schedules for adjacent logging sites, felling direction and the number of sites logged annually. Logging sites must be chosen annually in a way that the volume of harvested timber is in line with the terms of lease.

The measures required for regeneration are determined for the stands that are scheduled to be harvested. On sites that are not occupied by forest vegetation, the actions for forest establishment are determined according to the forest management plan. The forest inventory data, in which felling and regeneration methods are described separately for each stand, determines the methods for and intensity of regeneration.

When preparing the measures for forest fire prevention, the increased tendency towards outbreaks of fire as a result of forest utilisation must be taken into account.

11.7 Planning Wood Procurement

The level of wood procurement planning depends greatly on the productivity and size of the enterprise. In large corporations wood procurement is arranged by a separate department or specially assigned people, whereas in small enterprises wood procurement is the responsibility of people who have also other tasks to perform. The process of wood procurement may be described generally as follows:

- The assessment of the volume of and setting up a schedule for needed timber
- Storage planning
- Planning the delivery from own logging enterprises (leased forests, stands acquired in auctions)
- Assessing the need for purchasing timber from external suppliers. The raw material is purchased contractually from external suppliers, who are chosen according to their ability to deliver timber, timber quality and previous experiences in cooperation. Later the volume of external purchases may be updated with regard the market situation in 3–6 month periods.

The planning of business operations in a logging enterprise is primarily determined by its level of independence. If the logging enterprise is a part of a larger corporation, planning is done according to needs of wood processing enterprises of the group. Here the logging company is merely a procurement unit, instead of being an independent enterprise.

Independent logging enterprises compile an annual plan, which determines the logging potential for each tree species in its leased forest areas. If the enterprise has a backlog of orders, it may participate in wood-lot auctions. If necessary the timber requirements for its own production purposes are also assessed in the annual plan. In small enterprises the process of planning recurs is on a yearly basis almost unaltered and it is done according to previous experience. Timber exchange is rare and when it happens, it is done mostly within corporate groups.

The allocation plan of logging sites, which forest authorities compile according to forest inventories, plays a major part in planning the logging operations (Chapter 11.5). Choosing the wood lots to be felled is greatly affected by the season, terrain conditions and the condition of the forest road network. As the Russian road network is underdeveloped, the stands marked for cutting that are located close to the roads are harvested during the summertime and during the winters are felled the stands that are remote and difficult to access. The fact that most of the timber is harvested during the winter makes the raw material flow uneven and planning storages is essential both to the logging companies and to the timber processing enterprises.

11.8 Timber Harvest and Transportation

11.8.1 Logging Enterprises

Today the most important logging enterprises are the formerly state-owned logging units *lespromkhoz*s, of which over 90% have become limited companies. Despite privatisation, the operational structure of the former *lespromkhoz*s has stayed almost unaltered. The annual volume of logging in the logging enterprises is between 30,000 to 600,000 cubic metres. Other than these recently privatised companies, timber is harvested by numerous small private enterprises and entrepreneurs as well as by the *leskhoz*s that perform intermediate fellings.

In Northwest Russia there are over 4,000 enterprises that have registered logging as their main business activity. Although some of the logging enterprises are operating independently, low profitability is forcing an ever increasing number of logging enterprises to merge with large forest industry corporations. Among the largest forest industry corporations (timber harvest is over 1 million cubic metres per annum) are Ilim Pulp and Titan in the Arkhangelsk region, Syktyvkar pulp and paper mill in the Republic of Komi and Cherepovetsles in the Vologda region. Some of the forest industry corporations operating in Northwest Russia are listed in Chapter 12, Table 17. Among the largest independent logging enterprises are Zapkarelles in the Republic of Karelia, Belyi Ruchei in the Vologda region and Dvinles in the Arkhangelsk region. The volume of annual logging in these enterprises varies between 300,000–600,000 cubic metres. However, only a few of all the logging enterprises in Northwest Russia harvest more than 100,000 cubic metres per annum.

Structure of a *lespromkhoz*

The wood procurement department of a *lespromkhoz* consists of felling sites (*lesopunkt*), which are divided into foreman districts (*masterskij uchastok*). Additionally each *lespromkhoz* has, among others, one or more central processing yards called lower landings (*nizhnyj sklad*), administration department and repair shop. Usually 2–3 brigades operate in the area of one foreman district. A brigade consists usually of a skidder and an operator, choker man (if the skidder has a choker system), two forest workers, 1–2 assisting workers and 1–2 debranchers (if there is no delimiting machine available). The productivity of a skidder is 20–55 cubic metres per shift. Delimiting machines and loaders serve several brigades.

In small private enterprises and remote logging sites the brigades operate in work shifts (*vahrovij metod*). Workers are provided with temporary lodgings and the brigade operates continuously for a certain period of time, after which it is replaced by another brigade. Employees are often temporary workers. Traditional logging enterprises provide the workers transportation to the felling site and back and serve a meal during the day. The work in the forest is arranged according to the harvesting plan, which is also called the technological chart.

When applying the tree-length method, the majority of production cost is due to work in the lower landings, which can be many in number depending on the size of the logging enterprise. Although the optimal capacity of lower landings is over 300,000 cubic metres per year, usually less than 100,000 cubic metres of timber is processed each year in one lower landing on average. At the lower landing timber is unloaded from the transportation, assorted and scaled for cross-cutting. After cross-cutting, the timber is piled according to assortments, marked and measured. Timber may also be processed further into sawn timber before at the lower landing.

At the lower landing, the timber processing is done in stages and the processing line consists of cranes, conveyors, cross-cutting devices and possibly also multi-functional machines such as a debranching–cross-cutting machine or a cross-cutting–assorting machine. After processing, the timber is gathered in bunches suitable for transportation and stored in piles when necessary. Timber harvested according to the cut-to-length method is not processed at the lower landing but sent on for the further transportation.



Figure 22. Lower landing in Suojarvi in the Republic of Karelia. (Antti Mutanen)

11.8.2 Final Fellings and Used Logging Methods

Final fellings performed in mature and over-mature forests may be categorised as follows:

1. **Clear fellings** (*sploshnye rubki*), where all the trees are felled, except the viable undergrowth, seed trees and saplings. Most of the clear fellings are performed in the group III forests, whereas in group I forests they are allowed only with certain exceptions. The majority of final fellings in Russia are clear fellings.

Clear fellings are categorised into three groups according to the size of the felling site:

- Clear felling in narrow strips (*uskolesosechnye rubki*): the maximum width of the clear-strip is 100 metres.
- Clear felling in medium-size strips (*srednelesosechnye rubki*): the size and width of the felling site is between 11–25 hectares and between 110–250 metres, respectively.
- Clear felling in wide strips (*schirokolesosechnye rubki*): the size and width of the felling site is between 26–50 hectares and 260–500 metres, respectively.

2. **Selective fellings** (*vyborochnye rubki*), where trees are removed according to their age, size, quality and viability. Selective fellings are performed in uneven-aged forests as well as forests under protection that could not be felled in any other way. The selecting of the trees is done according to a predefined goal such as maximising the monetary value of felled timber, or maintaining the structure or the viability of the forest. Furthermore, if the forest consists of groups of uneven-aged stands, selective felling may be done by removing entire groups of trees according to both the location of trees and the need for regeneration.

The basic unit of final fellings is the felling site (*lesoseka*) and its size varies according to the forest management group in question, region and stand characteristics. Large felling sites may be further divided into stands marked for cutting (*delyanki*), which is defined according to the growing stock or logging conditions, and further still into cutting strips (*paseki*). Traditionally the cutting strips have been occupied by one logging brigade at the time. On the European parts of Russia the width of a felling site may be 100, 250 or 500 metres, whereas its length depends on the size of the planning compartment (*kvartal*). The open area of a clear felling site may not exceed 50 hectares.

In Russia, timber harvesting is broken down to three stages: felling, transportation and work at the lower landing. Felling is conducted according to full-tree, tree-length or cut-to-length logging methods. When applying the full-tree method, operations at the logging site are limited to a minimum; the tree is felled and skidded to the upper landing (*verhnyj sklad*) as a whole, loaded on to a truck and transported to the lower landing (*nizhnyj sklad*) for further processing. The full-tree method is seldom used though it may be an option when the tops of the trees can be utilised.

Most of the trees are harvested according to the traditional tree-length system that refers to a method where trees are felled, bunched and skidded to the upper landing for long-haul transportation to the lower landing. Debranching is done either manually at the logging site or with a delimiting machine on the loading site (upper landing); stems are cross-cut into timber assortments at the lower landing. The lower landings owned by logging enterprises are located along long-haul routes, through which the timber may be delivered to the users. Additionally, lower landings may belong to timber processing plants, in which case they are situated adjacent to them.

Although the lack of appropriate machinery is hindering the implementation of cut-to-length method, it is becoming increasingly popular in Russia. In the Republic of Karelia, for example, approximately 50% of harvested timber is logged according to the cut-to-length system, whereas its share in the other regions of Russia is considerably smaller. In Russia, the cut-to-length method refers also to a system where stems are skidded according to tree-length method but cross-cut on the upper landing.

11.8.3 Russian Logging Technology

The majority of the machines that are used in the tree-length method are of domestic origin. With regard the cut-to-length method, the quality of Russian machinery is inferior to western technology and thus its production is small. As a result, large logging enterprises and corporations are purchasing ever more western technology suitable for tree-length and cut-to-length logging methods. In 2004, for example, Ilim Pulp signed a 60 million euro contract with John Deere on delivering western logging technology to its logging units. When the contract is completed Ilim Pulp will own over 300 John Deere logging machines.

From now on in this chapter, the main emphasis is in describing the traditional Russian technology that is still widely used in Northwest Russia. Unfortunately, as ever since the collapse of the Soviet Union keeping record on the machinery in use has not been obligatory for the logging enterprises, no data on current number of logging machines in operation is available. In 1990, 13 000 logging machines were in operation in Northwest Russia (Table 13).

Table 13. Stock of machinery in Northwest Russian logging enterprises in 1990.

Contemporary region (region unit in 1990*)	Feller-buncher	Feller-skidder	Skidder	Delimiting machine	Loader
Arkhangelsk region (Arhangelsklesprom)	2	354	2 954	893	819
Republic of Karelia (Karellesprom)	20	151	1 432	544	419
Republic of Komi (Komilesprom)	91	83	2 255	625	505
Leningrad region (Lenles)	13	42	574	136	162
Murmansk region (Murmanles)	0	10	224	72	59
Novgorod region (Novgorodsklesprom)	32	4	407	59	111
Vologda region (Vologdalesprom)	112	10	1 399	377	354
Total	270	654	9 245	2 706	2 429

* The majority of logging enterprises were administratively subordinate to the regional units of the Ministry of Forest Industry, for example in the Republic of Karelia over 90% of the logging enterprises were subordinate to this Ministry. (Source: NIPIEILesprom)

Typically the machines that are used in tree-length logging system are built on either the chassis of TDT-55 or TT-4, that are products of Onego and Altaisky tractor plants, respectively. TDT-55 has also been used as a basis for developing machines for silvicultural operations. Although a Russian feller-buncher (*valochno-paketiruyuschaja mashina*) LP-19 may be seen on large stands marked for cutting, the most common way to fell trees is to use a chain saw. Although a production line for a harvester (ML-20) was established during the Soviet era, these machines are no longer in operation. Today, harvesters are created in Russia by mounting a felling head of western origin onto a Russian feller-buncher.

Skidding is a labour intensive stage in tree-length method and usually it is done with crawler skidders (*trelevochnyj traktor*). Various methods have been developed for bunching and attaching stems onto a skidder, but the most commonly used method in Russia is to use ground skidding where the stems are partly supported by the tractor. The stem bundles are fastened by chokers or grapples located on the rear of the skidding machine.

In choker skidders, which were developed as early as in the 1940s (TDT-40), a choker man attaches cables onto stems that are then winched onto a plate located in the rear of the skidder (Figure 23). In the 1970s and 1980s, more sophisticated skidders, such as TB-1 and LP-18, were developed. These models had grapple arm that could lift one stem at the time and place it onto a grab located on the back of the machine. Furthermore, in the 1980s such models were introduced that could lift a bunch of trees at one go and place it on a hydraulic grab or a wire loop at the rear of the machine (LT-154, LT-157). Additionally, when performing thinnings, agricultural tractor based forwarders on wheels are being used. Various models of skidders have been produced, but the most common are TDT-55 and TT-4 tractors; in 1990, the total number skidders in Northwest Russia was 9 200 out of which 8 400 were either TDT-55's or TT-4's. In 2003, the production of TDT-55 ended and production of a new model TLT-100 begun.

In the past, feller-skidders (*valochno-trelevochnaya mashina*) LP-17 and LP-49 have been in production, but due to their low productivity especially on logging sites with long skidding distances, they are not commonly in use. The feller-skidders are able to fell the trees, place them on a grab located on the rear of the machine and skid them to the upper landing. Feller-skidders were basic skidders with a felling head attached to them.

The debranching is either conducted on the felling site with chain saws or at the upper landing with delimiting machines (*suchkoreznaya mashina* LP-30) (Figure 24). Delimiting machines are tractors on crawler-tracks with a knife-like debranching device on top; some of the machines are also equipped with a cross-cutting device. Delimiting machines are clumsy in operation and thus cannot manoeuvre on the felling site. They are located at the upper landing as a part of one of the following logging systems:

- Chain saw – skidder – delimiting machine
- Feller-skidder – delimiting machine
- Feller-buncher – skidder – delimiting machine

Loading the stems for long-haul is arranged by using cranes attached to trucks or crawler-track loaders (*lesopogruchik* PL-1, LT-188) that lift the load 180° over the machine onto trucks (Figure 25). Most commonly, tree-length stems are transported from the upper landing by timber trucks (Maz, Kraz, Ural, Zil), whose carrying capacity is 10–25 tonnes. Additionally, in the areas with a poor road network, timber may be transported to the lower landing on specially built narrow-gauge railways. In Northwest Russia the narrow-gauge railway network covers several thousand kilometres. The maximum carrying capacity of a rail wagon is 28 tonnes.



Figure 23. Choker skidder TDT-55. (Vladimir Pecherin)



Figure 24. Delimiting machine LP-30. (Pavel Chikulaev)



Figure 25. Loader PL-1V at the upper landing. (Lauri Sikanen)

11.8.4 Timber Transportation

In Russia, the methods of timber transportation are dependent on the logging method employed. When using the cut-to-length method, timber is transported directly to the end user from the upper landing or via intermediate storages located, for example, by railway stations. With regard the tree-length method, the timber is transported to the user via lower landing where cross cutting takes place. Timber may be transported via rail, on the roads or along the inland water-ways.

In rail transportation, the most common rail car types are the high-sided roofless wagons (VOK) and the open-sided timber cargo wagons. The maximum load for a VOK-wagon is 45–65 cubic metres (45 tonnes) and for an open-sided timber wagon 80–85 cubic metres. Currently railway transportation is the most important way to deliver timber and the annual volumes carried by rail are on the increase. Furthermore, the average transportation distance is increasing; currently being 1,270 kilometres, whereas in 1995 it was 1,070 kilometres. The volume of transported timber has increased to 69 billion tonnes per kilometre from 53 billion tonnes per kilometre, in the same time period.

Due to state owned wagons being obsolete and timber cargo wagons being few in number, enterprises are suffering, especially during the winter time, from the lack of railway wagons. As a result, the largest forest industry corporations have purchased private cargo wagons or established transport companies. For example, FinTrans, an affiliated company of Ilim Pulp, has about two thousand timber cargo wagons on its own. Furthermore, corporations and enterprises use the services of private transport operators such as Evrosib. In 2005, the International Finance Corporation (IFC) granted the Evrosib transport company a 30 million US dollar loan for purchasing one thousand timber cargo wagons and wagons for transporting wood chips.

In Russia, timber trucks are used for transporting small amounts of timber on short and medium transportation distances (<140 kilometres). In comparison to other means of transportation, truck haulage is relatively expensive, 1–1.5 roubles per cubic metre per kilometre, which is due to the low carrying capacity of the trucks and poor condition of the road network. The utilisation of long-distance truck transportation is decreasing and is carried out only if no other means of transportation is available. Both Russian and foreign vehicles are used. Some of the trucks are equipped with a hydraulic arm and a grapple, whereas loaders are used with trucks without such a device.

Along the inland water-ways, timber is transported by shipping or by floating in bundles. The maximum carrying capacity for the various vessels used in timber shipping is 5,000 tonnes, and timber may be loaded onto them loose or in bundles. The volume of water-way transportation is decreasing, which is mainly due to a reduction in use of floating. The annual volume of timber transported along the inland water-ways has dropped from ten million tonnes in 1995 to eight million tonnes today.

11.8.5 Challenges for Timber Harvesting

During the past ten years, the profitability of timber harvesting has been low. As the prices of fuel and energy as well as the stumpage prices are increasing, the returns for the logging industry are getting smaller still. In the mid-1990s, the profitability of the business was below the break-even point and many privatised logging enterprises went bankrupt (Figure 26). Although, as a result of the rouble's devaluation in 1998, the profitability of timber harvesting has improved, it is still low compared to the other sectors of the forest industry; the share of unprofitable logging companies is over 50% of all the logging enterprises. However, one must bear in mind that the enterprises tend to underreport their profits in order to reduce taxes.

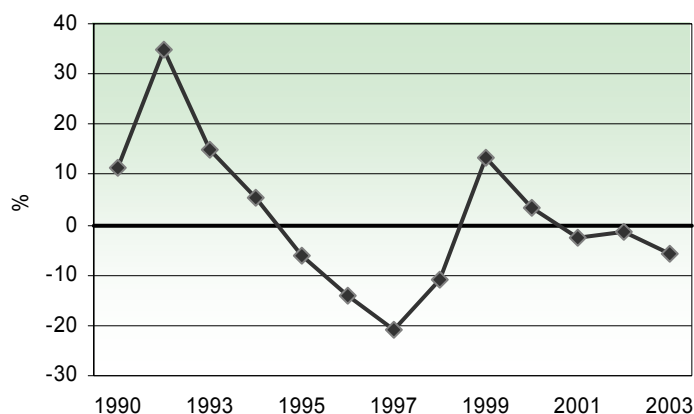


Figure 26. Profitability of wood harvesting* in 1990–2003. (Source: NIPIEILesprom)

*) The profitability (*rentabelnost proizvodstva*) is calculated by dividing the profit, prior to deducting taxes and interests, by the sum of tangible and non-tangible assets.

The main problem in timber harvesting is the poor condition of the road network system and especially the lack of all-season roads. This problem has been acknowledged by the federal authorities and the Ministry of Natural Resources is in the process of compiling an action plan for building 3,000 kilometres of new roads during the years 2006–2007. According to the authorities' estimations this would increase the annual yield of timber by 15–20 million cubic metres. In addition, the forest administration supports enterprises that invest in improving the infrastructure. Furthermore, the lengthening of the maximum leasing period of forests is

expected to enhance the road building activities of the enterprises. In the southern regions, an obstacle for road building is the lack of appropriate building material; mineral soil is deep under ground, which means that sand and gravel need to be transported from far away with associated transport costs. Additionally, water infiltration qualities of the soil are poor.

One of the reasons for the low annual yield in timber harvesting is the low-level of technology the logging enterprises use. Machinery is often worn out and obsolete and due to modern, and especially western, technology being expensive, only the logging companies that belong to large forest industry corporations can afford to purchase new technology. Furthermore, because low wages and physically demanding work do not attract young people to the logging industry, it has been difficult to recruit educated and motivated labour. The availability of cheap labour, however, has hindered the processes of modernising machinery and intensifying business activities. The logging enterprises are also reluctant in educating temporary workers. About one third of the costs of timber harvest are wages and social expenses (Figure 27).

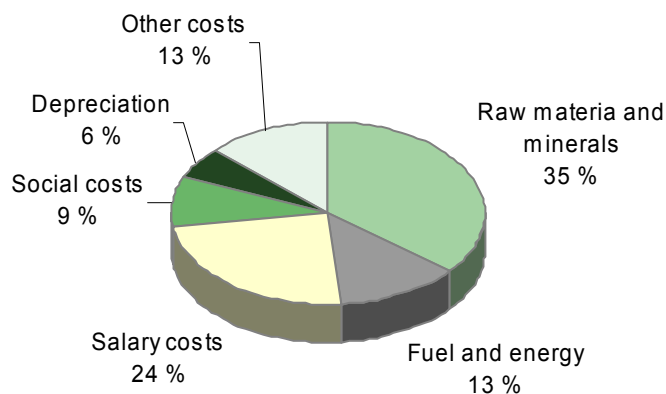


Figure 27. Cost structure of wood harvesting in Russia in 2003. (Source: NIPIEILesprom)

11.9 Forest Roads

Forest roads lead eventually to the sites where the lower landings of the logging enterprises are located. In Russia, forest roads are categorised as narrow-gauge railways, forest truck roads and winter roads. Forest roads are divided further into categories according to the main purpose of use; timber harvesting, silvicultural activities, forest fire suppression, service work or recreation. In practice, however, forest roads are used for various purposes.

The heaviest loads are transported via roads built for timber harvesting and this is taken into account when calculating the road's capacity. The planned service life and utilisation frequency determine the structure of the forest road.

The forest road network consists of

- Main forest roads (*magistrali*), which are the core of the forest road network. They are permanent, all-season roads that connect the logging sites to the lower landings (Figure 28).
- Branch roads or temporary forest roads (*vetki*) connect separate logging sites to the main forest roads. The intended service life of a branch road is several years.
- Haul roads or spur roads (*usy*) connect the stands marked for cutting to the branch roads. Their service life is less than a year.

Although an average load transported along the roads built for silvicultural operations is less than the loads transported along timber harvest roads, they should be planned and built similarly to the timber harvest roads.

All the permanent forest roads may be categorised as follows:

- Roads built for silvicultural operations by the forest administration, they are not included in logging enterprises' balance sheet as equity.
- Forest roads that are included in the enterprises' balance sheet as equity.
- Forest roads that do not belong to any organisation. These are mostly roads that have been built by logging enterprises that are no longer in business and that are currently not owned by any other organisation. Some of these roads have been built just recently without documented plans.

According to the official calculations, the optimal road density in Northwest Russia should be 20–22 metres per hectare. In reality the density is significantly lower (Table 14).

As Northwest Russia is a region of intensive forest utilisation, more roads have been built to serve the needs of timber harvest than silvicultural operations, which is the opposite from the situation in Russia as a whole. The majority of forest roads built by logging enterprises in Northwest Russia are forest truck roads, whereas in 2003 the share of winter roads was only 20%. The very same year, the narrow-gauge railways and blind tracks covered 6,000 kilometres and majority of them were located in the Arkhangelsk and Vologda regions and the Republic of Komi (Table 15).



Figure 28. Betony-paving is used in areas where local rock material is not available for road construction. (Timo Leinonen)

Table 14. Forest land road density in *leskhoz*es governed by the Ministry of Natural Resources in 2003.

Region	Forest roads m/ha	Forest and public roads m/ha
Russian Federation	1.3	1.9
Northwest Russia	2	2.8
Arkhangelsk region	1.5	1.9
Kaliningrad region	8	19
Republic of Karelia	3.3	4.1
Republic of Komi	1.2	1.6
Leningrad region	4.8	7.5
Murmansk region	1.7	2.5
Novgorod region	3.2	4.2
Pskov region	7	14.7
Vologda region	2.8	3.9

(Source: Calculated from the statistics of the Ministry of Natural Resources)

The Russian Federation, although being the owner of the forests, has not been keen in promoting the building of forest roads. However, in the near future the situation is expected to improve as the new action plan for building forest roads has been adopted. In 2003, 600 kilometres of forest roads for silvicultural purposes were built in the area governed by the Ministry of Natural Resources. Of this 600 kilometres ten kilometres was built in Northwest Russia.

Table 15. Length of road network in *leskhoz*es governed by the Ministry of Natural Resources in 2003.

Region	Public roads 1,000 km	Roads for silvicultural purposes, 1 000 km	Roads for timber transportation			
			1 000 km	Railways, %	Truck roads, %	Winter roads, %
Russian Federation	489.8	723.8	403.1	3	70	27
Northwest Russia	64.4	74.6	93.6	6	73	21
Arkhangelsk region	7.5	5.3	26.6	9	86	5
Kaliningrad region	2.7	1.3	0.6	0	100	0
Republic of Karelia	7.9	6.4	25.8	0	69	31
Republic of Komi	12.1	15.6	20.6	6	69	25
Leningrad region	9.6	13	4.5	10	69	21
Murmansk region	4.2	5.4	3.6	0	64	36
Novgorod region	3.6	9.5	1.8	13	45	42
Pskov region	8.6	6.8	0.9	7	67	26
Vologda region	8.1	11.2	9.2	15	65	20

(Source: Calculated from the statistics of the Ministry of Natural Resources)

The logging enterprises that have acquired a short-term usufruct do not participate in road building, and instead the road building is executed by the long-term leaseholders. The ability and tendency to build new forest roads or to maintain old ones is dependent on the economic state of the enterprise as well as on the volumes of annual logging. The defects in the federal legislation hinder the development of the forest road network, because forest roads are considered as equity, which increases the amount of taxes the enterprises are obliged to pay. Furthermore, the logging enterprises must pay taxes to the federation for using the forest roads they have built themselves. The forest roads, however, belong to the state because they have been built on state property, i.e. on forest land owned by the Federation. Thus, after the forest lease has expired, the logging enterprise must assign to the federal administration all the forest roads it has built. Extending the leasing period is hoped to encourage the logging enterprises to invest in the building and maintenance of forest roads.

12 Forest Industry

12.1 Russian Forest Industry in General

In Russia, the forest industry (*lesopromyshlennyj kompleks, LPK*) is comprised of the logging industry, mechanical forest industry, pulp and paper industry as well as chemical forest industry. Timber is harvested and processed throughout Russia by 22,000 enterprises. They employ over one million people, which is 6% of all the Russian industrial labour force. Of the total monetary value of forest industry production the pulp and paper industry comprises 43%, the sawmilling industry 40% and the logging industry 17%.

The changes in the structure of the national economy caused by the collapse of the Soviet Union in the early 1990s, led to a significant decrease in the volumes of industrial output, domestic demand as well as investments in means of production and infrastructure. The downturn in the output continued until 1998 when the rouble was devalued and favourable world market prices ended the fall. As a result, since 1999 the market situation has been stable; the domestic demand has revived and investments are being made. However, although the volumes of production, with regard most of the branches of the forest industry, have been on the increase, recently the profitability of production has stagnated (Figure 29). The most profitable branches of the forest industry are the pulp and paper industry as well as the wood-based panel industry (Table 16).

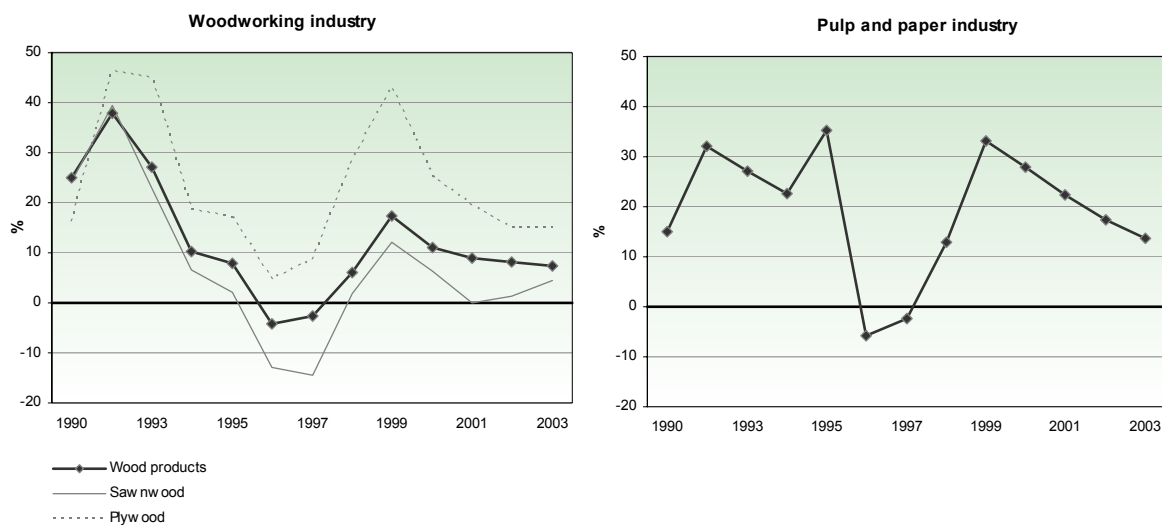


Figure 29. The trends in profitability* of Russian forest industry. (Source: NIPIEILesprom)

*) The profitability (*rentabelnost proizvodstva*) is calculated by dividing the profit, prior to deducting taxes and interests, by the sum of tangible and non-tangible assets.

Table 16. Key figures of Russian and Northwest Russian forest industry.

	Production in Russia		Change in production in 2003, % (in comparison with 2002)		Share of NW Russia in total production, % (2003)
	2003	2004 *)	Russian Federation	Northwest Russia	
Sawn wood, million m ³	20.2	19.8	+9	+10	27
Particle board, million. m ³	3.2	3.6	+16	+20	26
Plywood, million m ³	2	2.2	+9	+7	39
Fibreboard, million m ² (MDF-boards are not included)	321	342	+4	+1	19
Paper, million tonnes	3.7	3.9	+4	+3	60
Cardboard, million tonnes	2.7	2.9	+11	+10	52
Pulp, million tonnes	5.8	n/a	+3	+2	62

*) Preliminary information

(Sources: Rosstat, Karelijastat)

Although the majority of Russian forest resources are located in Siberia and the Russian Far East, the production of value-added wood products is concentrated in the European parts of the country. The spatial distribution of production plants is affected by the proximity to European markets as well as the necessary transportation network. With regard Russia as a whole, the share of forest industry's output of the total industrial output is 4%, whereas in many of the Northwest Russian regions it is the most important industry (Figure 30). Forest industry constitutes about 8% of national gross production in Russia.

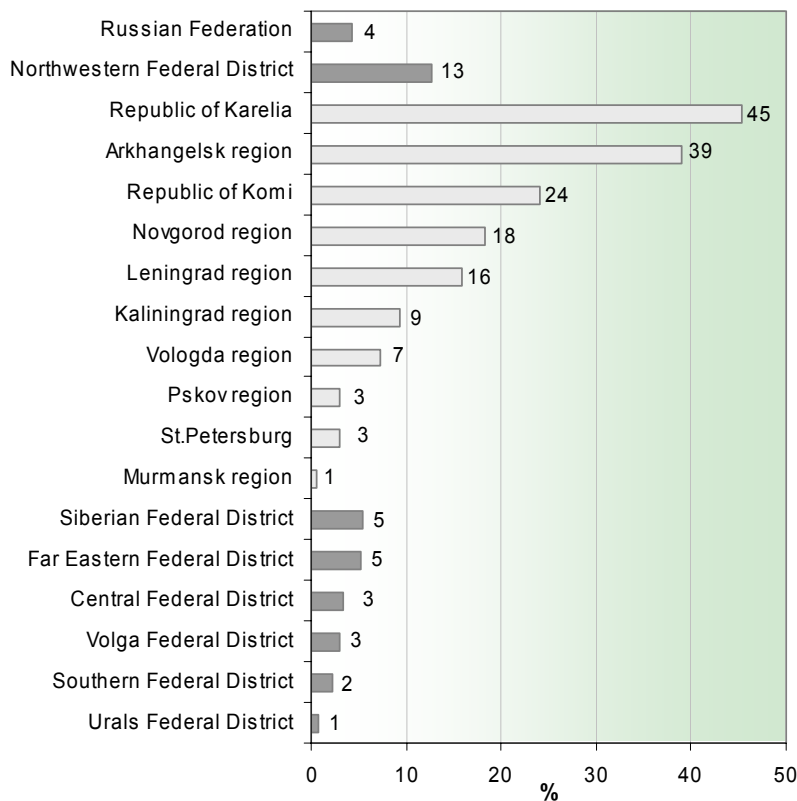


Figure 30. The share of forest industry in gross production in Russia in 2003. (Source: Rosstat)

The majority of enterprises in the forest industry are either privately owned or in mixed ownership, whereas enterprises owned solely by the Federation or municipalities are few in number. In 2002, of all the forest industry enterprises only 4% were state owned. During recent years, the Russian forest sector has, due to globalisation, concentrated on ever greater production units and the large corporations have become vertically integrated i.e. in addition to wood processing they conduct the logging and silvicultural operations (Table 17).

Table 17. Significant vertically integrated forest industry corporations operating in Northwest Russia.

Corporation	Enterprises	Region
Cherepovetsles (www.cherles.ru)	6 harvesting companies Sawmill Belozerskles Sawmill Belozersky LPH	Vologda region
Continental Management (www.lpkkm.ru)	Baikal pulp and paper mill Selenginsky pulp and cardboard factory Jenisey pulp and paper mill Several harvesting companies in Siberia Sawmill Lesozavod 2 Letnerechensky sawmill 4 harvesting companies	Irkutsk region Republic of Buryatia Krasnoyarsk region Arkhangelsk region Republic of Karelia Arkhangelsk region, Republic of Karelia
Guta Les (www.gutagroup.ru)	Sykytykar sawmill and woodworking plant Sawmill and woodworking plant Arhangelskles 2 harvesting companies (Komi, Irkutsk)	Republic of Komi Arkhangelsk region
Ilim Pulp Enterprise (www.ilimpulp.ru)	Kotlas pulp and papermill IlimSeverDrev fiberboard factory IlimSeverLes: 18 harvesting companies Bratsk pulp and paper plant Ust-Ilimsky LPK (pulp, forest chemistry) Ust-Ilimsky sawmill Ilim Bratsk woodworking company Ilim Bratsk sawmill Several harvesting companies	Arkhangelsk region Republic of Komi Arkhangelsk region and Republic of Komi Irkutsk region
Karellesprom	Belomorsk sawmill 18 harvesting companies	Republic of Karelia
Mondi Business Paper Sykytykar (www.mondibp.com)	Sykytykar pulp and paper mill 13 harvesting companies	Republic of Komi
National Timber Company (www.nationaltimber.com)	Sokol woodworking company Ilinsky sawmill Ustjales 6 harvesting companies Ulyanovsky sawmill	Vologda region Republic of Karelia Arkhangelsk region Vologda and Arkhangelsk regions Ulyanovsk region
North-West Timber Company (www.szlk.ru)	Kamennogorsky offset paper mill Nema pulp and paper mill Velsk glued timber structures mill	Leningrad region Kaliningrad region Arkhangelsk region
Novgorod forest industry holding "Novgorodskie Lesopromyshlenniki" (lesprom.velikiynovgorod.ru)	Chudovo-RWS (UPM) Parfino plywood factory Pestovo sawmill (UPM) Toporkovsky woodworking company Harvesting companies	Novgorod region
Onega sawmill and woodworking company	Sawmill Onezhky LDK 5 harvesting companies	Arkhangelsk region
Segezhabumprom (www.scbk.ru)	Segezha pulp and paper mill Segezha sawmill 8 harvesting companies	Republic of Karelia
Solombala sawmill and woodworking company (www.sldk.ru)	Solombalsky LDK Sawmill Lesozavod 3 10 harvesting companies	Arkhangelsk region
Titan Group (www.titangroup.ru)	Arkhangelsk pulp and paper mill Murmansk packaging mill Sawmill Lesozavod 25 Sawmill Shalakushsky lesozavod 14 harvesting companies	Arkhangelsk region Murmansk region (Vologda region, wood procurement)
Vologda forest industry holding "Vologodskie Lesopromyshlenniki" (www.volwood.ru) (Partly owned by Thomesto)	7 harvesting companies Furniture board factory Onego-mebel Sawmill Turovets Timber	Vologda region

12.2 Competitiveness of the Forest Industry

The foundations of Russian forest industry are based on the vast but under-utilised forest resources, cheap energy and well-educated labour. The ever increasing demand, especially in the domestic market, for forest industry products create opportunities for further development of this industry.

Of the total forest resources of Russia, which is 82 billion cubic metres of growing stock, 12% is located in Northwest Russia. The annual allowable cut in Northwest Russia is 103 million cubic metres, of which only 40% is utilised. The main obstacle for the effective utilisation is the underdeveloped network of forest roads. All the stands marked for cutting in the proximity of forest roads have been felled and building new forest roads would require substantial funding. Furthermore, the tree species composition in easily accessible forests is skewed due to birch (*Betula spp.*) and aspen (*Populus tremula*) colonising land at the expense of coniferous species.

In comparison with the other regions of Russia, enterprises located in Northwest Russia have an advantage of being geographically close to the main Russian and European markets. Although, in comparison with the Western countries, the road network is sparse and the utilisation of information technology is still limited, the infrastructure in Northwest Russia is relatively developed compared to the rest of Russia. With regard transportation and availability of energy, enterprises are dependent on state monopolies, whose tariffs are on the increase.

Forestry related tuition is given in various educational institutions in Northwest Russia. Currently educated labour is available, but among young people the interest towards the forest sector is diminishing, which is as a result of the low wage level and hard working conditions. In addition, educated people tend to move to urban areas, which is a challenge to enterprises located in peripheral areas. Furthermore, the lack of interaction between educational institutions and enterprises as well as teacher's and student's limited opportunities to participate in international cooperation, have led to a situation where Russian education is deficient for the needs of global forest industry corporations.

The majority of the production plants of the Russian forest industry were built during the Soviet era and are thus relatively old. The use of obsolete technology has led to low productivity, labour-intensive production processes, wasting raw material and energy as well as polluting the environment. Thus, currently the Russian forest industry is competitive only in producing low value-added products. Only the largest forest industry enterprises have ability to develop the necessary production and building up capacity. Some enterprises have managed to improve their position in the market by radically modernising or building completely new processing plants. For example, foreign owned pulp and paper mills in Svetogorsk (International Paper) and Syktyvkar (Mondi Business Paper) have begun a new era in Russia by starting the production of high quality copying paper both for the domestic and export markets. Modernisation of saw milling equipment has strengthened Russia's position, especially, in the European market. However, in order to secure the raw material supply for forest industry, substantial investments are needed to improve the existing logging technology and forest road network.

The position of the Russian forest industry on the international market is based on price competitiveness, which is due to the cheap domestic raw material and energy. This advantage, however, is not permanent and during recent years the prices of both the raw material and energy have gone up in relation to prices of the final products. Furthermore, the increase in cost price has led to smaller profitability, which hinders investment in modernising the means of

production. This tendency will strengthen if Russia is accepted to join the World Trade Organisation (WTO). One result of possible WTO membership is that the competition in the Russian domestic market is bound to increase due to the opening of the borders for imports.

The Russian Federation has taken measures towards securing the future development of the forest industry. With regard to high value-added products, the customs duty on exports has been reduced or abolished completely, whereas the import duty for wood processing equipment has been lowered. Furthermore, the forest legislation is being updated and for example lengthening the maximum forest leasing period to 99 years is expected to increase the willingness of enterprises to invest in the means of production and road building. In practice, however, the majority of current leasing contracts are signed for short periods. In addition, a proposal for funding forest road construction is being formulated.

12.3 Investments in the Forest Industry

Securing the competitiveness and future development of the forest industry requires long-term investments in the means of production, silviculture, wood procurement, infrastructure and environmental issues. Although new pulp and paper mills have not been built since the Soviet times in the mid-1970s, the largest Russian forest industry enterprises have made numerous investments in improving the existing production units and intensifying their wood procurement. Production processes have been modernised by introducing non-chlorine bleaching technology, updating the processing of raw material and utilisation of by-products and waste material. Thus far, the majority of all the investments are self-financed by the enterprises, but also the financial institutions have started financing the forest industry. For example, the Russian Vneshtorg Bank has a 600 million dollar programme for financing forest industry during 2004–2006.

The Russian forest sector is attracting foreign investors because of its vast markets and increasing demand; the domestic demand for paper and cardboard is estimated to double in the near future. However, thus far the foreign enterprises have invested only in the mechanical forest industry (Table 18). Furthermore, no major investments have been made because of the lack of investors' rights that have led to problems over the ownership of the production plants, lack of transparency in actions as well as lack of consistent forest policy that currently favours short-term leasing periods and usufructs.

Table 18. Foreign owned production plants in Russia and investment plans on forest industry announced by Russian and foreign companies.

Investor	Production unit, year of foundation	Region	Sphere of industry, production capacity
Woodworking industry			
Egger	Particleboard mill in Shuya, 2005	Ivanov region	Particleboard (250,000 m ³), laminated particleboard (75,000 m ³)
Gesco-Star Group	Rebuilding of Medvezhegorsk lespromkhoz, 2005	Republic of Karelia	Sawn timber (150,000 m ³)
Ilim Pulp Enterprise	Sawmill near Kotlas pulp and paper mill, 2007	Arkhangelsk region	Sawn timber (500,000 m ³)
Kronospan Holdings Ltd.	Kronospan Russia, 2004	Moscow region	MDF-board (200,000 m ³)
LesPlitInvest	MDF-board production in Priezorsk, 2004	Leningrad region	MDF-board (100,000 m ³)
Metsä-Botnia	Podporozhe sawmill, 2005 Suda sawmill, 2007	Leningrad region Vologda region	Sawn timber (300,000 m ³)
Pfleiderer AG	Particleboard mill, 2005	Novgorod region	Particleboard (500,000 m ³)
Stora Enso	Impilahti sawmill, 2003 Nebolchi sawmill, 2004	Republic of Karelia Novgorod region	Sawn timber (200,000 m ³)
Swedwood	Swedwood Tikhvin, 2002 Swedwood Karelia, 2003 Swedwood Esipovo, 2004	Leningrad region Republic of Karelia Moscow region	Sawn timber and furniture components Furniture board
Sveza Group	Modernisation of production, 2004-2007: Fanplit Novator Ust-Izhora plywood mill	Kostroma region Vologda region St. Petersburg	Plywood (310,000 m ³), particleboard (85,000 m ³)
Swiss Krono Group	Kronostar, 2004	Kostroma region	Particleboard, MDF-board (capacity 430,000 m ³ /year), floor laminate (2.5 million m ² /month), laminated MDF-board
Tiivi	Eurotiivi, 1990	Murmansk region	Windows
Tilly Group	Sykytkar sawmill, 2006	Republic of Komi	Sawn timber (500,000 m ³)
Titan Group	New sawline Lesozavod 25	Arkhangelsk region	
United Panel Group	MDF-board production in Zheshart plywood mill, 2003	Republic of Komi	MDF-board (130,000 m ³)
UPM	Chudowo-RWS, plywood mill, 1990 Chudowo-RWS, veneer mill, 2003 Pestovo sawmill, 2004	Novgorod region	Birch plywood (60,000 m ³ /year) Veneer (10 million m ² /year) Sawn timber (300,000 m ³ /year)
Pulp and paper industry			
Archangelisk pulp and paper mill (part of the Titan Group)	Modernisation of the mill, 2004	Arkhangelsk region	
Ilim Pulp Enterprise	Modernisation of Kotlas pulp and paper mill and Bratsk cardboard factory Development of wood procurement 2005-2007	Arkhangelsk region Irkutsk region	
International Paper	Modernisation of Svetogorsk pulp and paper mill	Leningrad region	
Kondopoga pulp and paper mill	New paper machine, 2003	Republic of Karelia	
Mondi Business Paper	Modernisation of Sykytkar pulp and paper mill	Republic of Komi	
North-West Timber Company	Modernisation of Nema pulp and paper mill and Kamennogorsk offset paper mill, 2006	Kaliningrad region Leningrad region	
Paper mill Volga	Rebuilding of the mill, modernisation of a paper machine, 2010	Nizhny Novgorod region	
SCA	Packaging factory Kuban, 1991 Packaging factory St. Petersburg Tissue paper factory Svetogorsk, 1998	Krasnodar region St. Petersburg Leningrad region	
Segezha pulp and paper mill	Modernisation of the mill, 2008	Republic of Karelia	
Syassky pulp and paper mill	Rebuilding of the mill	Leningrad region	
Stora Enso	Balabanovo packaging mill, 1998 Arzamaz packaging mill, 2004 Corrugated packaging plant in Lukhovitsy, 2008	Kaluga region Nizhny Novgorod region Moscow region	

(Sources: Company news letters, mass media)
 (The list has been compiled from available sources and thus it is not concise)

12.4 Sawmill Industry

Russia is the fourth largest sawn timber producer in the world with a 5% share of the total production. The Russian sawmill industry is export orientated and spatially the production is located in Northwest Russia and Siberia (Figure 31). In 2003, Russia produced 20 million cubic metres of sawn timber, of which five million was produced in Northwest Russia, mostly in the Arkhangelsk region (Table 19).

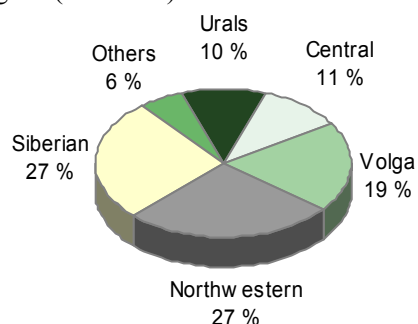


Figure 31. Production of sawn timber with regard administrative districts of the Russian Federation in 2003. (Source: Calculated from Rosstat statistics)

Table 19. Production of sawn timber and utilisation of total capacity in Russia in 2003.

Region	1,000 m ³	Utilisation rate, %
Russian Federation	20,200	44
Northwest Russia	5,351	46
Arkhangelsk region	1,979	62
Vologdan alue	919	54
Republic of Karelia	741	36
Republic of Komi	638	62
Leningrad region	491	65
Novgorod region	336	82
Pskov region	148	27
Pietarin kaupunki	64	4
Murmansk region	19	23
Kaliningrad region	16	n/a

(Source: Rosstat, Karelijastat)

Currently sawmilling in Russia is one of the least productive branches of the forest industry and only 40% of its capacity is in use. The production is constrained by an underdeveloped infrastructure and difficulties in securing a constant flow of raw material. One of the problems is also the obsolete means of production, as a result of which productivity is low, the end products are of poor quality and it is impossible to produce value-added special products. Furthermore, the western buyers have found the sorting of sawn timber and the quality of packaging inadequate. In the future, the volumes of sawn timber production in Northwest Russia will increase due to the launching of several projects for building sawmills with increased capacity (Figure 32). The largest Northwest Russian sawmill corporations, whose annual capacity is about 200,000–300,000 cubic metres, are located in the Arkhangelsk region (Table 20). However, the original capacity of these sawmills may have been substantially higher compared to current volumes, for example in 1980s the Solombala sawmill in Arkhangelsk region was capable of processing 1.5 million cubic metres per annum, whereas today the volume has halved.

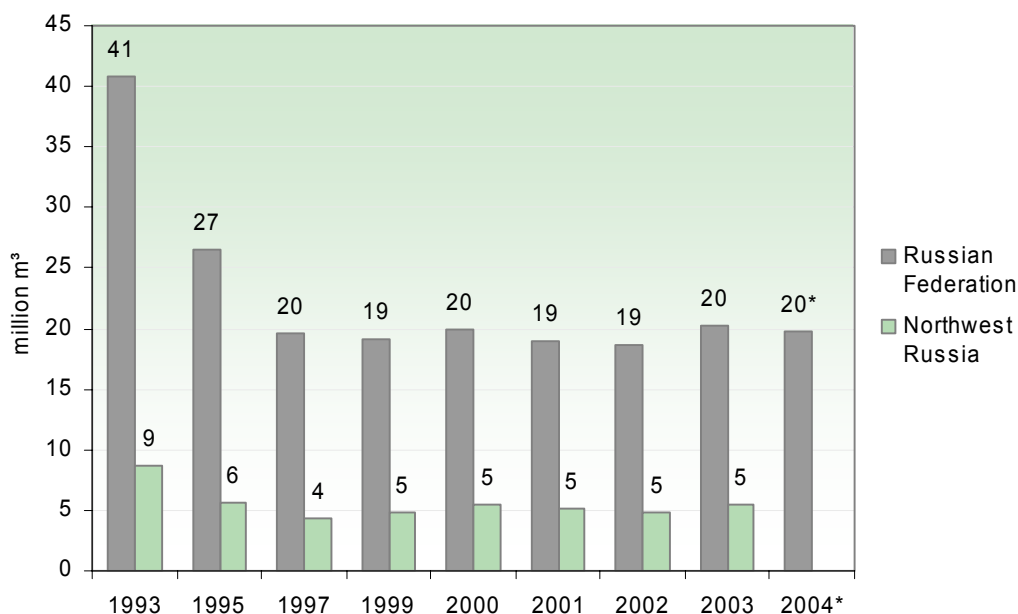


Figure 32. Trends in the production of sawn timber in 1993–2004, *preliminary report.
 (Source: Rosstat, Karelijastat)

Table 20. The largest sawn timber producers in Northwest Russia.

Region	Gross production in 2004		
	> 50,000 m³/a	> 100,000 m³/a	> 200,000 m³/a
Arkhangelsk region	ZAO LDK Arkhangelskles ZAO Ustyales	OAO Arkhangelsky LDK № 3 OAO Lesozavod №2	ZAO Lesozavod 25 OAO Solombalsky LDK OAO Onezhsky LDK OAO Lesozavod № 3
Republic of Karelia	ZAO Zapkarelles OAO Ilyinsky lesozavod OOO Medvezhegorsky LPH	OAO Segezhsy LDK	
Republic of Komi	OOO SevLesPil ZAO Leskom	OAO Syktyvkarsky LDK	
Novgorod region	OOO Madok ZAO Pestovo-Novo		
Vologda region	OOO Harovsklesprom AO Soldek	OAO Sokolsky DOK	

(Sources: mass media, Lesnoy kurier 2/2005, Itogi raboty ... 2003)

12.5 Wood-based Panel Industry

12.5.1 Plywood

The plywood industry is one of the most profitable branches of the Russian forest industry. In 2003, Russia produced over two million cubic metres of plywood, which is over 3% of the total world production. Over 60% of the plywood production is exported. Northwest Russia's share of the total Russian plywood production is 40%, where the Republic of Komi is the greatest producer (Figure 33, Table 22). Other significant producers are the regions of Kostroma, Perm and Vologda.

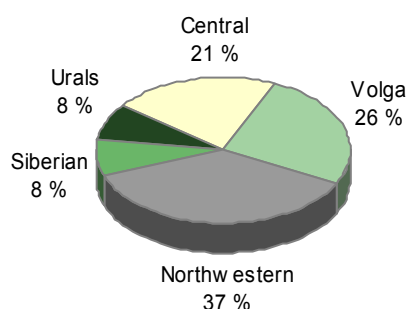


Figure 33. Russian plywood production with regard the administrative districts in 2003. (Source: Calculated from Rosstat statistics)

Currently the majority of Russian plywood is bulk production, but the production of coated plywood and other special products is developing. Although most of the significant production plants have begun producing large-size sheets of plywood, the majority of Russian plywood is small in size. The utilisation rate of production capacity is high, being almost 100% in most of the regions (Table 21). Unlike in most of the branches of forest industry, the production volumes in plywood industry have increased significantly; the production in 2003 was almost 2.5-fold in comparison with the volume in 1993 (Figure 34). The focal Northwest Russian plywood factories are presented in Table 22.

Table 21. Plywood production and the utilisation rate of the total capacity in 2003.

Region	1,000 m ³	Utilisation rate, %
Russian Federation	1,978	90
Northwest Russia	763	92
Republic of Komi	249	100
Vologda region	149	98
Leningrad region and St. Petersburg	135	n/a
Novgorod region	134	100
Arkhangelsk region	72	100
Republic of Karelia	23	94

(Source: Rosstat)

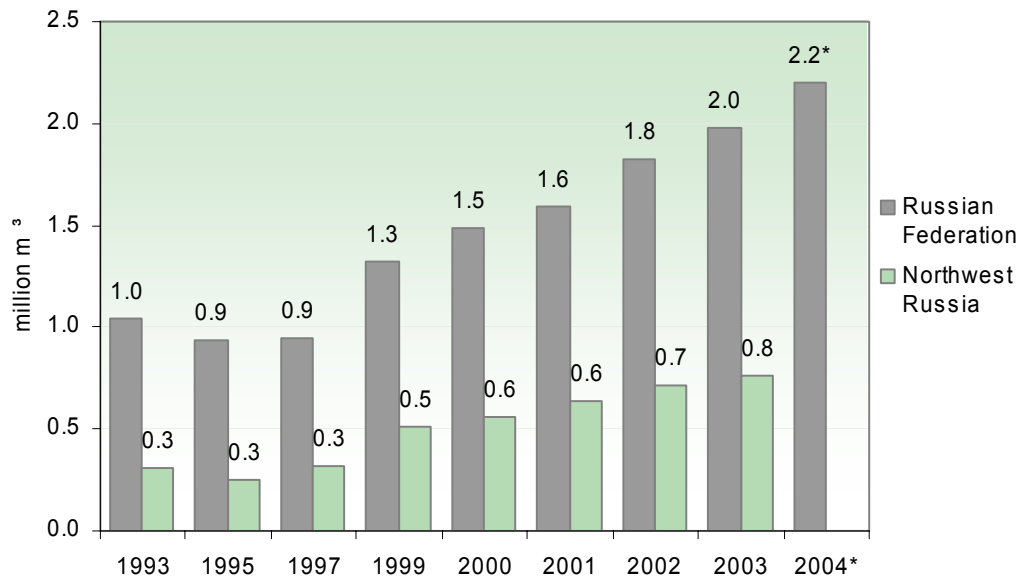


Figure 34. Trends in Russian plywood production in 1993–2004, *preliminary report (Sources: Rosstat, Karelijastat)

Table 22. Plywood producers in Northwest Russia.

Region	Enterprise	Annual production in 2004, 1,000 m ³
Arkhangelsk region	Arkhangelsk plywood mill (www.arpm.ru)	84.6
Republic of Karelia	Lahdenpohja plywood plant Bumex (http://bumex.ru)	19.2
Republic of Komi	Syktvykar plywood mill (www.plypan.com)	156.7
	Zheshart plywood mill (www.upgweb.ru)	121.6
Novgorod region	Parfino plywood factory (www.parfinofk.ru)	94.4
	Chudovo RWS (http://w3.wisa.upm-kymmene.com)	72.9
St. Petersburg	Ust-Izhora plywood mill (www.sveza.ru)	85.1
	Fanplast (www.fanplast.sp.ru)	60*
	Lesprom SPb	31.6
Vologda region	Novator (www.sveza.ru)	76.4
	Tsherepovets plywood and furniture plant	74.5

*) Annual production in 2002 (Sources: mass media, Lesnoy kurier 2/2005, Itogi raboty ... 2003)

12.5.2 Fibreboard

In 2003, Russia produced 320 million square metres of fibreboard, which is slightly less than 3% of the total world fibreboard production. The majority of Russian fibreboard production is in Central Russia and the Urals. Among the largest fibreboard plants in Russia are the Novoyenisey Forest Chemical Complex in Krasnoyarsk and Ilim Bratsk Wood Processing Mill in Irkutsk. Northwest Russia is not specialised in producing fibreboard and thus its share of the Russian production is less than 20%. In Northwest Russia fibreboard is produced in the regions of Arkhangelsk and Vologda as well as in the Republic of Komi (Table 23).

Table 23. Fibreboard production and utilisation rate of capacity in 2003.

Region	Million m ²	Utilisation rate, %
Russian Federation	321	80
Northwest Russia	60.6	77
Vologda region	25.4	57
Republic of Komi	20	91
Arkhangelsk region	18.8	83

(Source: Karelijastat)

The number of fibreboard processing lines that use the “wet method” has decreased significantly in Russia. The functioning plants are running at full capacity and the means of production are obsolete. However, unlike in Northwest Russia, the volume of output is on the increase with regard to Russia as a whole (Figure 35). Currently the most promising product in the fibreboard industry is the MDF (Medium Density Fibreboard), whose production is expected to increase in Russia. Until 2003, the only plant producing MDF was the Sheksinsky Combinat for Wood-based Panels in Vologda region. The establishment of new production lines are being considered by many Russian and foreign enterprises, for example Kronospan in Moscow region and Kronostar in Kostroma region. Both the enterprises have begun the construction of a MDF plant as well as are considering further investments on expanding the production. The planned capacity of both the plants in total is over 600,000 cubic metres per annum. The most important Northwest Russian fibreboard plants are presented in Table 24.

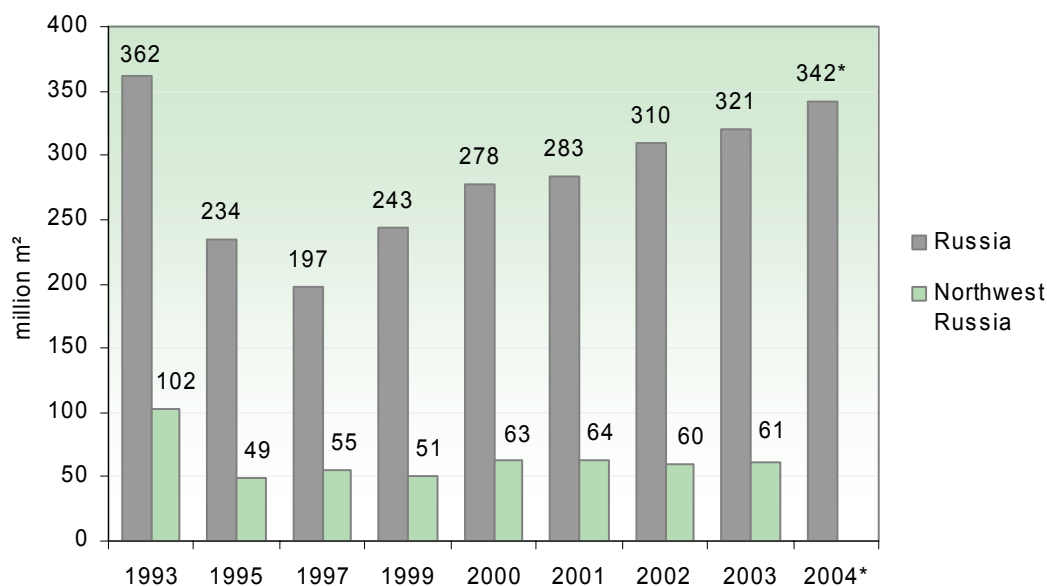


Figure 35. Trends in fibreboard production in Russia in 1993–2004, *preliminary report, (MDF-boards are not included). Sources: Rosstat, Karelijastat)

Table 24. The largest fibreboard producers in Northwest Russia in 2003.

Region	Enterprise	Fibreboard 2003, 1,000 m ²	MDF 2003, 1,000 m ³
Arkhangelsk region	Arkhangelsk pulp and paper mill (www.appm.ru)	8,223	
	Kotlas pulp and paper mill (www.ilimpulp.ru)	10,520*	
Republic of Komi	Knyazhpogotsk fibreboard plant (www.angelfire.com/mn/hardboard)	19,963	
	Zheshart plywood mill (www.upgweb.com)	N/A	N/A
Vologda region	Sheksninsky factory for wood-based panels (www.skdp.ru)	4,283	48.3
	Sokol pulp and paper mill (www.sokolmill.ru)	8,000*	

* annual production in 2002

(Sources: company homepages, Itogi raboty... 2003)

12.5.3 Particle Board

In 2003, Russia produced 3.2 million cubic metres of particle board, which is slightly less than 4% of the total world particle board production. During the same year, Northwest Russia produced 26% of the Russian particle boards, and Vologda region was the greatest producer in the area (Table 25). One of the largest producers of particle boards in Russia is the Syktyvkar Plywood Mill in the Republic of Komi (Table 26).

During recent years, the production of particle boards has been on the increase (Figure 36). Several Russian and foreign enterprises, such as Pflleiderer in Novgorod region, Kronostar in Kostroma region and Egger in Moscow region, have begun to modernise existing particle board plants and construct new ones.

The domestic demand for particle boards is on the increase due to the expanding furniture manufacturing. Almost all the Russian particle boards are sold in domestic markets and for example in 2003, only 6% of the total production was exported. As a result of obsolete means of production, the price of the products is too high or the quality fails to meet the requirements of international customers.

OSB (Oriented Strand Board) is not yet produced in Russia, but for example, Kronostar is planning to begin a production in 2006–2007. The lack of domestic demand has been the major hindrance for developing OBS production.

Table 25. Particleboard production and capacity utilisation rate in 2003.

Region	1,000 m ³	Utilisation rate, %
Russian Federation	3,181	84
Northwest Russia	840	n/a
Vologda region	382	80
Republic of Komi	295	100
Republic of Karelia	106	n/a
Leningrad region	104	n/a

(Source: Karelijastat)

Table 26. Particleboard producers in Northwest Russia.

Region	Enterprise	Annual production in 2004, 1000m ³
Republic of Karelia	Karelia DSP (www.kareldsp.ru)	127.5
Republic of Komi	Syktyvkar plywood mill (www.plyplan.com)	177.6*
	Zheshart plywood mill (www.upweb.ru)	77.9*
Leningrad region	Nevsky laminat	113.1
Vologda region	Monzensky woodworking plant	127.4
	Sheksninsky factory for wood-based panels	192.4
	Tsherepovets plywood and furniture factory	118

*annual production in 2003 (Sources: company homepages, Lesnoy kurier 2/2005, Itogy raboty...2003)

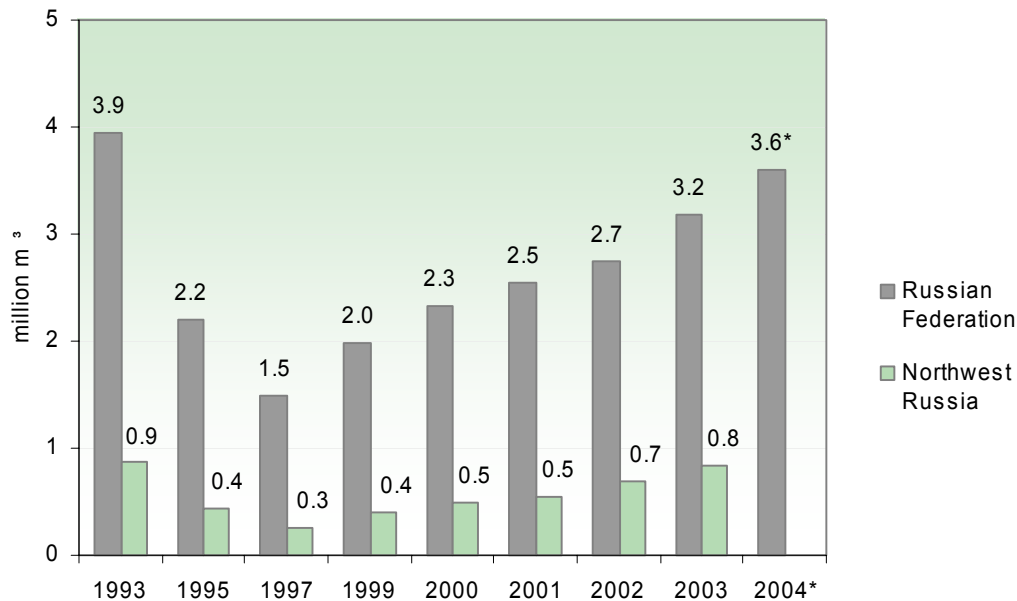


Figure 36. Trends in particle board production in Russia in 1993 - 2004, *preliminary report. (Sources: Rosstat, Karelijastat)

12.6 Chemical Forest Industry

Of all the branches of Russian forest industry, pulp and paper industry is the most significant and the most stable, and its share of the monetary value of the gross output of the forest sector is 40%. In 2003, the growth rate for pulp and paper production was 4% and for cardboard production 11% (Figure 37). The growth in production volumes is mainly due to a constant increase in domestic demand for packaging material. Although new production plants have not been established recently, the growth in production has been made possible by increasing the capacity of existing equipment. Currently the production capacity is fully utilised and investments have mainly been done to increase the degree of upgrading. Half of the Russian large pulp and paper production plants are located in Northwest Russia (Table 27).

In 2002, Russia was the eighth largest pulp producer in the world with a share of slightly less than 4% of the total production. In 2003, Russia produced 5.8 million tonnes of pulp, of which about 50% was market pulp, whereas the greatest pulp production regions in Russia were Arkhangelsk and Irkutsk. Over 60% of Russian pulp was produced in Northwest Russia (Figure 38). Half of the Northwest Russian pulp is produced in Arkhangelsk region (Table 28).

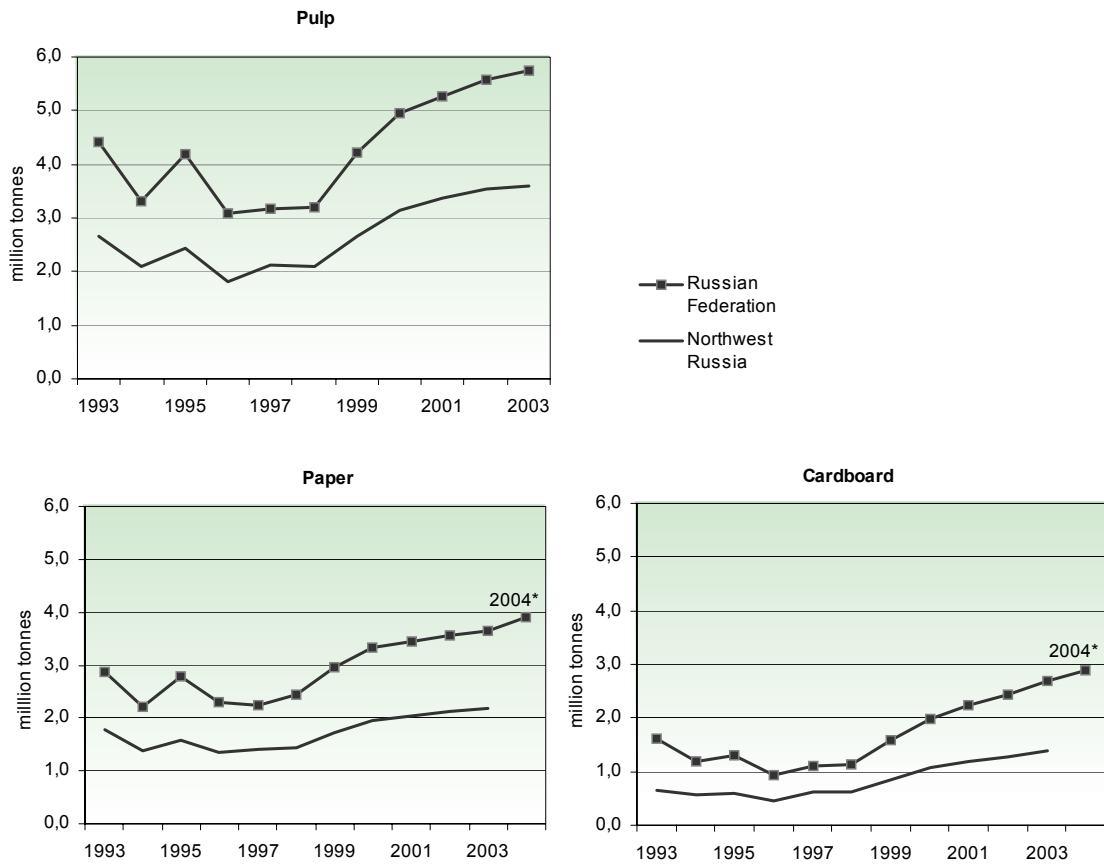


Figure 37. Trends in pulp, paper and cardboard production in Russia in 1993–2004, *preliminary report. (Sources: Rosstat, Karelijastat)

Table 27. Pulp, paper and cardboard producers in Northwest Russia.

Region	Enterprise	Products	Annual production in 2003
Arkhangelsk region	Arkhangelsk pulp and paper mill (www.appm.ru)	Pulp total (sulphate, deciduous) of which market pulp Paper Cardboard for manufacturing corrugated board Cardboard (general) Corrugated board	770,760 t 216,927 t 80,138 t 248,981 t 53,725 t 130,224 t
	Kotlas pulp and paper mill (www.ilimpulp.ru)	Pulp total (sulphite, deciduous and sulphate, dissolving pulp, coniferous) of which market pulp Paper Cardboard and kraftliner Paper sacks	912,530 t 311,050 t 249,480 t 271,000 t 117 million pieces
	Solombala pulp and paper mill (www.sppm.ru)	Pulp total (sulphate – coniferous) of which market pulp Packaging paper Products of chemical forest industry	212,900 t 206,940 t 3,730 t N/A
	Voloshky pulp mill nro 5	Pulp total (sulphite) of which market pulp	430 t 300 t
Kaliningrad region	Neman pulp and paper mill	Copying paper Pulp total of which market pulp Packaging and wrapping paper, wallpaper base-board Cardboard for manufacturing corrugated board	12,060 t 64,210 t 10,650 t 45,150 t 12,190 t
	Sovetsky pulp and paper mill (www.sovpaper.ru)	Pulp total (sulphite – coniferous) of which market pulp Copying paper Wallpaper base-board Wallpaper Corrugated board	70,100 t 39,130 t 10,260 t 12,230 t 13 million rolls 8,310 t
	ZAO Tsepruss (www.cepruss.ru)	Pulp total (sulphite – coniferous) of which market pulp Calendered cardboard Paper towels	80,710 t 69,140 t 2,650 t 11 million packages
Republic of Karelia	Kondopoga pulp and paper mill	Newsprint and packaging paper Pulp total	584,190 t 105,420 t
	Laskela paper mill	Wallpaper baseboard, wrapping paper and ticket paper	2,990 t
	Pitkaranta pulp mill (www.pitzavod.onego.ru)	Sulphate pulp of which market pulp	80,760 t 80,420 t
	Segezha pulp and paper mill (www.scbk.ru)	Pulp total Paper Cardboard Paper sacks	243,240 t 176,130 t 58,000 t 269 million pieces
	Suojarvi cardboard factory "Suojarvskaja kartontara"	Glued cardboard and cardboard for boxes Cardboard boxes	7,790 t N/A
Republic of Komi	Mondi Business Paper Syktyvkar (www.neusiedler.at/mondi)	Copying and printing paper, newsprint, hygiene and packaging paper Pulp total of which market pulp Cardboard	512,900 t 505,650 t 9,320 t 179,940 t

table continues...

... table continues

Region	Enterprise	Products	Annual production in 2003
Leningrad region	"Goznak" paper mill (www.goznak.ru)	Copying, printing, card and map paper	22,740 t
	Kamennogorsk offset paper mill (www.szlk.ru)	Copying paper	24,570 t
	"Kommunar" paper and cardboard mill (www.kommunar.ru)	Label and copying paper, packaging paper for food and medical industry, kraft and sack paper, paper for corrugated board	29,350 t
	Komsomolets paper mill	Packaging paper Notebooks	15 700 t 66 million pieces
	St. Petersburg cardboard and printing mill (www.ilimpulp.ru)	Packaging cardboard from recycled paper, box and package blanks with multicolor print	213,510 t
	Syassky pulp and paper mill	Pulp total (sulphate – coniferous) of which market pulp Chemimechanical pulp Sanitary and wrapping paper, wallpaper base-board Hygiene products	91,060 t 47,130 t 20,000 t 41,290 t N/A
	Svetogorsk pulp and paper mill	Market pulp (sulphite, coniferous and sulphate, deciduous) Copying paper Writing, insulation and notepaper Packaging board for liquids, toilet paper, paper tissues Packaging cardboard	20,520 t 20,860 t 242,900 t N/A 83,650 t
	Vyborg pulp mill "Vyborgskaya tsellyuloza"	Pulp total (sulphite) of which market pulp Wallpaper base-board, coated packaging papers Cardboard for manufacturing corrugated board, calendered cardboard Paper products	55,980 t 16,380 t 21,430 t 36,560 t N/A
Vologda region	Sokol pulp and paper mill (www.sokolmill.ru)	Newsprint, packaging paper, wallpaper base-board, hygiene, ticket and writing paper Cardboard Pulp	42,360 t 12,590 t 41,910 t

(Sources: company homepages, Lesprom Industry Consulting, LesInformKonsalt)

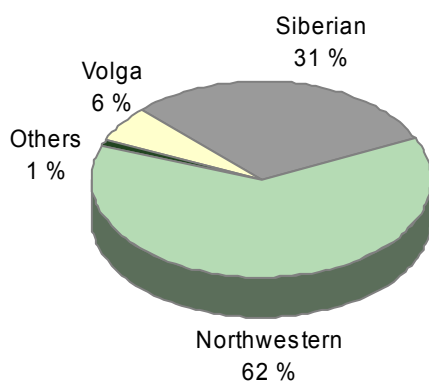


Figure 38. Share of federal districts with regard to pulp production in Russia in 2003.
 (Source: Calculated from Rosstat statistics)

Table 28. Pulp production in Russia in 2003.

Region	1,000 tonnes
Russian Federation	5,764
Northwest Russia	3,598
Arkhangelsk region	1,895
Leningrad region	510
Republic of Komi	506
Republic of Karelia	430
Kaliningrad region	216
Vologda region	42

(Sources: Rosstat, Karelijastat)

The sulphite method is the most common pulp making method in small and medium sized pulp mills. Large pulp plants produce sulphate pulp, whose share of the total volume of production is thus greater. Although almost all the large pulp mills in Northwest Russia use, or are about to use, non-chlorine (or ECF) bleaching, the majority of Russian pulp mills use chlorine bleaching. In comparison to Western countries, mechanical pulp is produced to a significantly lesser degree in Russia.

In 2003, Russia produced 6.3 million tonnes of paper and cardboard, which is 2% of the world's total production. About 50% of the Russian paper production was newsprint. Northwest Russia is the greatest paper and cardboard producer of all the Russian administrative districts with 60% and 51% shares in total paper and cardboard production, respectively (Figure 39). Five of the seven largest paper mills in Russia, as well as the three largest cardboard plants are located in Northwest Russia. Among the largest paper producers in Northwest Russia are Kondopoga paper mill as well as Mondi Business Paper Syktyvkar and Svetogorsk pulp and paper mills, whereas among the largest cardboard producers are Arkhangelsk and Kotlas pulp mills and St. Petersburg cardboard plant. Since the late 1990s, the volumes of both the paper and the cardboard production have increased steadily. The production capacity of the plants is almost 100% and increasing the production volume would require significant investments (Table 29).

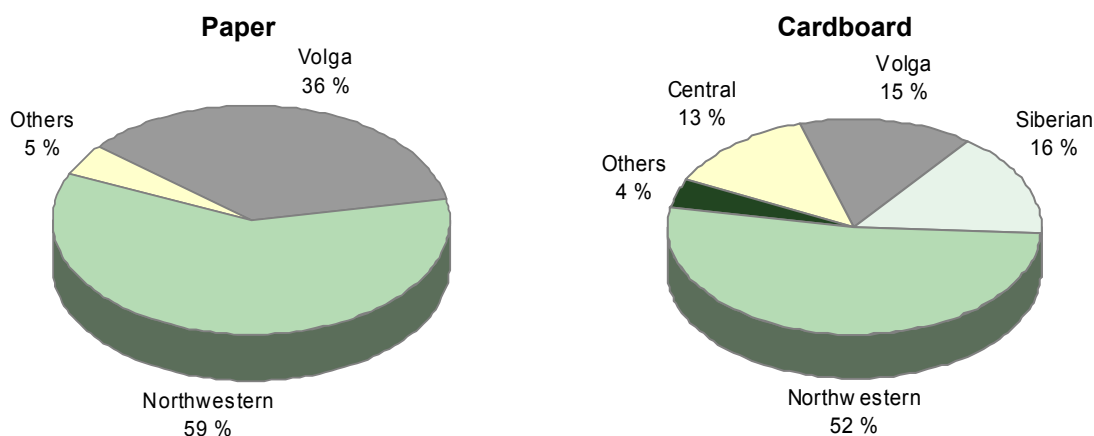


Figure 39. Shares of federal districts in 2003 with regard the total paper and cardboard production.
 (Source: Calculated from Rosstat statistics)

About 50% of the paper and cardboard produced in Northwest Russia is exported. On the international market, newsprint is one of the most competitive products of the Russian pulp and paper industry. Similarly to other branches of forest industry, the focus of paper and cardboard production is in low value-added products. Prior to 2001, Russia was dependent on imports in printing paper, whereas today the Russian products dominate the domestic market. However, because the domestic production is still struggling with quality issues, the majority of high quality paper and cardboard products are of foreign origin.

Table 29. Paper and cardboard production and the utilisation rate of capacity in Russia in 2003.

Region	Paper 1 000 t	Utilisation rate, %	Cardboard 1 000 t	Utilisation rate, %
Russian Federation	3,682	83	2,696	76
Northwest Russia	2,194	-	1,398	-
Republic of Karelia	759	70	65	13
Republic of Komi	526	100	183	100
Leningrad region	416	97	367	97
Arkhangelsk region	333	99	705	100
Kaliningrad region	71	89	23	95
Vologda region	43	34	26	100
St. Petersburg	32	84	12	-
Novgorod region	13	81	14	59
Pskov region	0	-	4	95

(Sources: Rosstat, Karelijastat)

12.7 Foreign Trade of the Forest Industry

12.7.1 Value of Foreign Trade

During the past five years, the foreign trade of the forest industry products has been on the increase with regard both the quantity and monetary value of the products (Figure 40). In Northwest Russia the greatest exporters are the Arkhangelsk region and the Republic of Karelia, where numerous export orientated saw mills and pulp and paper mills are situated. The city of St. Petersburg, on the other hand, is the major importer of forest industry products in Northwest Russia (Table 30).

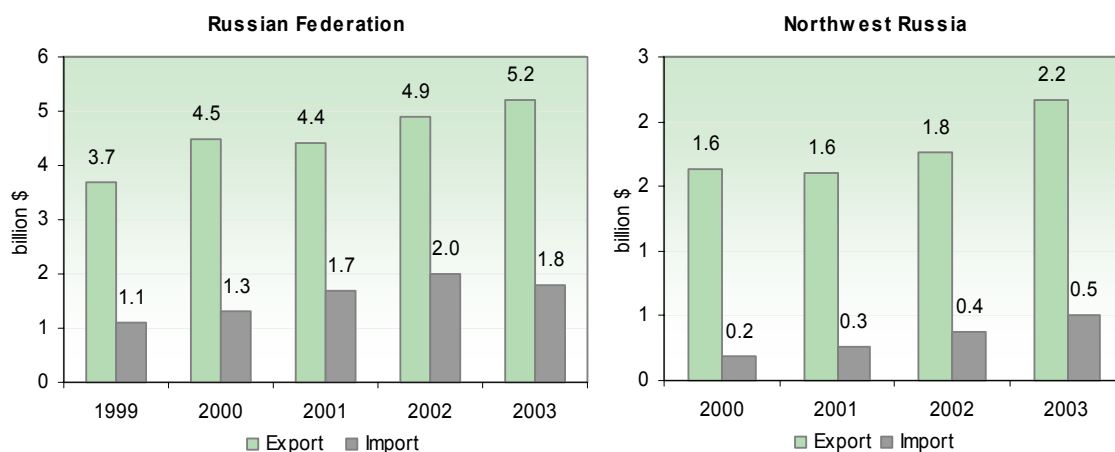


Figure 40. Trends in exports and imports of Russian forest industry products. (Sources: Rosstat, Karelijastat)

Table 30. Monetary value of forest industry products' foreign trade in Northwest Russia.

Region		2000	2001	2002	2003
		million USD			
Arkhangelsk region	export	467.8	411.2	462.6	537.2
	import	0.6	0.6	0.8	2.9
Kaliningrad region	export	59	51.3	54.6	70.6
	import	33.1	42.6	62.6	77.3
Republic of Karelia	export	368	407	378.8	435
	import	15.7	16.4	32.5	37.4
Republic of Komi	export	154	180	211.7	245.2
	import	0.6	1.2	4.4	7.6
Leningrad region	export	245.1	230.1	239.6	297
	import	21.8	35.1	49.1	75.5
Murmansk region	export	2.5	3.6	3.8	4.4
	import	0.2	0.3	0.3	0.5
Novgorod region	export	68.8	70.2	84.4	109.7
	import	4.2	14.6	34.8	57.6
St. Petersburg	export	161.4	165.7	208	268.9
	import	108.2	148.2	185.3	233.4
Pskov region	export	22.8	22.3	25.8	41.8
	import	2.2	7.8	14.6	13.5
Vologda region	export	105.7	102.8	123.6	159
	import	3.9	2.2	2.8	3.4

(Sources: Rosstat, Karelijastat)

12.7.2 Exports

The forest industry is a significant exporter in Russia as a whole but especially in Northwest Russia. The forest sector exports comprise about 4% of the monetary value of the total exports of Russia. Over half of the forest industry output is exported (Table 31). Russia is exporting forest industry products, mainly round wood and pulp and paper, to over one hundred countries (Figure 41). In 2003, the total monetary value of forest industry exports was 7 billion US dollars and, according to preliminary estimations, the value increased by 26% in 2004.

Table 31. Share of export from the total production of Russian forest industry.

	2002	2003
	%	
Round wood	51	51
Plywood	64	61
Pulp	85	83
Newsprint	69	67

(Source: Ministry of Economic Development and Trade)

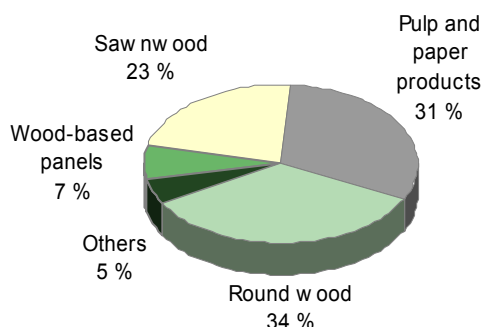


Figure 41. The structure of forest industry products' export with regard to their monetary value in 2003. (Source: NIPIEILesprom)

Round wood has been for years the most important export product of the Russian forest industry and its export is on the increase (Figure 42). In 2003, Russia was the world's largest round wood exporter with 38 million cubic metres, a volume that equals one third of the total round wood exports in the world. In 2003, the greatest round wood exporters in Russia were the Republic of Karelia and the Vologda region (no data was available on the exports of Leningrad region and the city of St. Petersburg, but according to unofficial sources, in 2002 they exported over 6 million cubic metres of round wood in total) (Table 32). In some regions exported round wood comprises 70–80% of the region's total production of merchantable wood. Export orientated regions tend to import significant amounts of wood from the other regions of Russia. For example in 2002, almost one million cubic metres of timber was transported to the Republic of Karelia from mainly the regions of Arkhangelsk and Vologda. In 2003, the major markets for Russian round wood were China (37%), Finland (32%), Japan (14%) and Sweden (6%).

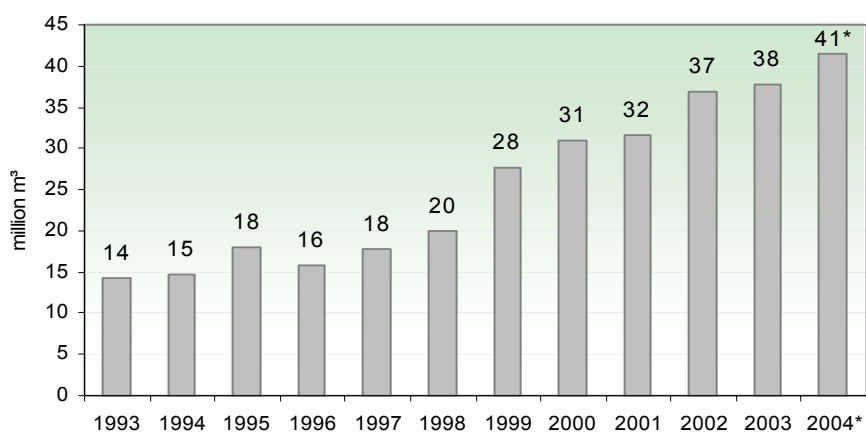


Figure 42. Trends in round wood export in Russia in 1993 - 2004, *preliminary report. (Sources: Karelijastat, preliminary report for 2004 Federal Customs Service: www.customs.ru)

Table 32. Export of roundwood from Northwest Russia in 2003.

Region	1,000 m ³	Share of foreign export of the total production of merchantable wood, %
Republic of Karelia	3,564	66
Vologda region	2,198	39
Novgorod region	1,178	78
Murmansk region	64	56
Arkhangelsk region	37	0,4
Pskov region	33	6
Republic of Komi	26	0,5
Kaliningrad region	n/a	
Leningrad region and St. Petersburg *	n/a	

*) According to unofficial sources 6,8 million m³ in 2002 (Source: Karelijastat)

During recent years, the export of sawn timber has also been on the increase (Figure 43). The volume of exports in 2003 was 3.5-fold increase in comparison to 1993's volume. In 2003, half of the Russian sawn timber was exported. Northwest Russia's share of the exported sawn timber was 40%. The greatest exporter of sawn timber was the Arkhangelsk region, where the export orientated large Northwest Russian saw mills are located (Table 33). In 2003, the major markets for Russian sawn timber were Egypt (11%), Japan (8%), China (8%), the Great Britain (7%) and Germany (5%).

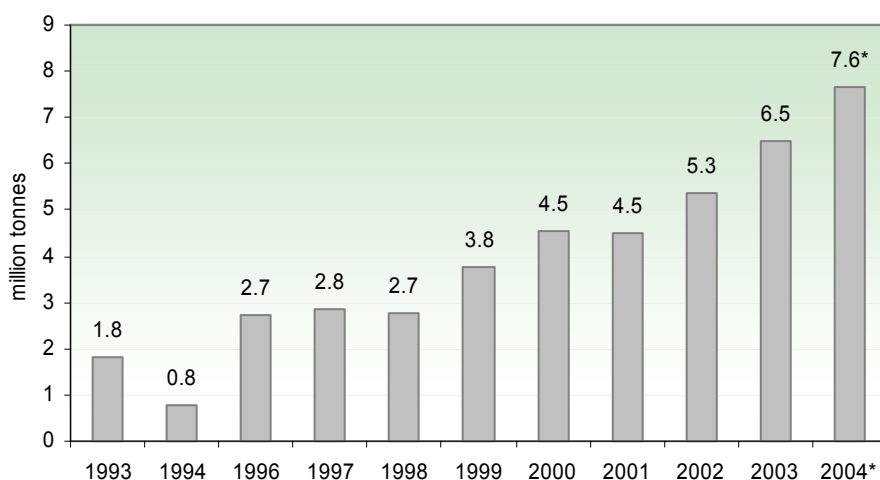


Figure 43. Trends in sawn wood export in Russia in 1993–2004, *preliminary report. (Sources: Karelijastat, preliminary report for 2004 Federal Customs Service: www.customs.ru)

Table 33. Export of sawn timber from Northwest Russia in 2003.

Region	1,000 tonnes
Arkhangelsk region	1,321
Republic of Komi	368
Vologda region	326
Republic of Karelia	302
Novgorod region	112
Pskov region	8
Murmansk region	4
Leningrad region and St. Petersburg	n/a
Kaliningrad region	n/a

(Source: Karelijastat)

Of all the plywood produced in Russia, over 60% is exported. In 2004, according to a preliminary report, the volume of exported plywood was 1.4 million cubic metres, which is a three-fold increase in comparison to 1993's volume (Figure 44). The greatest market was the USA, but plywood was also exported to Great Britain, Estonia and Germany. The greatest exporter in Northwest Russia was the Republic of Komi, which exported half of the produced plywood (Table 34).

Unlike plywood, particle board and fibreboard can not be regarded as export products. In 2003, 6% (0.2 million cubic metres) of plywood and 25% (80 million square metres) of fibreboard was exported. The domestic demand for plywood and fibreboard is high, whereas their competitiveness on the international market is weak.

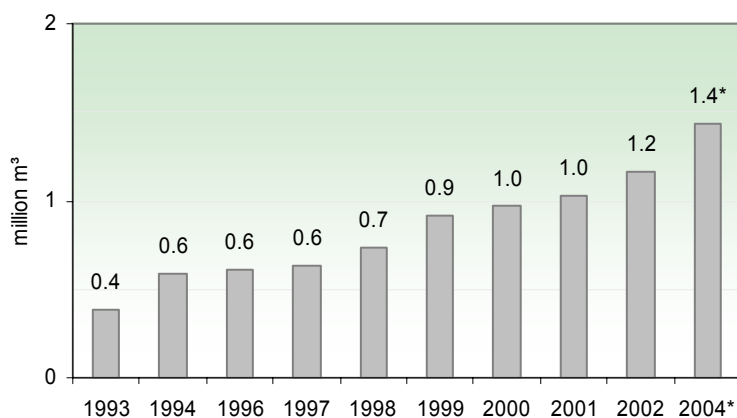


Figure 44. Trends in plywood export in Russia in 1993–2004, *preliminary report.

(Sources: Karelijastat, preliminary report for 2004 Federal Customs Service: www.customs.ru)

Table 34. Export of plywood from Northwest Russia in 2003.

Region	1,000 m ³	Share of gross production, %
Republic of Komi	181	73
Novgorod region	97	72
Vologda region	63	42
Arkhangelsk region	60	83
Republic of Karelia	15	66
Kaliningrad region	6	-
Murmansk region	0	-
Pskov region	0	-
Leningrad region and St. Petersburg *	n/a	-

*) According to unofficial sources 81 000 m³ in 2002 (Source: Karelijastat)

During the past ten years, the volume of exported pulp has been on the increase (Figure 45). In 2003, two million tonnes of pulp (one third of the total production) was exported. Pulp is exported to more than 25 countries, of which the most important in 2003 was China (44%). Other important markets were, for example, Ireland (23%) and Hungary (6%).

Recently, the volumes of exported paper and cardboard have been steady (Figure 46). On the international market, newsprint is the most competitive product of the paper industry and its share of the Russian forest industry exports has been about 50%. The majority of other paper products are sold domestically. The greatest paper and cardboard exporter in Northwest Russia is the Republic of Karelia (Table 35). The greatest markets for Russian paper and cardboard are China (13%), Germany (9%), India (9%) and Turkey (8%).

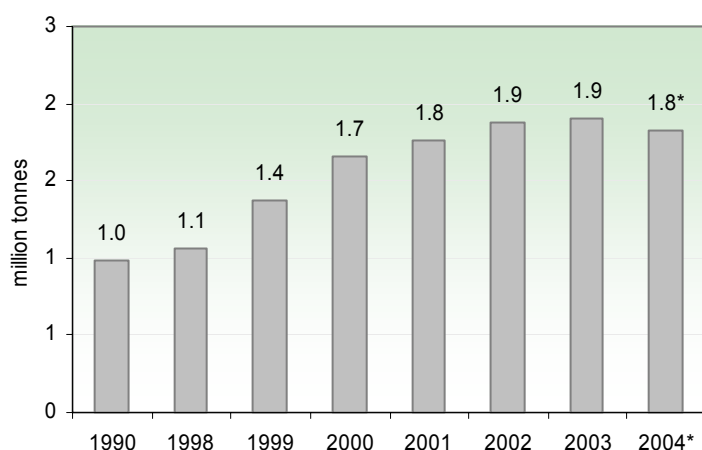


Figure 45. Trends in pulp export in Russia in 1990–2004, *preliminary report.
 (Sources: NIPIELesprom, preliminary report for 2004 Federal Customs Service: www.customs.ru)

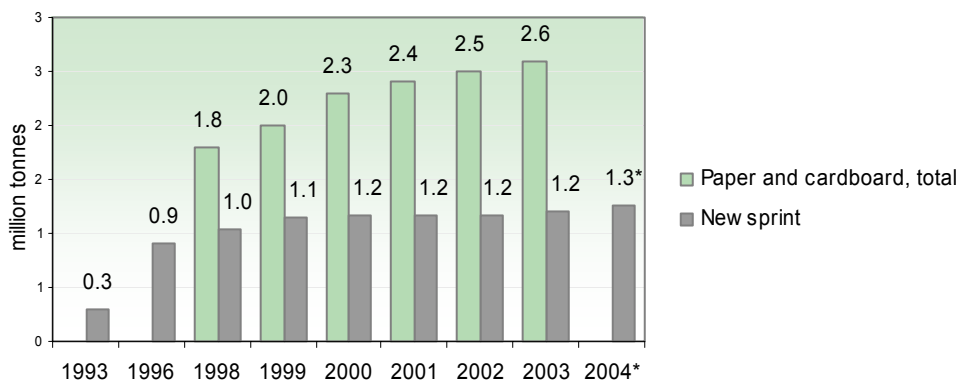


Figure 46. Trends in paper and cardboard as well as newsprint exports in Russia in 1998–2003 and 1993–2004, respectively, *preliminary report. (Sources: NIPIEI Lesprom, newsprint: Rosstat, preliminary report for 2004 Federal Customs Service: www.customs.ru)

Table 35. Export of paper, cardboard and related products from Northwest Russia in 2003.

Region	1,000 t
Republic of Karelia	547
Arkhangelsk region	404
Republic of Komi	370
Kaliningrad region	31
Vologda region	4
Novgorod region	2
Murmansk region	0
Pskov region	0
Leningrad region and St. Petersburg	n/a

(Source: Kareljastat)

12.7.3 Imports

In 2003, the monetary value of imported forest industry products was 2.4 billion US dollars, whereas the largest importing countries were Germany, Finland and Italy. Of the total monetary value of imported forest industry products, pulp and paper comprises 60%. In 2002, the monetary value of plywood imports was 65 million US dollars and fibreboard 43 million US dollars.

Concerning products of woodworking industry, joinery and building material are imported from Finland, Germany, Slovenia and Italy. Wood-based panels (OSB and MDF) are imported from Belarus, Poland, France, Estonia and Finland. Pulp and paper products, mostly high quality printing paper and hygiene products, are imported from Finland, Sweden, Lithuania, Poland and China. Thus far, the majority of MDF used by the Russian furniture industry has been imported, but as a result of improved quality of domestic supply, the volume of imports can be expected to decrease in the future.

The import of forest products is dependent on the exchange rate of the rouble. If the rouble remains stable, the volume of import is likely to increase, whereas if the value of rouble declines, the volume of import will decrease.

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Statistic annex

The sources of the following forest industry statistics are an official statistical publication released in 2005 "Regiony Rossii, 2004", as well as the central statistical service of Moscow and regional statistical service of Northwest Russia, whose information was obtained via statistical service of the Republic of Karelia. Statistics were utilised with regard the years 1997–2003, figures for particle board and fibreboard production were not available. Some of the information acquired from the regional statistical service was unambiguous with the published statistics.

Because statistics concerning export were not always obtainable, unofficial statistics, publications from the Research and Design Institute on Economics, Production Management and Information for the Forest, Pulp and Paper and Woodworking Industries *NIPIEILesprom*, were used as a source.

PRODUCTION OF RUSSIAN FOREST INDUSTRY

Production of merchantable wood	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
	million m ³										
Russian Federation	131	86.8	92.3	73.1	66.7	63.9	76	80.6	83.5	84.2	90.3
Northwest Russia	39.6	28	28.6	22.9	22.5	22.9	28.8	30.2	31.1	29.8	30.2
Arkhangelsk region	12.3	8.3	8.3	7.5	7.6	7.3	8.5	9.1	9.1	8.5	8.4
Kaliningrad region	0.1	0.1	0.08	0.05	0.03	0.03	0.02	0.03	0.02	0.02	0.12
Republic of Karelia	5.6	4.4	4.8	3.9	3.9	3.9	5.1	5.1	5.3	5	5.4
Republic of Komi	10.1	6.6	6.7	4.9	3.9	4.1	5	5.8	5	4.4	5
Leningrad region	2.5	1.7	1.6	1.4	1.5	1.5	2.6	2.2	3.3	3.5	3.3
Murmansk region	0.4	0.2	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Novgorod region	1.4	1.1	1.3	1.1	1.1	1.2	1.6	1.7	1.6	1.6	1.5
St. Petersburg	0	0	0	0	0	0	0	0	0	0	0
Pskov region	0.5	0.5	0.5	0.5	0.5	0.5	0.6	0.6	0.6	0.6	0.6
Vologda region	6.7	5.1	5.2	3.8	4	4.2	5.3	5.8	6.1	6	5.7

Sawn timber production	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
	million m ³										
Russian Federation	40.9	30.7	26.5	21.9	19.6	18.5	19.2	20	19	18.6	20.2
Northwest Russia	8.8	7.2	5.6	4.7	4.3	3.9	4.7	5.3	5.3	4.9	5.4
Arkhangelsk region	3.2	2.3	1.8	1.6	1.6	1.5	1.8	2	2.1	1.9	2
Kaliningrad region	0.05	0.04	0.08	0.03	0.02	0.02	0.02	0.02	0.01	0.01	0.02
Republic of Karelia	1.3	1	0.9	0.6	0.5	0.5	0.7	0.9	0.8	0.7	0.7
Republic of Komi	1.4	1.1	0.9	0.8	0.7	0.6	0.7	0.8	0.7	0.6	0.6
Leningrad region	0.7	0.6	0.4	0.3	0.3	0.3	0.3	0.4	0.4	0.3	0.5
Murmansk region	0.1	0.05	0.05	0.03	0.03	0.03	0.03	0.04	0.03	0.02	0.02
Novgorod region	0.4	0.3	0.3	0.3	0.3	0.3	0.4	0.4	0.3	0.3	0.3
St. Petersburg	0.3	0.4	0.2	0.1	0.08	0.04	0.03	0.03	0.06	0.06	0.06
Pskov region	0.2	0.2	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Vologda region	1.1	1.2	0.8	0.7	0.6	0.5	0.7	0.7	0.7	0.8	0.9
	1 000 m ³										
Russian Federation	1 042	889	939	972	943	1 102	1 324	1 484	1 590	1 821	1 978
Northwest Russia	313	265	256	266	323	409	514	559	633	716	763
Arkhangelsk region	40	24	25	17	25	33	47	47	57	66	72
Kaliningrad region	0	0	0	0	0	0	0	0	0	0	0
Republic of Karelia	14	8	8	1	1	1	12	16	21	22	23
Republic of Komi	96	88	53	50	73	116	157	175	199	221	249
Leningrad region	7	5	4	5	6	8	11	13	15	14	12
Murmansk region	0	0	0	0	0	0	0	0	0	0	0
Novgorod region	62	60	81	96	101	102	100	110	125	136	134
St. Petersburg	42	37	26	35	44	68	84	82	89	117	124
Pskov region	0	0	0	0	0	0	0	0	0	0	0
Vologda region	50	43	59	62	72	82	102	116	128	141	149

Particle board production	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
	1 000 m ³										
Russian Federation	3 941	2 626	2 206	1 472	1 490	1 568	1 986	2 335	2 545	2 744	3 181
Northwest Russia	877	530	431	209	258	322	404	495	547	698	840
Arkhangelsk region	117	36	19	5	0	0	0	0	0	0	0
Kaliningrad region	0	0	0	0	0	0	0	0	0	0	0
Republic of Karelia	0	0	0	0	0	0	0	0	30	81	106
Republic of Komi	275	180	168	76	100	143	180	208	216	258	295
Leningrad region	25	9	8	2	0	25	17	24	11	88	104
Murmansk region	0	0	0	0	0	0	0	0	0	0	0
Novgorod region	0	0	0	0	0	0	0	0	0	0	0
St. Petersburg	115	88	57	20	1	0	0	0	0	0	0
Pskov region	0	0	0	0	0	0	0	0	0	0	0
Vologda region	345	218	179	121	157	177	236	300	330	309	382
Fibreboard production	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
	million m ²										
Russian Federation	362	240	234	184	197	194	243	278	283	310	321
Northwest Russia	102.1	67.3	53.4	41.7	54.8	40.7	51.3	62.6	63.5	60	60.6
Arkhangelsk region	21.2	15.1	13.5	12.9	15	12.6	17.5	18.1	18.4	18.6	18.8
Kaliningrad region	0	0	0	0	0	0	0	0	0	0	0
Republic of Karelia	10.6	5.2	2.8	0.3	0	0	0	0	0	0	0
Republic of Komi	29.8	19.4	13	9.7	17.5	10.9	16.7	20.8	22.2	20.1	20
Leningrad region	3.9	2	1.3	0.03	0.02	0.1	0	0	0	0	0
Murmansk region	0	0	0	0	0	0	0	0	0	0	0
Novgorod region	5.8	4.6	4.1	3.4	4	2.6	0	0	0	0	0
St. Petersburg	0	0	0	0	0	0	0	0	0	0	0
Pskov region	0	0	0	0	0	0	0	0	0	0	0
Vologda region	30.8	21	18.7	17	18.3	15.4	18.7	28.6	27.7	26.3	25.4

Pulp production	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
						1 000 t					
Russian Federation	4 403	3 314	4 197	3 075	3 164	3 210	4 225	4 960	5 272	5 579	5 764
Northwest Russia	2 648	2 086	2 433	1 800	2 129	2 104	2 659	3 154	3 368	3 537	3 598
Arkhangelsk region	1 529	1 245	1 344	1 021	1 276	1 214	1 505	1 714	1 752	1 846	1 895
Kaliningrad region	151	105	180	123	105	102	105	196	212	218	216
Republic of Karelia	350	262	324	242	219	222	307	382	409	405	430
Republic of Komi	258	261	275	212	269	300	382	436	480	527	506
Leningrad region	297	182	275	181	237	245	319	374	454	482	510
Murmansk region	0	0	0	0	0	0	0	0	0	0	0
Novgorod region	0	0	0	0	0	0	0	0	0	0	0
St. Petersburg	0	0	0	0	0	0	0	0	0	0	0
Pskov region	0	0	0	0	0	0	0	0	0	0	0
Vologda region	63	32	35	21	23	22	41	52	62	58	42
						1 000 t					
Paper production	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
						1 000 t					
Russian Federation	2 884	2 216	2 773	2 302	2 226	2 453	2 968	3 326	3 442	3 552	3 682
Northwest Russia	1 793	1 372	1 589	1 359	1 412	1 436	1 727	1 940	2 033	2 133	2 194
Arkhangelsk region	304	177	211	208	195	216	253	297	301	321	333
Kaliningrad region	59	37	49	42	27	19	14	51	59	70	71
Republic of Karelia	645	555	632	551	555	519	659	725	700	711	759
Republic of Komi	395	372	382	312	373	413	439	460	500	528	526
Leningrad region	247	160	244	201	214	218	271	305	360	396	416
Murmansk region	0	0	0	0	0	0	0	0	0	0	0
Novgorod region	24	7	7	4	3	3	10	17	15	14	13
St. Petersburg	45	26	22	12	12	14	27	28	29	29	32
Pskov region	0	0	0	0	0	0	0	0	0	0	0
Vologda region	76	38	42	28	33	35	52	57	70	64	43

Cardboard production	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
	1 000 t										
Russian Federation	1 607	1 196	1 301	922	1 114	1 144	1 579	1 986	2 225	2 428	2 696
Northwest Russia	661	561	605	464	613	619	863	1 070	1 191	1 275	1 398
Arkhangelsk region	417	368	400	333	483	460	575	620	627	674	705
Kaliningrad region	14	8	7	5	5	4	4	14	15	20	23
Republic of Karelia	35	20	9	9	6	7	9	45	83	63	65
Republic of Komi	30	50	60	11	15	30	63	100	131	156	183
Leningrad region	149	105	120	96	98	114	199	277	311	326	367
Murmansk region	0	0	0	0	0	0	0	0	0	0	0
Novgorod region	0	0	0	0	0	0	0	1	6	10	14
St. Petersburg	7	5	5	7	4	3	5	8	7	9	12
Pskov region	4	3	3	3	2	2	4	3	3	4	4
Vologda region	5	2	1	0	0	0	5	3	8	13	26

(Sources: Rosstat, Karelijastat)

FOREST INDUSTRY EXPORT FROM RUSSIA

	1993	1994	1996	1997	1998	1999	2000	2001	2002	2003
Round wood, million m ³	14.2	14.8	15.9	17.8	20	27.7	30.9	31.7	36.9	37.7
Sawn timber, million tons	1.8	0.8	2.7	2.8	2.7	3.8	4.5	4.5	5.3	6.5
Particle board, million m ³	0.05	n/a	0.34	0.17	0.2	0.13	0.15	0.2	0.22	0.19
Fibreboard, million m ²	31.3	n/a	52.9	54.4	54.8	80.9	88.6	64.4	77.5	80.3
Plywood, million m ³	0.38	0.59	0.61	0.63	0.74	0.92	0.98	1.03	1.16	n/a
Newsprint, million tons	0.3	0.23	0.9	0.84	1.04	1.15	1.17	1.17	1.18	1.21
Pulp, million tons	n/a	n/a	n/a	n/a	1.06	1.37	1.66	1.76	1.88	1.91
Paper and cardboard, million tons	n/a	n/a	n/a	n/a	1.77	2.05	2.3	2.35	2.46	2.55

(Sources: Rosstat, Karelijastat, NIPIELesprom: pulp, cardboard and newsprint)

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FOREST INDUSTRY EXPORT FROM REGIONS OF NORTHWEST RUSSIA

Roundwood	1999	2000	2001	2002	2003
			1 000 m ³		
Arkhangelsk region	102	52	56	58	37
Kaliningrad region	8	24	n/a	n/a	n/a
Republic of Karelia	2 948	3 218	3 674	3 688	3 564
Republic of Komi	127	60	57	25	26
Leningrad region and St. Petersburg	n/a	n/a	n/a	n/a	n/a
Murmansk region	36	38	68	95	64
Novgorod region	901	714	807	937	1 178
Pskov region	35	31	40	26	33
Vologda region	2 348	2 307	2 368	2 392	2 198

Sawn timber	1999	2000	2001	2002	2003
			1 000 t		
Arkhangelsk region	703	981	1 320	1 297	1 321
Kaliningrad region	n/a	n/a	n/a	n/a	n/a
Republic of Karelia	263	320	301	291	302
Republic of Komi	147	268	262	298	368
Leningrad region and St. Petersburg	n/a	n/a	n/a	n/a	n/a
Murmansk region	10	7	8	3	4
Novgorod region	57	76	85	97	112
Pskov region	8	10	11	9	8
Vologda region	75	121	145	247	326

Particle board	1999	2000	2001	2002	2003
			1 000 m ³		
Arkhangelsk region	0	0	0	0	0
Kaliningrad region	n/a	n/a	n/a	n/a	n/a
Republic of Karelia	n/a	n/a	n/a	n/a	n/a
Republic of Komi	4.4	1	2.2	7.1	3.9
Leningrad region and St. Petersburg	n/a	n/a	n/a	n/a	n/a
Murmansk region	0	0	0	0	0
Novgorod region	0	0	0	0	0
Pskov region	0	0	0	0	0
Vologda region	0.9	0.2	0.2	0.4	n/a

Fibre board	1999	2000	2001	2002	2003
			million m ²		
Arkhangelsk region	3.2	8.5	6.1	6.6	5.4
Kaliningrad region	n/a	n/a	n/a	n/a	n/a
Republic of Karelia	0	n/a	n/a	n/a	n/a
Republic of Komi	1.5	1.8	1.8	4.8	3.9
Leningrad region and St. Petersburg	n/a	n/a	n/a	n/a	n/a
Murmansk region	0	0	0	0	0
Novgorod region	0	0	0	0	0
Pskov region	0	0	0	0	0
Vologda region	3.1	3.9	3.3	2.8	1.8

Plywood	1999	2000	2001	2002	2003
			1 000 m³		
Arkhangelsk region	20	19	38	51	60
Kaliningrad region	0	n/a	25	17	6
Republic of Karelia	12	16	19	16	15
Republic of Komi	125	139	150	167	181
Leningrad region and St. Petersburg	n/a	n/a	n/a	n/a	n/a
Murmansk region	n/a	n/a	n/a	n/a	n/a
Novgorod region	75	85	90	107	97
Pskov region	0	0	0	0	0
Vologda region	53	61	60	60	63

Paper, cardboard and related products	1999	2000	2001	2002	2003
			1 000 t		
Arkhangelsk region	405.7	473	422.9	437.4	404
Kaliningrad region	1.3	28.1	23.4	32.1	30.7
Republic of Karelia	419.1	501.1	549.5	520.4	546.7
Republic of Komi	249.7	265.2	315.1	366.8	369.9
Leningrad region and St. Petersburg	n/a	n/a	n/a	n/a	n/a
Murmansk region	0.1	0.1	0	0	0
Novgorod region	0.1	n/a	n/a	1.2	2.3
Pskov region	0	0	0	0	0
Vologda region	1.8	3.2	4.6	3.4	4.3

(Source: KarelIJastat)

ANNEX 1

EXAMPLE of a logging permit (form according to statute no. 729 of the Ministry of Natural Resources from August 12th 2003)

Logging permit № _____

(Lesorubochnyj bilet)

« _____ » _____

Subject of the Russian Federation

Republic of Karelia

(republic, region, federal district)

Leshoz _____
Lesnichestvo _____
Operation <i>final felling</i> _____

Cutting method <i>clearcut</i> _____
Calculation method <i>according to area</i> _____

Based on *Forest lease agreement no X*

Name of the company is allowed

to cut timber *according to the allotment plan*

Forest fee zone _____ fee class _____

Discount is given on the basis of _____ %.

Forest management group	Number of <i>kvartal</i>	Number of cutting area	Cutting area, ha	Tree species	Undergrowth to be protected		Timber, solid volume, m3				Sum of payment, roubles		To be paid, roubles	
					Area, ha	Number, 1,000/ha	Merchantable wood	Firewood	Logging residue	Total	Minimum charge	Charge to be applied		
Total														

Amount, with regard to the monetary value of felled timber, to be paid to the federal budget _____ roubles,

to the budget of the subject of the Russian Federation _____ roubles,

to the regional budget _____ roubles.

Term of payment _____

(term and interest)

Fellings do not include _____ stands outside the area marked for cutting

(seed trees, seed zones and other trees with regard each cutting strip)

Locations of temporary storages _____

Timber transportation is allowed *simultaneously with the logging operations*

Termination of logging and timber transportation (date) " _____ " _____

Back side of the logging permit

Measures for forest protection and their schedule _____

Schedule for debarking and chemical treatment of timber _____

Clearing of the felling site should be done simultaneously with logging so that timespan between felling and clearing is not more than 15 days during snowless season, similarly clearing in spring _____ logging residues are piled on tracks and pressed by a tractor _____
(clearing method)

Site preparation is conducted according to the technological charts (harvesting plan) that has been compiled together with the leskhoz.

Special requirements _____

Stamp

Leskhoz manager _____ Engineer _____

I am familiar with the rules concerning the standing sale and the fire safety regulations.

According to the Forest Code of the Russian Federation §90 I am obliged to conduct the following regeneration measures in _____ :
(year)

planting _____ ha,
(method)

sowing _____ ha,
(method)

promoting the natural regeneration _____ ha.
(method)

Signature of the forest user _____

Notes with regard the delays in timber transport _____

Other notes _____

Stamp

Director of the leskhoz _____

ANNEX 2

Technological chart

Technological chart (*tekhnologicheskaya karta*), i.e. harvesting plan, is compiled for each logging site and provides the information concerning the schedule for timber harvesting. Technological chart must include descriptions on logging method, schedule for timber harvesting, method for collecting logging residue, roads, tracks, loading sites, lower landings, parking places and maintenance areas for machinery as well as areas where precautions are taken for protecting undergrowth and saplings.

An example of a technological chart according to publication "Tehnologiya i mashiny lesosechnyh robot"

I confirm
Chief engineer
" " 19

TECHNOLOGICAL CHART
(EXAMPLE)

Stand marked for cutting measures taken in kvartal no, in lesnichestvo _____, of
lespromkhoz _____, in corporation _____.

Technical manager _____
Foreman _____
" " 19

Schedule for timber harvesting:
begins on the " " 19
ends on the " " 19

I Thematic map on logging site

Provides information such as location on main roads for timber transportation, branch roads, haul roads, loading sites, storages, parking places and areas for maintaining machinery, site huts, administration buildings, etc.

II Characteristics of the logging site

1. Exploitable area 25 ha.
2. Volume of stand to be logged 5,000 m³.
3. Tree species composition 5S3E2Os (5pine 3spruce 2aspen)
4. Average volume of stand per hectare 200 m³.
5. Average volume of a stem 0.36 m³.
6. Characteristics of undergrowth (species, trees/ha, spatial composition).

III Technical information

1. Working order: *the logging site is divided into stands marked for cutting equalling 500 x 500 m in size; each stand marked for cutting is logged by using combined brigades and two BTM LP-17A machines; logged timber is skidded to the upper landing; work is performed in two shifts.*
2. Preparatory work: *forest is divided into safety zones and haul roads are constructed; storage areas are being prepared; preparations of area for supervising the work is done before beginning the logging operations.*
3. Felling and skidding *will be done with machines LP-17A.*
4. Debranching *will be done with machines LP-30B.*
5. Scaling of felled trees *will not be performed.*
6. Sorting and piling of felled trees *will not be performed.*
7. Loading *will be done with PL-2 loaders.*
8. Clearing of felling site *will be done with machines PSG-3 and piled on tracks.*
9. Branches *will be chipped and chips will be transported to the lower landing in containers.*

IV Key figures

1. Daily volume of logged timber per foreman's district 500 m³.
2. Number of combined brigades 2.
3. Daily volume of logged timber per brigade 250 m³.
4. Number of machinery per foreman's district:
6 units of LP-17A (including two spare machines); 3 units of LP-30B (including one spare machine); PL-2 (including one spare machine); one chipper.
Number of workers 8 operators for LP-17A; 4 operators for LP-30B; 2 operators for PL-2; 2 chipper operators; 6 loggers and 2 maintenance men for haul tracks.
Workers and machine operators in total 16; assistant workers 8.

Preparatory work prior to actual logging operations have been conducted according to technical safety regulations and instructions concerning the occupation of the logging site.

Engineer
" " 19

The following brigades and focal machine operators have been initiated with this technological chart:

1. _____
2. _____
3. _____
4. _____
5. _____
6. _____
7. _____