Forest sustainability in the Northwestern Federal District of Russia

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1. Introduction

The combustion of wood for energy purpose is not considered to contribute to the augmentation of greenhouse gases concentration in the atmosphere, as long as the CO2 emissions released during the combustion of wood are balanced by the growth of new trees. It is therefore essential to investigate if the forests in the region where the wood used for energy purpose are managed in a sustainable way, avoiding resources associated with overexploitation of forests, land use change, depletion of carbon stocks, etc...

In this framework, literature research was carried out to produce a summary of forest management in the Northwestern Federal District of Russia, including general condition, management and sustainability assessment.

2. Russia forests overview

2.1. Location and distribution

Russia covers a total area of 17,097,610 km², located partly in Eastern Europe but mostly in Northern Asia. It is bordered to the north and east by the Arctic Ocean and to the east by the Pacific. The territory of Russia can be divided into four major regions, namely (from west to east): the European plains (average altitude of 180 m), the Ural mountains (maximum altitude of 1,894 m), the mountainous areas along the southern border, the lowlands (150 m) and highlands of Siberia and the eastern mountain ranges such as the Altai and Sayan (4,750 m).

Figure 1 : general map of Russia

Source: Ezilon.com

The country can be divided in nine federal districts (*federalnyye okruga*). Each district has several federal subjects and one presidential envoy appointed by the president of Russia. This configuration permits the liaison between federal subjects and federal government. Districts exist also to enforce the federal laws on the territory of the country.

Table 1 : Districts of Russia

	Name of district	Area (km²)	Population (2010 Russian Census)	Administrative center	Continent
	Central Federal District	652,800	38,438,600	Moscow	Europe
	Southern Federal District	418,500	13,856,700	Rostov-on-Don	Europe
	Northwestern Federal District	**1,677,900**	**13,583,800**	**Saint Petersburg**	**Europe**
	Far Eastern Federal District	6,215,900	6,291,900	Khabarovsk	Asia
	Siberian Federal District	5,114,800	19,254,300	Novosibirsk	Asia
	Ural Federal District	1,788,900	12,082,700	Yekaterinburg	Europe and Asia
	Volga Federal District	1,038,000	29,900,400	Nizhny Novgorod	Europe
	North Caucasian Federal District	170,700	9,496,800	Pyatigorsk	Europe
	Crimean Federal District	26,100	2,284,400[a]	Simferopol	Europe

http://en.wikipedia.org/wiki/Federal_districts_of_Russia

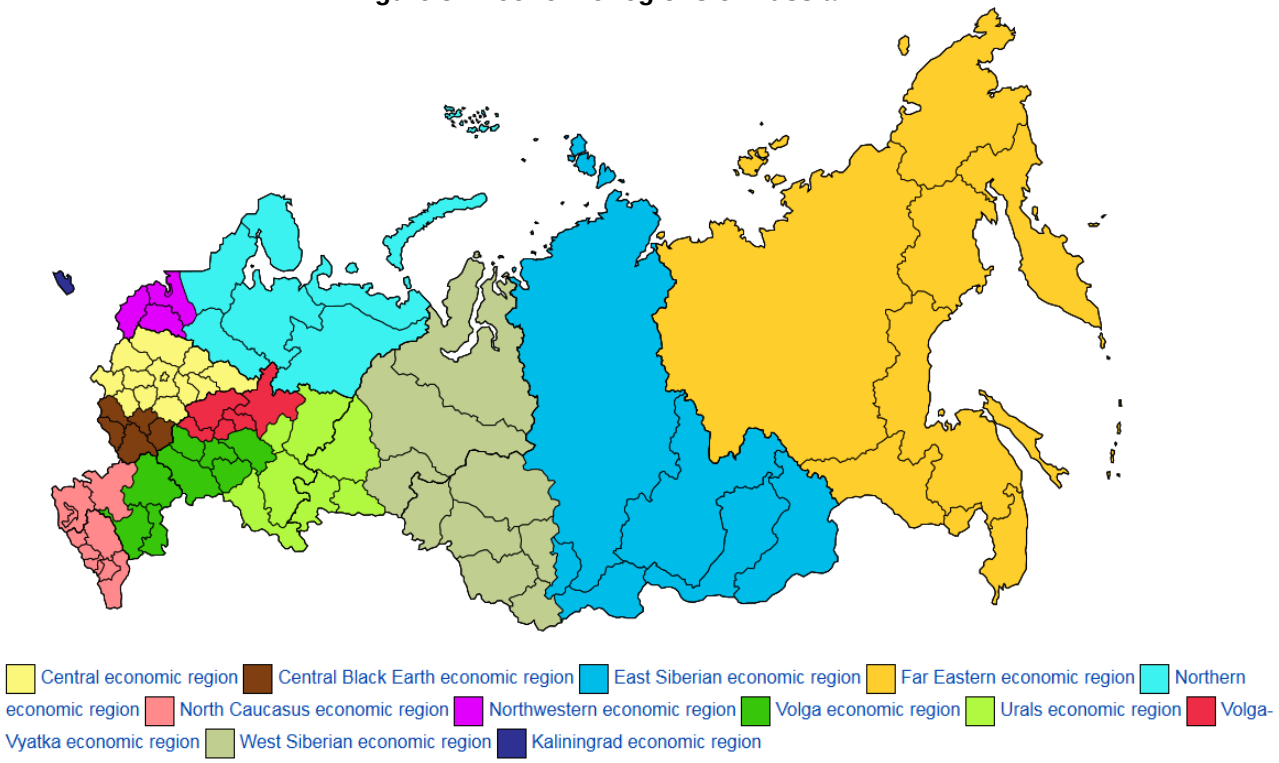
Figure 2 : Federal map of Russia

Source : http://en.wikipedia.org/wiki/Subdivisions_of_Russia

Russia can also be divided in 12 economics regions (*ekonomicheskiye rayony)* that are subjects to economic and statistical purposes.

The Northern and Northwestern economic regions are included into the Northwest district (see figure 3).

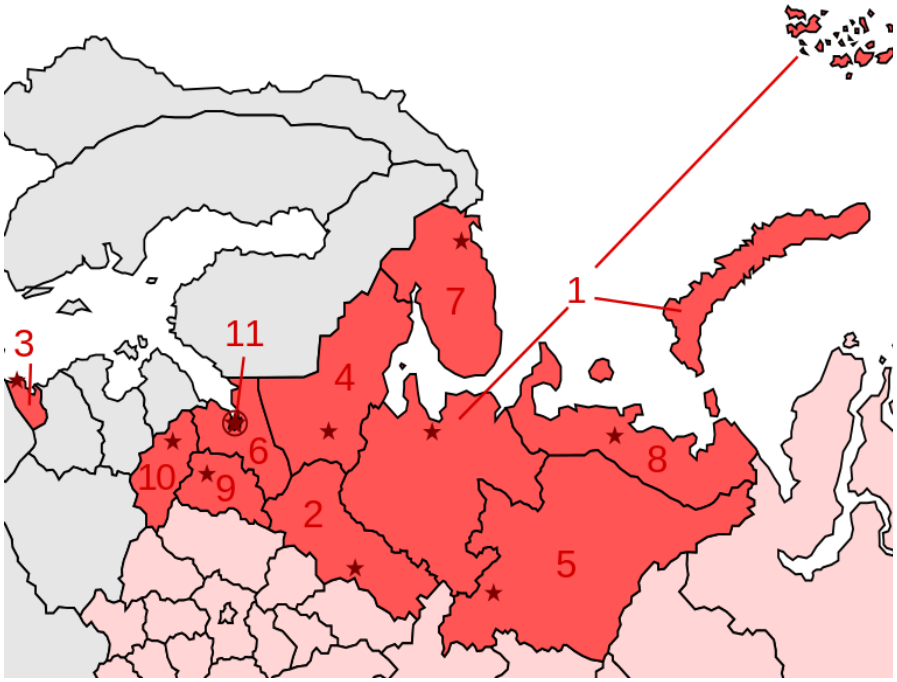
Figure 3 : Economic regions of Russia



Source: http://en.wikipedia.org/wiki/Economic_regions_of_Russia

Nothwestern Federal District is the northern part of European Russia and is divided into eleven Federal subjects (Figure 4).

Figure 4 : Federal subject of the Northwestern Federal District



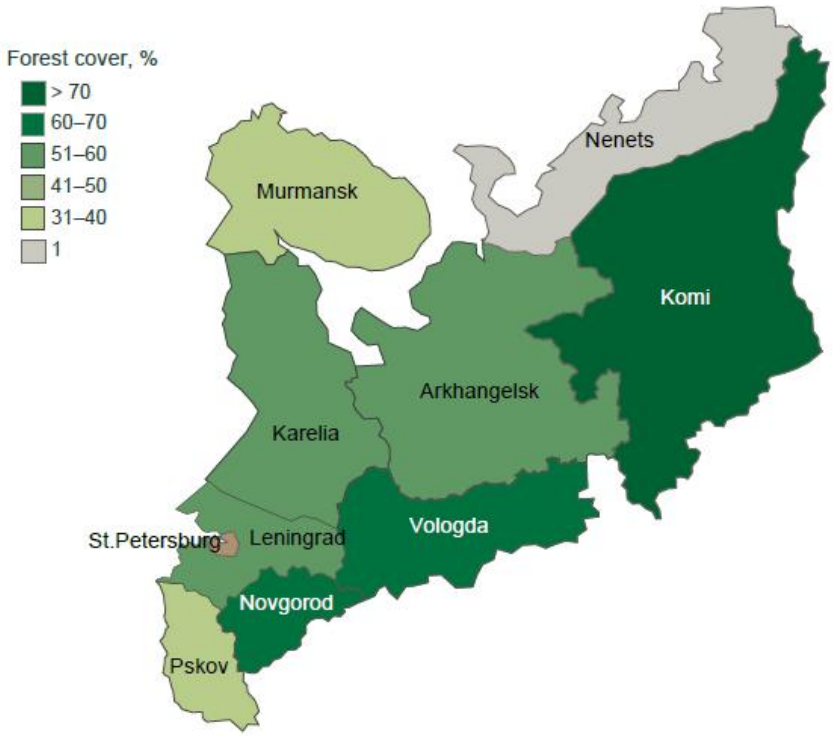
N°	Federal subject
1	Arkhangelsk Oblast
2	Vologda Oblast
3	Kaliningrad Oblast
4	Republic of Karelia
5	Komi Republic
6	Leningrad Oblast
7	Murmansk Oblast
8	Nenets Autonomous Okrug
9	Novgorod Oblast
10	Pskov Oblast
11	Saint Petersburg

Source: http://en.wikipedia.org/wiki/Northwestern_Federal_District

2.2. Forest cover and land uses.

"Forest fund" in Northwest Russia covers 113 million hectares[1]. In addition, forests outside the forest fund include urban forests, protected areas, etc... Most of forest land is in the Taiga, but in the most southern parts also include temperate mixed forests are met (see section 2.3).
Rotation periods in the Russian forestry are long, and half of the forests are mature or over-mature by their development class. Large areas of old-growth forests are situated in Northwest Russia.

Figure 5 : Forest cover in the regions of Northwest Russia - excl Kaliningrad region
(source: Forestry in Northwest Russia – 2013)



In Russia forests are classified into three groups according to their designated function: production, protective and reserve forests. In Northwest Russia almost 70% of the forest land is intended for wood production, and 30% are protective forests with some restrictions to use. Share of protective forests differ greatly between the regions being highest in the Murmansk and Leningrad regions. There are no reserve forests in Northwest Russia.

According to FEDSTAT (2013), forestland covers is 795 million ha in Russia, amongst which 88.4 million ha in the Northwest region. About 46.6% of the Russian Federation is forested, while 52.3% of the land is forested in the Nortwestern region, as shown in the table hereunder.

[1] Forestry in Northwest Russia (Conifer) report
http://conifernet.org/wp-content/uploads/2014/12/CONIFER_forest_industry.pdf

Table 2 : Percentage of forested area in Russia in 2013 (FEDSTAT – 2013)

Federal District	Percentage of forested area	Total area (thousand ha)	Forest cover (thousand ha)
Central	34,5 %	65,280	22,554
Northwestern	*52,7 %*	*167,790*	*88,467*
Southern	6,2 %	41,850	2,612
North Caucasian	10,6 %	17,070	1,802
Volga	36,3 %	103,800	37,656
Urals	38,8 %	178,890	69,470
Siberian	54,2 %	511,480	277,023
Far Eastern	47,6 %	621,590	295,673
Total Russian Federation	46,6 %	1,707,750	795,257

Source: Calculated from http://www.fedstat.ru/indicator/data.do (Площадь лесных земель = The area of forest land)
Noted that Crimean Federal District is excluded from this analyse.

Based on the Atlas of the Forest Northwest (2009), in Russia, forest land area covered 838 million hectares in 2008. The volume of the growing stock was 76 billion cubic metres, of which 12% was located in the Northwest Russia (see Table below).

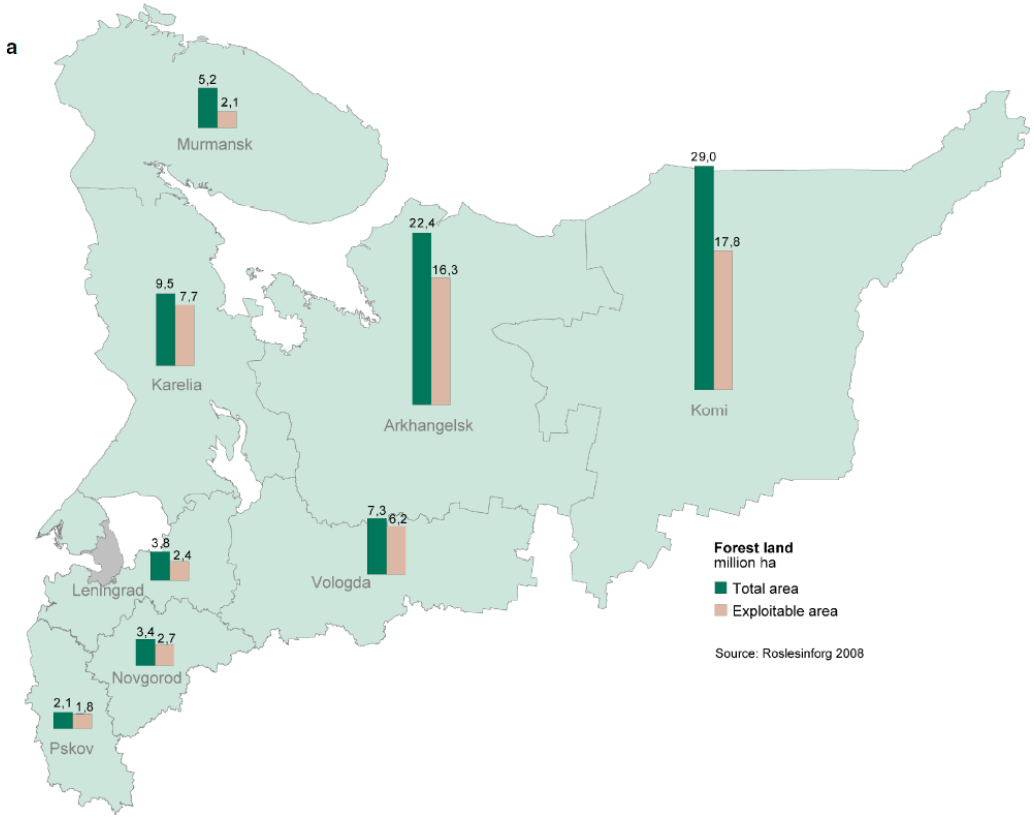
Table 3 : Forest resources of Russia and Northwest Russia in 2008

Region	Forest land [1]	Stocked forest land [2]			Exploitable forests [3]		
		Area	Volume	Mean increment [4]	Area	Volume	Mean increment
	1 000 ha	1 000 ha	mil. m³	mil. m³	1 000 ha	mil. m³	mil. m³
Russian federation	838 069	746 310	76 404	947	345 449	40 814	577
European part of Russia[5]	151 127	147 844	19 711	323	103 659	13 645	238
Northwest Russia	82 917	81 352	9 163	121	57 141	6 637	94
Arkhangelsk	22 377	21 994	2 481	29	16 260	1 783	22
Karelia	9 529	9 255	943	14	7 744	744	12
Komi	28 982	28 628	2 849	30	17 771	1 913	22
Leningrad	3 805	3 622	631	10	2 404	400	7
Murmansk	5 186	5 120	226	2	2 108	92	1
Novgorod	3 408	3 333	560	10	2 733	457	8
Pskov	2 090	2 042	322	7	1 784	280	6
Vologda	7 297	7 124	1 104	18	6 154	931	15

Source: Roslesinforg 2008

The figure below shows the forest land areas by region in Northwest Russia. A large proportion of forestland is in Arkangelsk and Komi. There is a large proportion of forest which is not exploitable because of access, particularly in Komi and Murmansk.

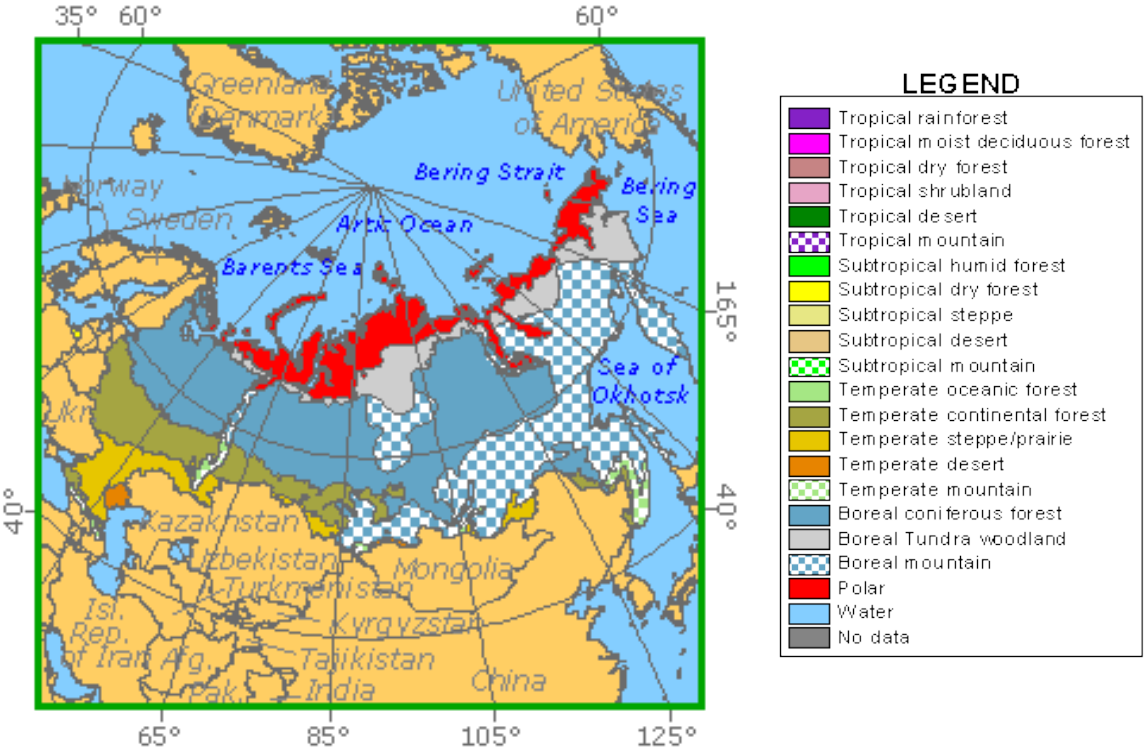
Figure 6 : Forest area in Northwest Russia
("Atlas of the forest sector in Northwest Russia – 2009)



2.3. Ecological zones

Because of Russia's huge size, its climate is extremely varied with average annual temperatures ranging from 30 °C in the South Caucasus to -30 °C in the Arctic regions and precipitation ranging from 125-224 mm/year in the north-east of the country to 975-1,494 mm/year in the South Caucasus.

Figure 7 : Ecological zones in Russia

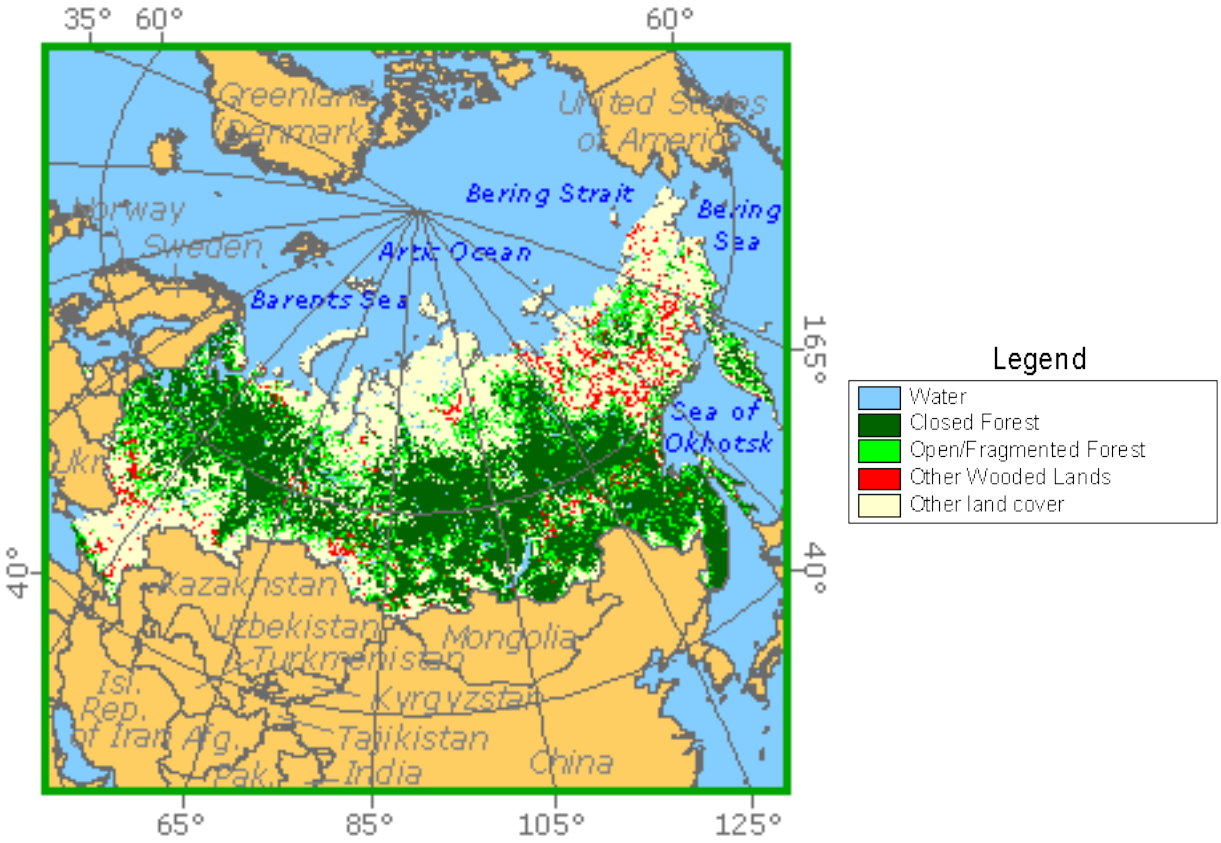


Source: http://www.fao.org/forestry/country/18314/en/rus/

The Northwest district is largely dominated by “boreal coniferous forests”, even though the “temperate continental forest” is also present.

Russia contains several major types of vegetation. In most of the country, the climax vegetation is coniferous forest. With the exception of the polar, desert, steppe and high mountain regions, forest vegetation is the type of vegetation best suited to the federation’s conditions and grows there spontaneously.

Figure 8 : Natural forest formations in Russia



Source: http://www.fao.org/forestry/country/en/rus/

The vast majority of Russia consists of natural forests (98%) with a tiny proportion of plantations (2%). As shown on the below, major forest areas are spread widely across the whole country along a line stretching east-west. However, there is virtually no forest in the polar regions of the north or on the great plains of the far south-west.

According Rosleshoz management forests in 2008, the forest in Russia is composed very largely by naturally regenerated forest (66.2%), primary forest (31.7%) and with a lower proportion by planted forest (2.1 %).

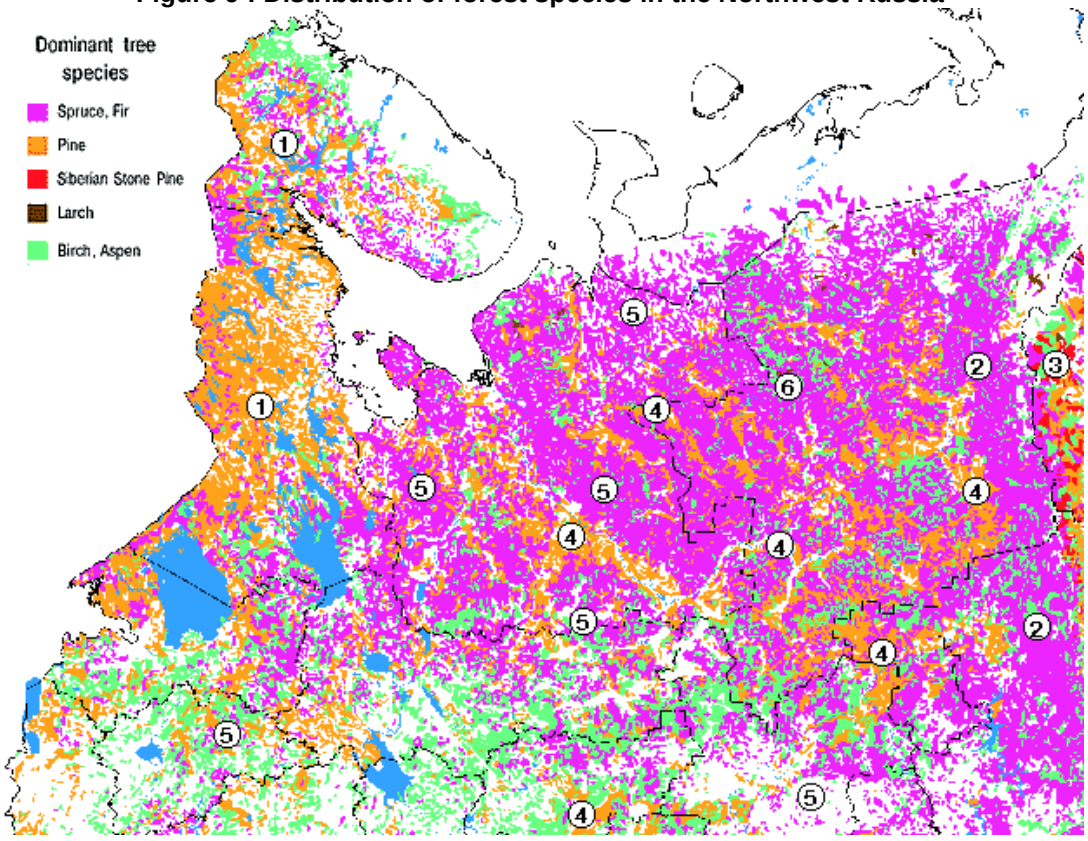
Table 4 : Forested area in Russia

Categories	*Area (thousand hectare)*	*Percentage of the total forested area*
Primary forest	256,481.5	31.7%
Other naturally regenerated forest	535,617.6	66.2%
Planted forest	17,707.1	2.1%
Total forest land area	**838,069.2**	**100.0%**

Source: Global Forest Resources Assessment 2010

Most of the semi-natural forests are located in the European part of the country or inside the forest harvesting areas either side of the Trans-Siberian Railway. Many of these areas have suffered from over-exploitation in the past and are now degraded or poorly stocked, with alder, aspen and birch, for example, growing on land once occupied by stands of conifers.

Figure 9 : Distribution of forest species in the Northwest Russia



Source : http://old.forest.ru/eng/publications/north/02.htm

The northwestern of Russia can be divided into main parts regarding the natural forest vegetation type[2] :

The Baltic shield (1) *is dominated by pine forests. These stands grow on outcrops of crystalline rock or sandy glacial sediments which were formed during the latter stages of the last glacial retreat. There is also an abundance of bogs and lakes which in the north form a complex mosaic within mountainous areas. The landscape dynamics of the Baltic shield is strongly influenced by forest fires. These fires are frequent but usually small-scale and rather weak ground fires due mainly to the pronounced fragmentation of the topography. The area of the Baltic shield is clearly defined on forest maps by the dominance of pine forest (see Figure 4).*

The western slopes of the Ural Mountains (2) *are characterized by substantial amounts of precipitation, many days with cloudy and foggy weather, and high levels of wintertime snow accumulation. This area is dominated by Spruce-Fir and Spruce-Fir-Siberian Stone Pine forests, historically only marginally affected by fire and in many cases not showing any signs of fire influence at all. On forest maps this territory is clearly visible as a uniform spruce-dominated forest, although*

[2] http://old.forest.ru/eng/publications/north/02.htm

the southern part is now dominated by birch-aspen and mixed coniferous-birch-aspen forests following clear-cutting.

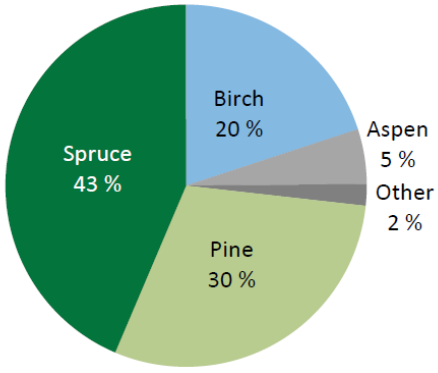
***The eastern slopes of the Ural Mountains (3)** are characterized by significantly less precipitation and usually a more broken topography in comparison with the western slopes. The eastern slopes also differ significantly in forest composition and fire characteristics, and are dominated by fire-influenced coniferous forests in a way similar to the Baltic shield (mainly pine forests, but often with a considerable fraction of Siberian Stone Pine and larch).*

***The valleys of large rivers and the wide fluvioglacial depressions (4)** support dry pine forests and very frequent fires, much like the Baltic crystalline shield. The high frequency of fires is connected partly with the dominance of sandy sediment in the soil, but also linked with historic disturbance as the large river valleys and forested lowlands were the first parts of the taiga to be colonized by people.*

***The morainic plains (5)** account for the major portion of the studied territory. In the past, these areas had a relatively low human population density, and the least developed transportation infrastructure. In the northern part of the taiga most of these watersheds are characterized by extensive amounts of bogs, sometimes to the extent that open bogs and low-productive bog forests dominate them. It is in these least accessible and least productive areas that we find most of the remaining intact forests.*

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 (see Figure below). Vologda, Novgorod and Pskov regions stand out from the other regions of Northwest Russia due to the significant proportion of deciduous species in their forests (Table below). Dominance of coniferous species and especially by spruce is characteristic to the Northwest Russian forests. Spruce and pine trees are mainly dominant regarding to aspen and birch trees in the northern part and southwest of the District: Arkhangelsk, Karelia, Mumansk, Komi and leningrad region. Birch trees and aspen are dominant at the southern part of the District regarding to spruce and pine trees: Vologda, Novgorod, Pskov

Figure 10 : Forest stands area in the Northwestern district by dominant tree species



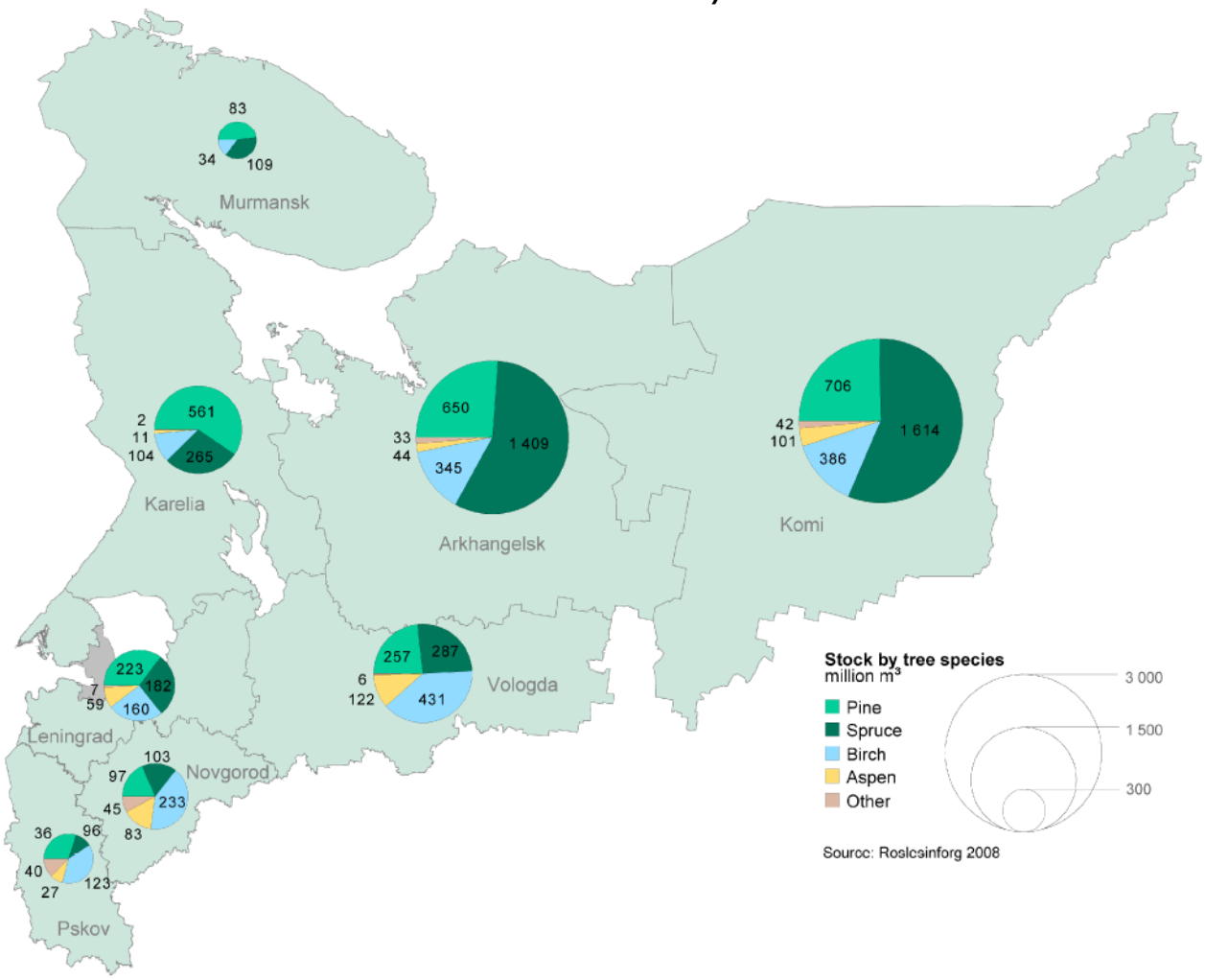
Source : http://conifernet.org/wp-content/uploads/2014/12/CONIFER_forestry.pdf

Table 5 : Tree species composition of forests managed by the Ministry of Natural Resources in 2003

Region	Volume of growing stock	Dominant tree species				
		Pine (*Pinus spp.*)	Spruce (*Abies spp.*)	Larch (*Larix spp.*)	Birch (*Betula spp.*)	Aspen (*Populus spp.*)
	million m³					
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)

Figure 11 : Main tree species by region in Northwest Russia ("Atlas of the forest sector in Northwest Russia – 2009)



2.4. Forest ownership

The highest legal document concerning the forests and regulating forest utilization 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[3].
The forest fund is owned by the Russian Federation and covers 95% of the forest area.
Forests outside the forest fund are located in military areas, cities, and villages and can be owned by the state, communities, companies, or private individuals[4].

According to the Forest Code of the Russian Federation (1997), all forests of the country are state-owned. The most of forests is in federal ownership (99.89%) but governed by different agencies (see figure below). Forests of inhabited areas are in municipal ownership. Forests are directly managed by

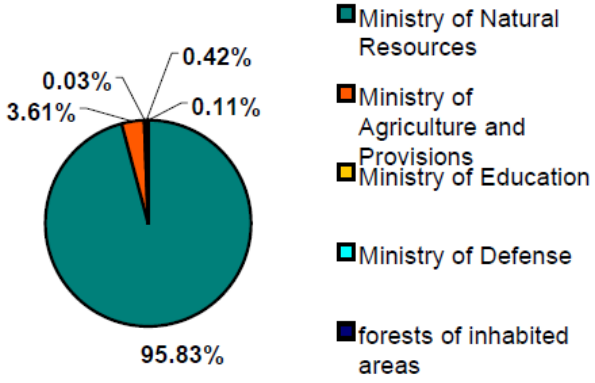
[3] Northwest Russian Forestry in a Nutshell
[4] Atlas of the forest sector in Northwest Russia - 2009

state forest management units (leskhozes), which are supervised by regional committees of natural resources accountable to the Ministry of Natural Resources of the Russian Federation in Moscow. The legislation allows granting federal forests to the regional ownership. Forests may be leased by logging companies or private persons for various kinds of use for a period ranging from 3 to 49 years. Furthermore, rights for short-term use can be obtained for less than one year in some cases. In addition to wood harvesting, usage rights are given for collecting non-wood forest products or hunting. The right to use the forests can be obtained only through auctions.

According to the Russian Federation (The State of the World's Forest Genetic Resources – Country Report), in 2011, the total area of the leased land in Russia was 212.0 million hectares.
In Northwest Russia, in 2009, 45% of the forest land is leased, the highest share being in the Leningrad region (see figure below)[5].
In 2013, 60% of the forestland in Northwest Russia is leased for long-term use with almost 7 000 lease contracts.

On the other hand, the structure of the Russian forest industry is rather different, with prevailing private ownership (see figure below).

Figure 12 : Structure of Governance of Russian forests
("Illegal logging in Northwestern Russia and export of Russian Forest Products to Sweden" – WWF 2003)



[5] Atlas of the forest sector in Northwest Russia - 2009

Figure 13 : Area of leased forests, 1-01-2008 (atlas of the forest Northwest – 2009)

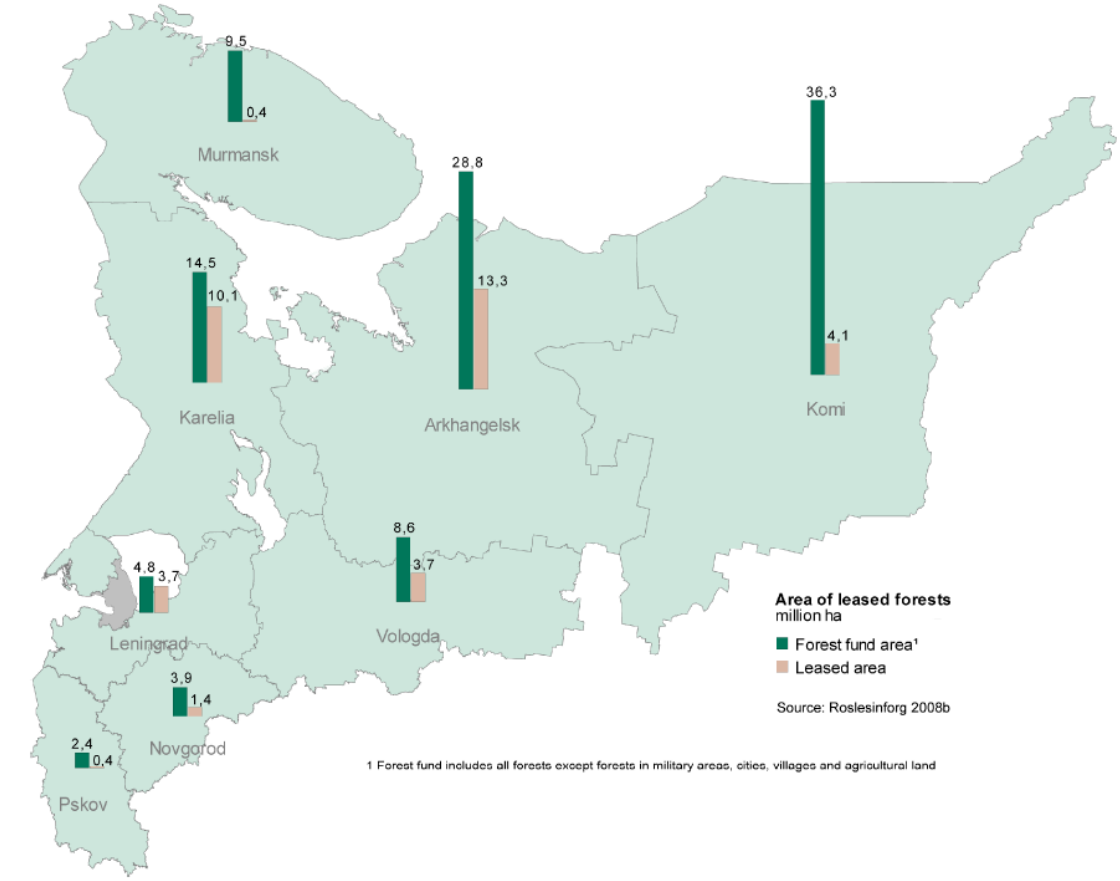
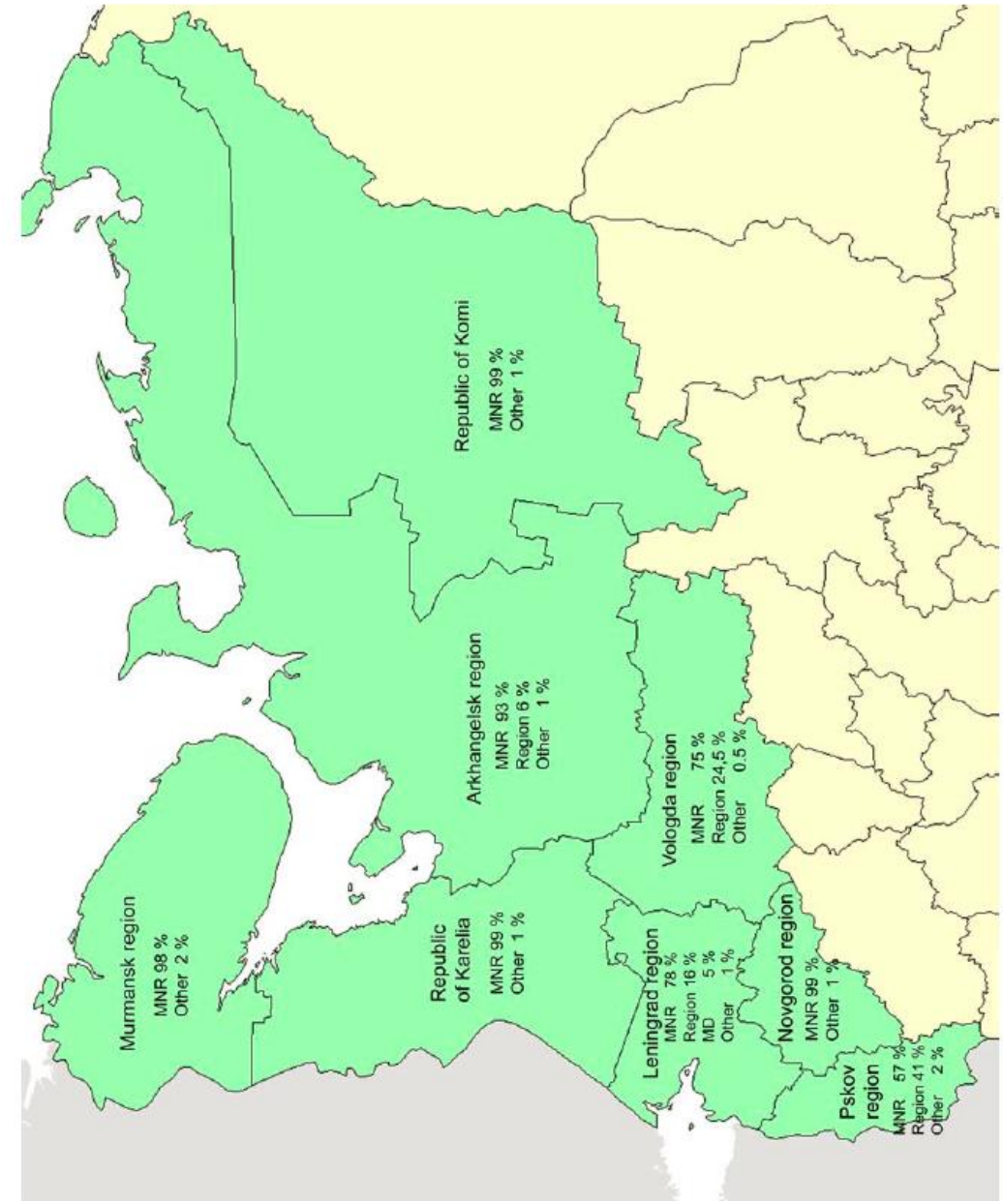


Figure 14 : The share of forest land governed by the Ministry of Natural Resources (MNR) in Northwest Russia in 2003 (Northwest Russian Forestry in a nutshell)



information on Kaliningrad region no included in the map

2.5. Competent authorities

According to “Conifer”, the main authority in the Russian forestry is the Ministry of Natural Resources (MNR) and Ecology and its subordinate, the Federal Forestry Agency.

Other competent authorities are present like:

- The Forestry Department : responsible for formulation and implementation of Forest policy and strategy
- General state forest enterprise : responsible for management of state forests;
- State environmental inspections Forest control divisions: responsible for control of state and private forests, extension and consultation of private forest owners.

The forest fund is owned by the Russian Federation. Forest governance is shared between the Federation and regions. Powers related to forest management, protection and use are delegated to the regions, while the authority of the federal bodies focus mainly on policymaking, governance of forest relations by laws and regulations, and on some specific issues, such as forest inventory.

At the regional level the highest forest authority is a part of the regional administrative structure – a ministry, department, committee, etc. The elementary units of the forest administration at the local level are forest districts and forest parks. The regional forest authorities are responsible for allocation of forest use rights. State forests can be obtained for wood harvesting, recreation or other use primarily through 10–49 years lease contracts that can be concluded as a result of public auction. Rights for short-term use are granted by a sale/purchase contract of forest stand. Forest users pay a lease charge or payment for sale/purchase contract for the state[6].

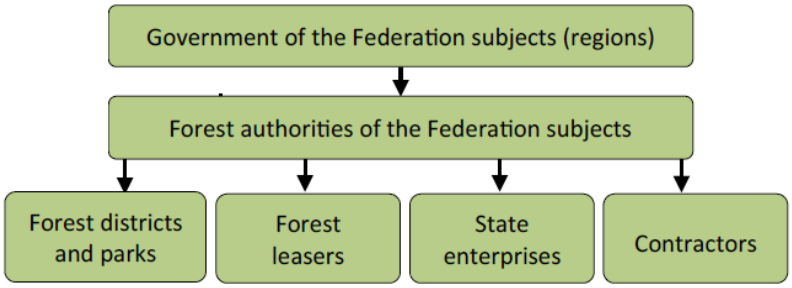
Main tasks of the Russian forest policy are:

- improvement of effectiveness in forest sector,
- intensification of forest use and regeneration,
- boosting domestic market of forest products,
- increasing competitiveness of the Russian forest industry,
- more effective protection of forests against fires, insects, diseases and illegal loggings,
- improvement of forest productivity and tree species composition.

The figure below shows participants in forestry relations at regional level.

[6] Forestry in Northwest Russia – Conifer - 2013

Figure 15 : Participants in forestry relations at regional level (Forestry in Northwest Russia – Conifer 2013)



A list of the regional forest services in Northwest Russia is presented in table below[7].

Table 6 : Regional forest services in Northwest Russia

Region	Name	Official website
Arkhangelsk	Department of forest sector/ Департамент лесного комплекса	http://www.dvinaland.ru/power/departments/deples/
Karelia	Ministry of forest sector/ Министерство лесного комплекса	http://www.gov.karelia.ru/gov/Power/Committee/Forest
Komi	Forest committee/Комитет лесов	http://rkomi.ru/top/org_isp/inye/kom_les/
Leningrad	Committee for natural resources and nature conservation/Комитет по природным ресурсам и охране окружающей среды	http://www.lenobl.ru/gov/committee/nature
Murmansk	Forestry committee/ Комитет по лесному хозяйству	http://www.gov-murman.ru/power/comit/forestry/
Novgorod	Forestry committee/ Комитет лесного хозяйства	http://adm.niac.ru/web.nsf/2e0cbaffb9bcdb53c32573330042d4c4!OpenView
Pskov	State committee for nature use and nature conservation of the Pskov region/ Государственный комитет Псковской области по природопользованию и охране окружающей среды	http://www.licensing.pskov.ru/
Vologda	Department of forest sector/ Департамент лесного комплекса	http://vologda-oblast.ru/main.asp?V=589&LNG=RUS

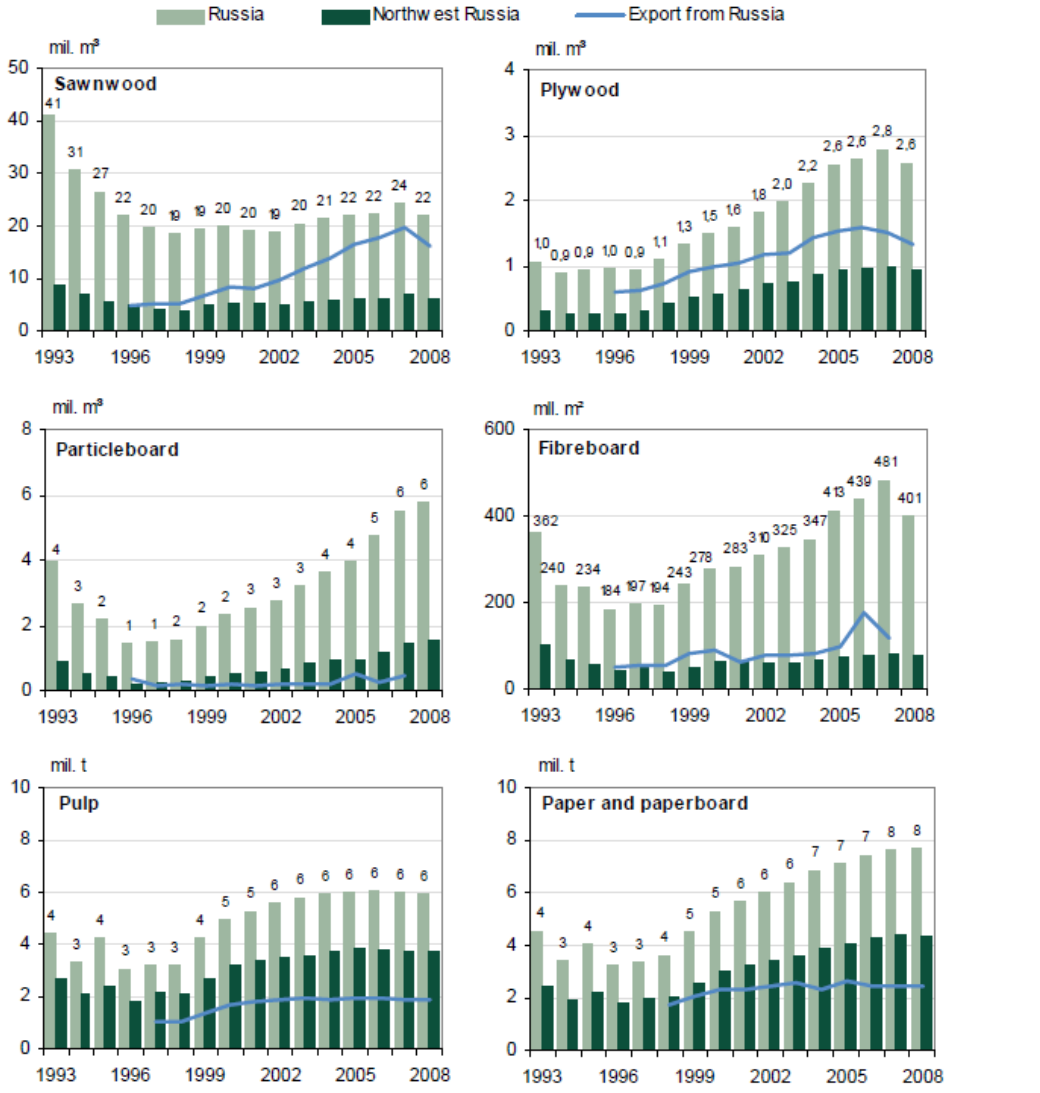
2.6. Overview of wood-related industry

According to the Finnish Forest Research Institute ("Atlas of the forest sector in Northwest Russia 2009), between 1999 and 2009, industry has been developing steadily in Russia as well as in Northwest Russia. Particle board production has grown strongly, having tripled. Other branches of forest industry have doubled their production, excluding the sawmill industry, whose growth has been more modest. The Russian forest industry is export oriented, as the majority of the produced sawnwood, half of the plywood, and one third of the pulp, paper, and paperboard are exported. The

[7] Atlas of the forest sector in Northwest Russia - 2009

global economic crisis also hit the Russian forest sector at the end of 2008, when production amounts started to decrease (see figure below).

Figure 16 : Production trends and exports of the main products of the Russian forest industry (source: Altas of the forest sector in Northwest Russia 2009)



Year 2008 preliminary data
Amount of sawnwood exported converted from tons to m³ using FAO conversion factor for coniferous sawnwood (1,82)

Sources: Karelijastat, Rosstat 2004, 2007, 2008, 2008a, 2008b, 2009, Federal Customs Service of Russia, Lesprom

According to the Russian Statistics Service, production of forest products decreased considerably during the first half of 2009 compared to the previous year. Decreases in production were 19% for sawnwood, 32% for plywood, 39% for fibreboard, 31% for particle board, 9% for paper, and 14% for paperboard (Rosstat 2009a).

Based on the Rosstat data (2008), the most important producers of forest products (sawnwood, plywood, wood-based boards, pulp, paper, paperboard), production and consumption of birch and aspen, and producers of wood pellets in Northwest Russia are presented in appendix 1.

The wood-products industry forms 4% of the total industrial production in Northwest Russia and the pulp and paper industry, 8%, and these shares are the highest in comparison with the other federal districts of Russia (Rosstat 2008).

2.7. Evolution of forest area and risk of conversion

A survey based on satellite analysis concluded that the surfaces of forest land decreased after the end of the Soviet period (analysis carried out on the period 1990 to 2005)[8], despite de diminution of timber harvesting in the 1990ies.

Several reasons are behind the loss of forest areas:

- losses of forestland for other anthropogenic reasons like urban developments, particularly in the Northwest region
- increased frequence of wild fire
- deficient regeneration.

According to the report "Northwest Russian Forestry in a Nutshell", 12%, of the Russian forest land, (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.

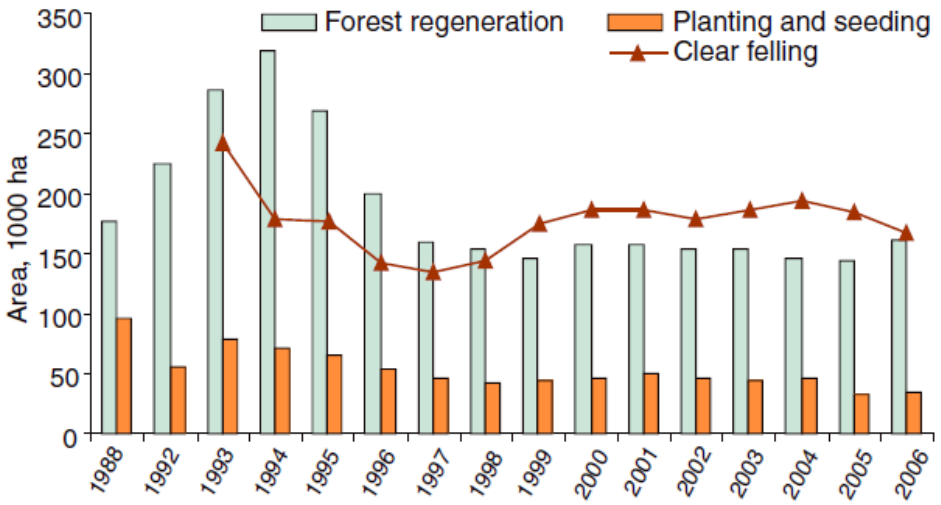
In Northwest Russia, the situation is better, with the share of treeless forest land is only 2%, i.e. (1.7 million hectares). Before 1999, the forest area subject to regeneration in NW Russia was annually larger than the area submitted to clear felling. Since 1999, however, this is the opposite[9]

In the period 1999–2006 almost every fifth hectare of clear-felling was left without active forest regeneration measures (Figure 17). This development threatens the sustainability of forest management and worsens the quality of forming stands.

Figure 17 : Dynamic of forest regeneration and clear felling in Northwest Russia between 1988 and 2006
("Intensification of forest management and improvement of wood harvesting in Northwest Russia – working papers 2009")

[8] Peter Potapov, Svetlana Turubanova, Ilona Zhuravleva, Matthew Hansen, Alexey Yaroshenko, and Alexander Manisha, Forest Cover Change within the Russian European North after the Breakdown of Soviet Union (1990–2005), International Journal of Forestry Research 2012

[9] Intensification of forest management and improvement of wood harvesting in Northwest Russia – working papers 2009

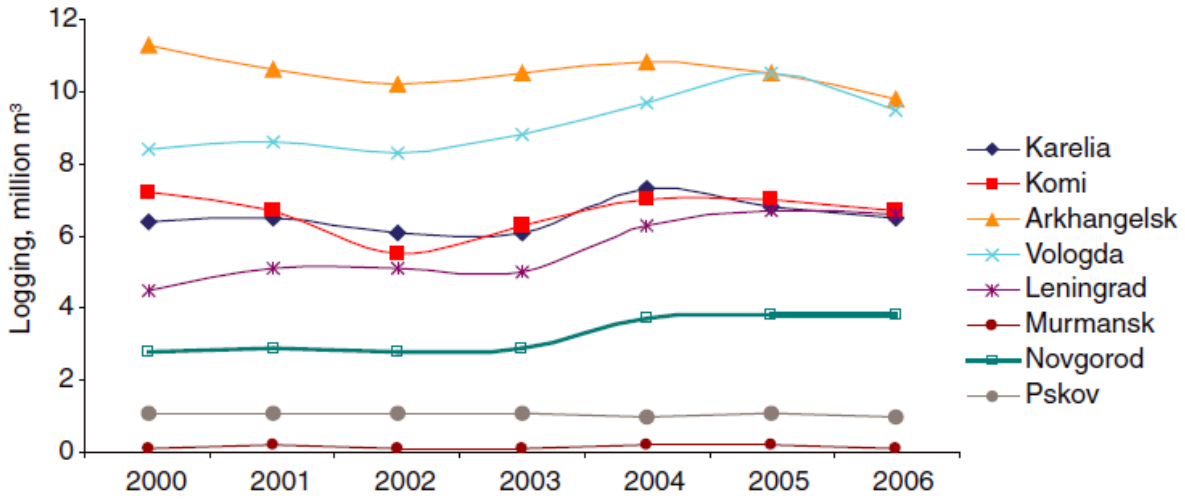


Currently the greatest obstacle for conducting silvicultural operations and especially forest regeneration is insufficient funding. In the past, the federal subjects were responsible for financing silvicultural operations, but due to amendments to the Forest Code in early 2005, the funding for silviculture 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.

2.8. Living wood volumes and removals

According to “Intensification of forest management and improvement of wood harvesting in Northwest Russia – working papers 2009”, in Northwest Russia, wood harvesting dropped in the 1990s from 82 to 40 million m3 per year, and in 2000-2006 it was characterized by relative stability (figure below). The annual allowable cut has been used incompletely, approximately 45% in case of all species and 60% in case of coniferous.

Figure 18 : Development of roundwood removals in Northwest Russia in 2000-2006
("Intensification of forest management and improvement of wood harvesting in Northwest Russia" – working papers 2009)



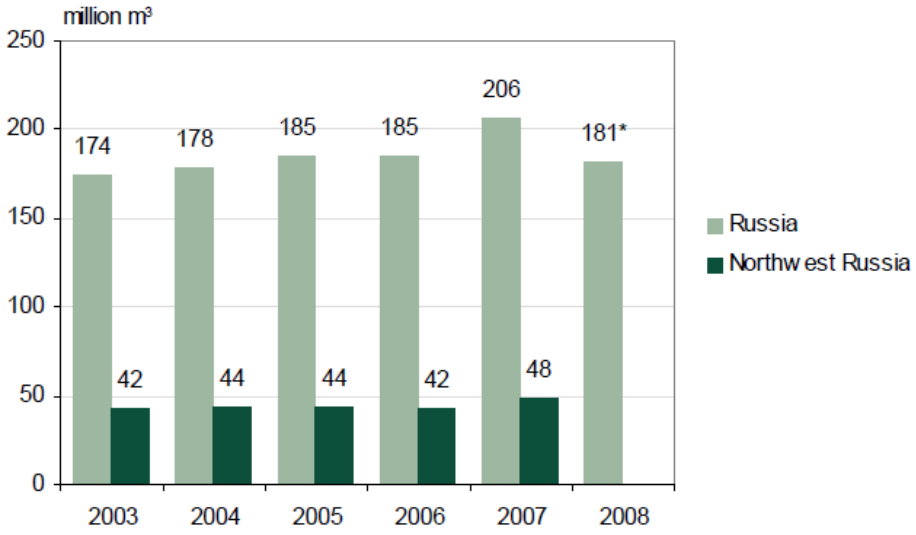
The table below shows the forest area, growing stock, increment and fellings estimated for 2010 in Northwest Russia (Conditions and prospects for increasing forest yield in Northern Europe – Working Papers of the Finnish Forest Research Institute 2013).

Table 7 : Forest area, growing stock, increment and fellings: estimates for 2010 in NW Russia

Forest area (mill.ha)	Growing stock (mill m³ OB)	Growing stock per hectare (m³)	Annual increment (mill. M³ OB)	Annual increment/growing stock (%)	Growth per ha and year (m³)	Annual fellings (mill. m³)
89	10096	114	134	1.3	1.5	46.9

Based on the Atlas of the forest Northwest (2009), until 2007, wood harvesting was at a quite stable level and harvesting volumes were increasing slightly, regardless of the numerous problems that harvesting companies had been facing (low quality of forest stands, inadequate infrastructure, increasing production costs, and low productivity, bankruptcy, export taxes…)

Figure 19 : Development of roundwood removals in Russia and Northwest Russia
("Atlas of the forest Northwest - 2009")



Sources: Roslesinforg 2005, 2006, 2007, 2008, * UNECE

According to the "Northwest russian Forestry in a Nutshell" (2003). the volume of final fellings is determined by the allowable cut, which is the basis for planning forest management. In addition to final fellings, 7 million cubic metres of timber is harvested in Northwest Russia through intermediate and other fellings, such as clearing building, sites, road areas or firebreaks (table hereunder).

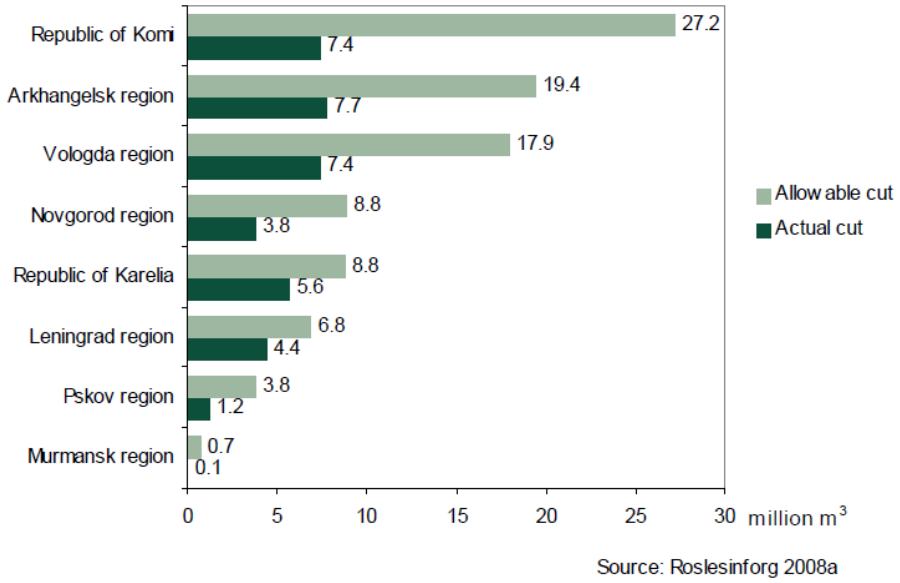
Table 8 : Forest use in Russia in 2003
(Northwest Russian Forestry in a Nutshell" (2003))

Region	Final fellings		Intermediate fellings	Other fellings	Total
	Planned harvesting	Realised harvesting			
	million m³				
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 graphics below illustrates allowable and actual cut of final fellings in Northwest Russia in 2007. We can observe that the most important roundwood removals are located in Komi, Afkhangelsk, Vologda regions.

Figure 20 : Allowable and actual cut of final fellings in Northwest Russia in 2007
("Atlas of the forest Northwest - 2009")



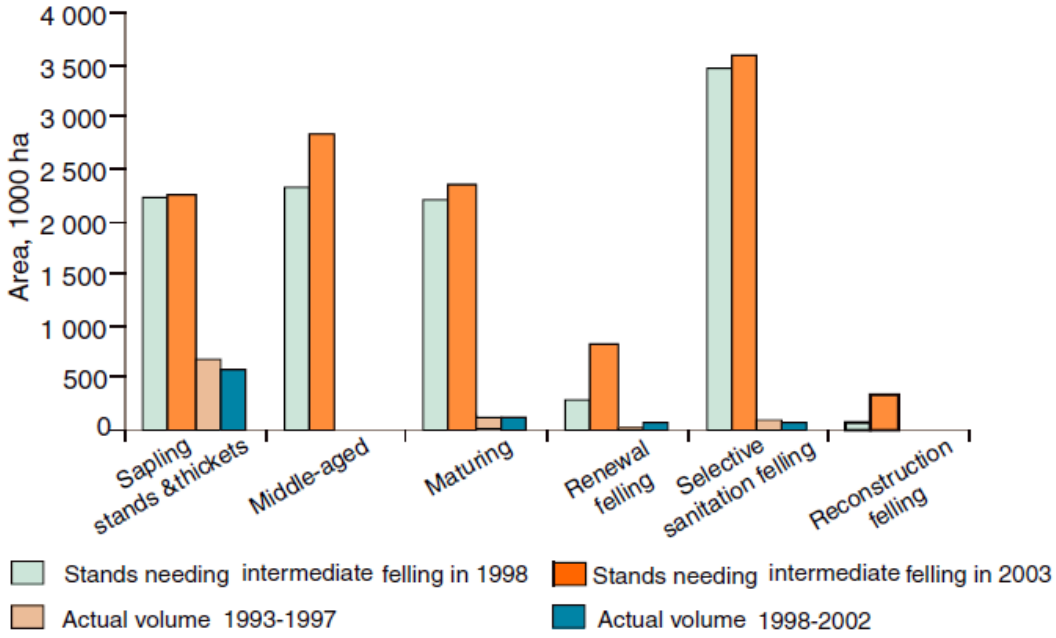
Source: Roslesinforg 2008a

According to "Intensification of forest management and improvement of wood harvesting in Northwest Russia – working papers 2009", *in the past few years, Annual Allowable Cut (AAC) of Russian forests totalled up to 500 million m3 (2005 – 570.7 million m3), including 300 million m3 for the coniferous category. The ratio of AAC and actualised cut illustrates the "state-of-the-art" in all branches of the forestry sector. In spite of the fact that in 2005, in Russia only 23% of AAC was actually logged.*
In Northwest Russia, AAC decreased from 95.3 million m3 in 1988 to 92.2 million m3 in 2006 (for the coniferous category, from 67.5 to 52.0 million m3). It is noteworthy that at the beginning of the 1990s, growing demands for environmental protection and exhaustion of economically accessible forest-resources had resulted in a decrease of AAC, especially for coniferous. Along with the decrease of production, Russia is still going through structural reorganization. However, the forest sector has started to move its production facilities to the regions with higher consumption levels and closer location to foreign markets. Thus, based on the economic reasons, the Northwestern part of Russia has been prioritized for forest use and development.

According to "Intensification of forest management and improvement of wood harvesting in Northwest Russia – working papers 2009", in Northwest Russia, *the actual volume of* ***intermediate felling*** *in comparison with needed volume is insignificant (…). Reasons for small amounts of intermediate fellings have been, among others, concentration to more productive final fellings, wood-harvesting technology inappropriate for thinnings, undeveloped forest-road network and lack of demand for pulpwood in many regions. In Northwest Russia, in 2006 the volume of intermediate fellings made up only 3.7 million m3. It was 11% of timber harvested at the final fellings. In fact, higher volumes could be harvested under the conditions of developed pulpwood markets. The volume of intermediate*

felling can make up at least half of final fellings volume without breaking the rules of sustainable forest management.

Figure 21 : Target and actual volume of intermediate felling by types in Northwest Russia
(Intensification of forest management and improvement of wood harvesting in Northwest Russia – working papers 2009")



2.9. Protection of ecosystems and biodiversity

Based on Northwest Russian Forestry in a Nutshell", 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.

Nature conservation areas may be categorized according to their administrative bodies as federal, regional or local level protection areas. A network of especially protected natural areas (EPNA) plays an important role in conservation of typical and unique natural landscapes, biological diversity, and sites of natural and cultural heritage. These sites are officially excluded from the management regime and are under the specific nature protection management. According to the Federal law of the Russian Federation "On the Specially Protected Natural Areas" (1995), the following categories of specially protected sites are officially in use:

Nature reserves: Nature reserves are completely outside commercial utilization. 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): 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: 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: 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: 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 (dendochrological parks) and botanical gardens

Land areas with remedying and health promoting qualities: Soil resources or mineral water springs that are believed to have health promoting features are included in this category.

The protection areas of Northwest Russia are presented in Table below.

Table 9 : Conservation areas in Northwest Russia
(Northwest Russian Forestry in a Nutshell)

Conservation area	Location	Year of founding	Area, 1,000 ha
NATURE RESERVES (*zapavednik*)			
Darvinsky	Vologda region, Jaroslavsk region	1945	113
Kandalakshsky	Murmansk region, Republic of Karelia	1932	71
Kivach	Republic of Karelia	1931	11
Kostomukshsky	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 (*zakaznik*)			
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 Tundrovy	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

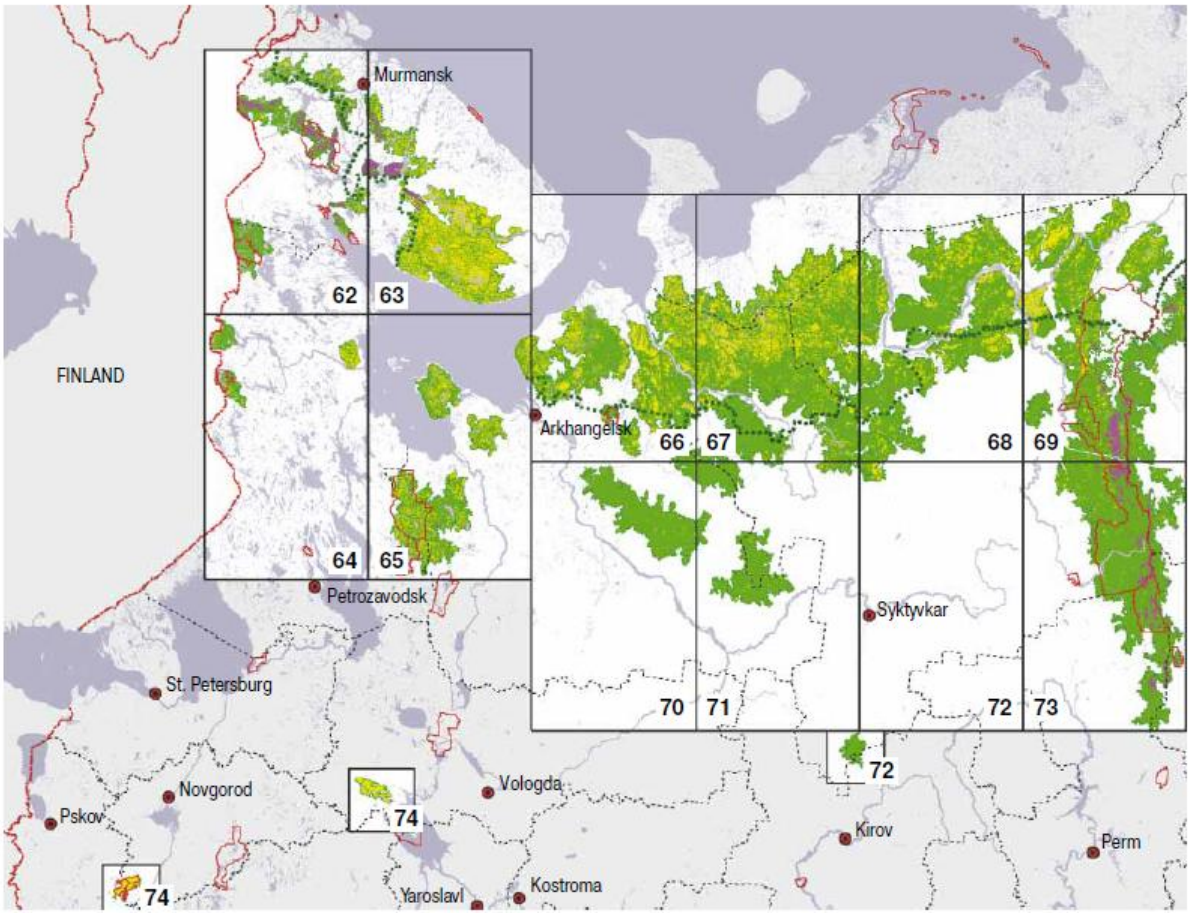
(Source: Protected Areas in Russia, 2003)

According to the working paper - 2009 “Intensification of forest management and improvement of wood harvesting in Northwest Russia, t*he proportion of specially protected forest areas is 5.2% of the total forest area, but the proportion of forests in strict nature reserves is insignificant (1.1%). The percentage value of forests in specially protected areas varies from 3.6% in the Republic of Karelia to 10.6% in the Pskov region (Janickaja et al. 2003). The Murmansk region, Komi Republic, Leningrad region, Pskov region, and the Republic of Karelia have a significant area of forests for conservancy and preservation of the environment.*

The net of the Russian federal and regional EPNA may be significantly complemented by the inclusion of essentially undisturbed by human development forest territories, called intact forest landscapes (IFL). IFL are defined as territories of more than 50 thousand ha in size, containing mature and overmature forest lands, without settlements and working elements of the economic infrastructure inside, formed by the natural ecosystems which have not been affected by intensive economic activities during the last 100 years (Yaroshenko et al. 2001). The minimal linear size of IFL should be 10 kilometers, the minimal distance between the borders of IFL contour 2 kilometers, hindering bordering effects. The most part of essentially undisturbed spruce and pine forests of the European part of Russia survived in the republics of Komi and Karelia, Murmansk, and Arkhangelsk regions. The majority of large undisturbed forestlands of Russia are unique and important for the maintenance of the ecological balance of ecosystems of the North, so they deserve the strictest protection. During the compilation of the atlas of essentially undisturbed forest landscapes of Russia, it was found out that in a zone of closed forests (excluding the zones of tundra and forest-tundra, and sea water areas), the proportion of the federal level EPNA was only 2.4% (Yaroshenko et al. 2001). Herewith, only 5% of all IFL was protected (Janickaja et al. 2003). The detailed analysis (Karpačevskij 2001) of the layout in the areas of different categories of ENPT regimes and protection for the Arkhangelsk and Murmansk regions and the republics of Karelia and Komi showed that though the set of all EPNA occupied 11.6% of the overall area of these regions, final cuttings (industrial harvestings) were forbidden only on 4.7% of the overall area. The simultaneous interdiction of final cutting and intermediate cutting existed only on 3.1% of the territory. At that, only 12.6% of the remaining IFL in this region was protected. In spite of the large area occupied by IFL in Northwest Russia, their wood resources are relatively low and hard-to-reach. Thus, the allocated IFL basically consist of the least productive forest lands of Russia, which were kept in minimally disturbed condition mostly due to their low productive capacity.

According to “The last intact forest landscapes of Northern European Russia” – Greenpeace Russia and Global Forest Watch, Northern European Russia still contains a number of large areas of intact natural boreal forest (or taiga) landscapes.
The map below shows the distribution of intact forest landscapes in Northwest Russia.

Figure 22 : map of intact forest landscapes



LEGEND

- Country borders
- Regional borders
- Regional centers
- Towns with population over 50 thousand
- Other settlements
- Roads
- Railroads
- Rivers
- Lakes
- Federal level nature protection areas (nature reserves and national parks)
- Subtundra forest border (unproductive forest excluded from industrial exploitation)
- Borders of intact forest lanscapes

MAIN LAND CATEGORIES OF THE INTACT FOREST LANDSCAPES:

- Forest
- Bogs
- Treeless mountain areas

Map of intact forest landscapes for August 2000

2.10. Protection of water

The protective function of forests on water resources has been recognized for a long time in Russia, with areas of "water-protective forests" in place from the early Soviet period across the country[10]. While forests in parts of the Soviet Union were exploited relentlessly as industrial forests, the best old growth forests of the Russian heartland were protected, with ecological concerns given priority.

Water protective forests are designated to regulate the water flow, preserve water sources from silting up and river sides from eroding. The following categories of water protecting forests are recognized[11]:

- forests located in water protective zones;
- forests located in the first and second belts of sanitary protection zones of drinking water and household water supply sources;
- prohibited forest belts along water bodies;
- soil protective forests along water bodies or on ravine slopes.

The width of water protective zones should be in accordance with the Water Code (depending on the type and category of water body to be protected).

About 7.5 % of forest estate of the Russian Federation consisted of water protective forests, according to the State Forest Inventory on 01.01.2008. Prohibited forest belts along water bodies are located on more than 55 million hectares.

2.11. Protection of soils

The above described protective forests present in Russia are relevant to protect water quality and also soil quality. Forestry in Russia, including the Northwest region, is known to rely heavily on clear cutting for harvesting, which is likely to be damaging for soils and cause erosion issues.

No specific information regarding the state of forest soils and the implementation of best practices were available.

2.12. Protection of carbon stocks

The amount of carbon stock in Russian forests is evaluated hereunder.

[10] Late Soviet Ecology and the Planetary Crisis, John Bellamy Foster, Monthly Review 2015, Volume 67, Issue 02 (June), http://monthlyreview.org/2015/06/01/late-soviet-ecology-and-the-planetary-crisis/

[11] http://www.foresteurope.org/documentos/Forests_and_Water.pdf

Table 10 : Forest cabon pools (estimation 2009) in billon tons (Pg)

Live biomass	37.5
Coarse woody debris	7.0
Litter carbon	8.3
Soil carbon	136.2
Total	193.4

Source:Maria Palenova, 2015[12]

This is the situation in 2009. It is of course interesting to see how those stocks evaluate over time. Two evaluations are available, even though they are limited to carbon stored in living wood, excluding dead biomas, litter and soil carbon.

A study published in 2003 concluded that the carbon stocks in the Russian forests was progressively growing, with annual sequestration largely exceeding losses[13]:

Table 11 : Carbon balance of the Russian forest (1990 and 2000)

Components of carbon balance, Mt C/year:		1990	2000
NEP- net ecosystem production		570	600
Losses (emission) in forests, including:		128	107
	Cut- final cutting, thinning and removals	66	32
	Waste- burning wood waste (coarse wood debris)	31	15
	Burn- forest fires	15	19
	Pest- forest pests and diseases	7	32
	Fuel- burning fuel wood	9	9
Balance in forest ecosystems		**442**	**493**

However, a similar modelisation by WRI[14] leads to the conclusion that the net annual carbon growth is estimated to be around 40 million tons per year for the period 1993 to 2003. Even though the descrepancies show the difficulty to have a reliable picture of the situation, as well as possibly diverging scopes and methodologies, at least both authors agree that the annual balance is positive, with increased stocks of carbon sequestrated in forests.

[12] Impact by logging practices on soil in boreal forests
which overtly affected by climate change, http://www.rinya.maff.go.jp/j/kaigai/kyoryoku/pdf/russia.pdf
[13] Carbon Balance in the Russian Forests, Boris N. Moiseev and Andrei N. Filipchuk, 2003, XII World Forestry Congress http://www.fao.org/docrep/ARTICLE/WFC/XII/0151-B1.HTM
[14] STOCKS AND FLOWS: CARBON INVENTORY AND MITIGATION POTENTIAL OF THE RUSSIAN FOREST AND LAND BASE http://www.wri.org/sites/default/files/pdf/gfw_stocksflows.pdf

2.13. Protection of air quality

Concerning forests, the main impact on air quality relates to fire. It includes wild fire (which are unintended) and prescribed fire (which is used as part of forest management under controlled conditions). Unmanaged fire will substantially reduce the carbon storage and timber yield of these projects, thereby decreasing economic gains.

According to “Economic accessibility forest resources”, annual damage from forest fires is estimated to be 3-3.5 billion rubles.

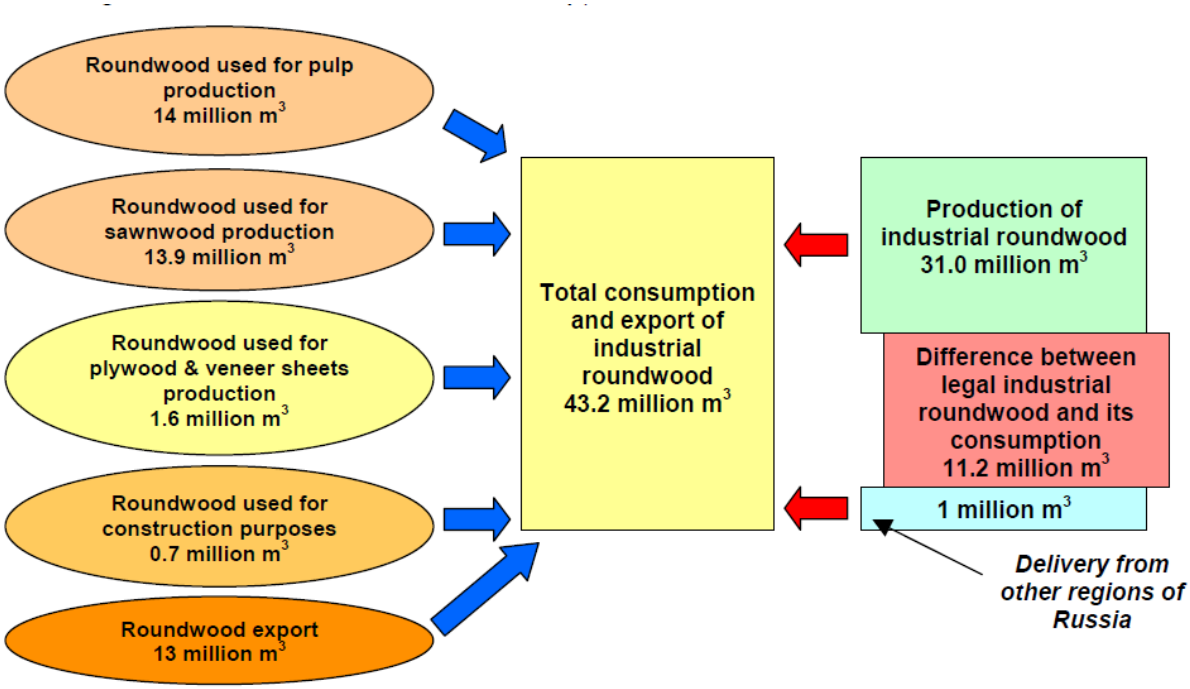
Based on WWF report “Illegal logging in Northwestern Russia and export of Russian Forest products to Sweden” - 2003, forest fires are not of great significance in the region as in the Russian Far East or Siberia. They are necessary for boreal forest ecosystems. However their occurrence is much above the natural level. More than 90% of all forest fires are induced by human. Every year hundred thousands of hectares of forests in Northwestern Russia suffer from forest fires.

2.14. Illegal logging

Illegal logging occurs when timber is harvested, transported, processed, bought or sold in violation or circumvention of national or sub-national laws. Illegal logging is especially a problem in the Russian Far East (in particular through exports to China). Even though Northwest Russia is less critical, illegal logging remains an issue in this region as well.

According to “Illegal logging in Northwestern Russia and export of Russian forest products to Sweden” WWF – 2003, an estimation of illegal logging in northwestern Russia was performed through the comparison of the amounts of wood harvested in the region against the total amounts of wood consumed and exported from the region. If all wood is legally harvested, the volume of harvested wood should be equal to the volume of consumed wood in the region and exported wood plus wood delivered from other regions of the country.
The conclusion was that as much as **11.2 million m³** of industrial roundwood (about 36%) might be produced from illegally harvested wood, as illustrated hereunder.

Figure 23 : production and consumption of roundwood in Northwest Russia
(Illegal logging in Northwestern Russia and export of Russian forest products to Sweden" WWF – 2003)



2.15. Civil rights and traditional rights

The FSC risk assessment platform www.globalforestregistry.org considers Russia as at "unspecified risk" in terms of violation of civil and traditional rights, because some of the following criteria are not all verified:

1) There is no UN Security Council ban on timber exports from the country concerned: **low risk**
2) The country or district is not designated a source of conflict timber (e.g. USAID Type 1 conflict): **low risk**
3) There is no evidence of child labour or violation of ILO Fundamental Principles and Rights at work taking place in forest areas in the district concerned: **unspecified risk**
4) There are recognized and equitable processes in place to resolve conflicts of substantial magnitude pertaining to traditional rights including use rights, cultural interests or traditional cultural identity in the district concerned: **unspecified risk**
5) There is no evidence of violation of the ILO Convention 169 on Indigenous and Tribal Peoples taking place in the forest areas in the district concerned: **unspecified risk**

2.16. Forest certification

Even though the certified forest areas in Russia have been growing quickly over the last 10 years, it is Russia, it is still very little developed with 38 million ha FSC certified, i.e. 4% of total forest area[15].

According to FSC and conservation of intact forests in North-west Russia[16], FSC certification in Russia is currently one of leading factors which support responsible forest management of forests. There is no other single initiative or activity, which have similar positive impact on forest companies as the FSC certification. NGO's campaigns against some companies in Karelia, Archangelsk and other regions in the 1990's and beginning of the 2000's initiated strong interest of several companies in FSC certification. FSC certification requirements were seen both by the companies and NGO's as the acceptable compromise of ecological, social and economic aspects of forest management. Large massive of intact forests in North-West Russia were identified by NGO's (Greenpeace, Social-ecological union, Center of Wildlife protection) in the middle of the 1990's.
Russian forest legislation and norms never recognized intact forests or provided special management measures or regimes in such forests. The NGO's campaign to protect such forests was in many aspects opposite to existing regulations and a change of legislation and regulations in Russia is very complicated process.

FSC certification was accepted by Federal forest agency and some regional administration as important mechanism and different interpretations how to ensure implementation of forest legislation and in the same time fit in FSC requirements were done (e.g. Komi Republi, Arachangelsk Oblast etc).

FSC accredited certification bodies made pre-conditions to get FSC certification by establishing written agreement between Ngo's and companies on the use of such massives. The typical agreement is the moratorium on logging intact forest massives. Many companies signed such moratoriums with Greenpeace, WWF and some other NGO's. The major drive facto to sign such moratoriums was to reduce commercial risks from confrontations with NGO's and ensure path to FSC certification.
FSC Principle 9 considering High Conservation Value Forests (HCVF) is in Russia one of the most discussed principles, but the fact that FSC has Principle 9 is a very strong factor and argument to provide special approach to manage HCVF and conserve the most important of them and./or the most important parts of it.

If certification map of Arkhangelsk region was ever compiled, people can observe the fact that first certification projects were done in leased forests, surrounding forests, such as Dvinsko-Pïnejsky. Later on FSC certification spread over other forests.

[15] https://ic.fsc.org/preview.2014-fsc-market-info-pack.a-3692.pdf

[16] The large intact forests in North-West Russia – Protection and sustainable use (TemaNord 2009:523 Nordic Council of Ministers, Copenhagen 2009) Chap 20 "FSC and conservation of intact forest massives in North-West Russia" - Andrei Ptichnikov

FSC certification also requires establishing, declaration and implementation of ecological policy of the company. Certified companies have now ecological director or specialist, responsible for certification, environment and social aspects of company business. Such policies and specialists provide important feedback to company businesses from inside.

Conservation of intact forests in North-West Russia has been and still is a very difficult and challenging task. FSC certification requirements and NGO's pressure are two leading factors, which provide conservation of forests. Unlike some Scandinavian countries, Russian government still has weak regulation of conservation of biodiversity in the commercial forest and conservation of HCVF. Special focus of NGO's activities might lead the Russian forest agency to initiate country-wide inventory of high conservation value forests, key habitats and monitor what is going on with rare and valuable forest ecosystems in commercial zone.
After years of practical implementation in the forest sector of North-West Russia FSC certification seems to the most powerful tool to support NGO's conservation efforts. However, some more progress is needed in terms of sustainability in the legislation and its practical implementation.

3. Conclusions

Forestland is estimated to cover 795 million ha in Russia, amongst which 88.4 million ha in the Northwest region, which means than more than 50% of the territory is forested in Northwest Russia. Coniferous are dominant, particularly in the north (mostly spruce and pine), but some deciduous tree species are also present (mostly birch).

Nearly all the Russian forest are publicly owned, most of which (95%) by the Forest Fund and the balance by various federal, regional or local levels of government. The privately owned forest are negligible, however large forest surfaces are leased to private companies. In Northwest Russia, as much as 60% of the forests are leased.

Despite reduced level of forest harvesting after the end of the Soviet period, forest surfaces in Russia are believed to have been losses because of urbanisation, fires and inadequate regeneration. However, the volume of standing trees and the carbon stocks in living biomass are beleved to increase, reflecting more maturity of the forests under reduced harvesting rates.

The proportion of specially protected forest areas in Russia is 5.2% of the total forest area, including soil, water and biodiversity protective forests. However, the proportion of forests in strict nature reserves is insignificant (1.1%).

The balance between gains in losses in terms of carbon stock in living biomass is positive in Russia, even though the amount of sequestrated carbon is difficult to quantify (with figures as different as 40 and 400 millions tons sequestrated per year).

Every year hundred thousands of hectares of forests in Northwestern Russia suffer from forest fires, and forest management has failed to reduce the occurrence of such wildfires over recent years.

Even though the illegal logging concerns in Russia are more severe in the Eastern part, the Northwest region is not exempt, with some estimates leading to the conclusion that it could be as much as 11 million m³ per year (36%).

The FSC risk assessment platform www.globalforestregistry.org considers Russia is at unspecified risk in terms of violation of illegal logging and in terms of violation of traditional and civil rights.

Even though the certified forest areas in Russia have been growing quickly over the last 10 years, it is Russia, it is still very little developed with 38 million ha FSC certified, i.e. 4% of total forest area.

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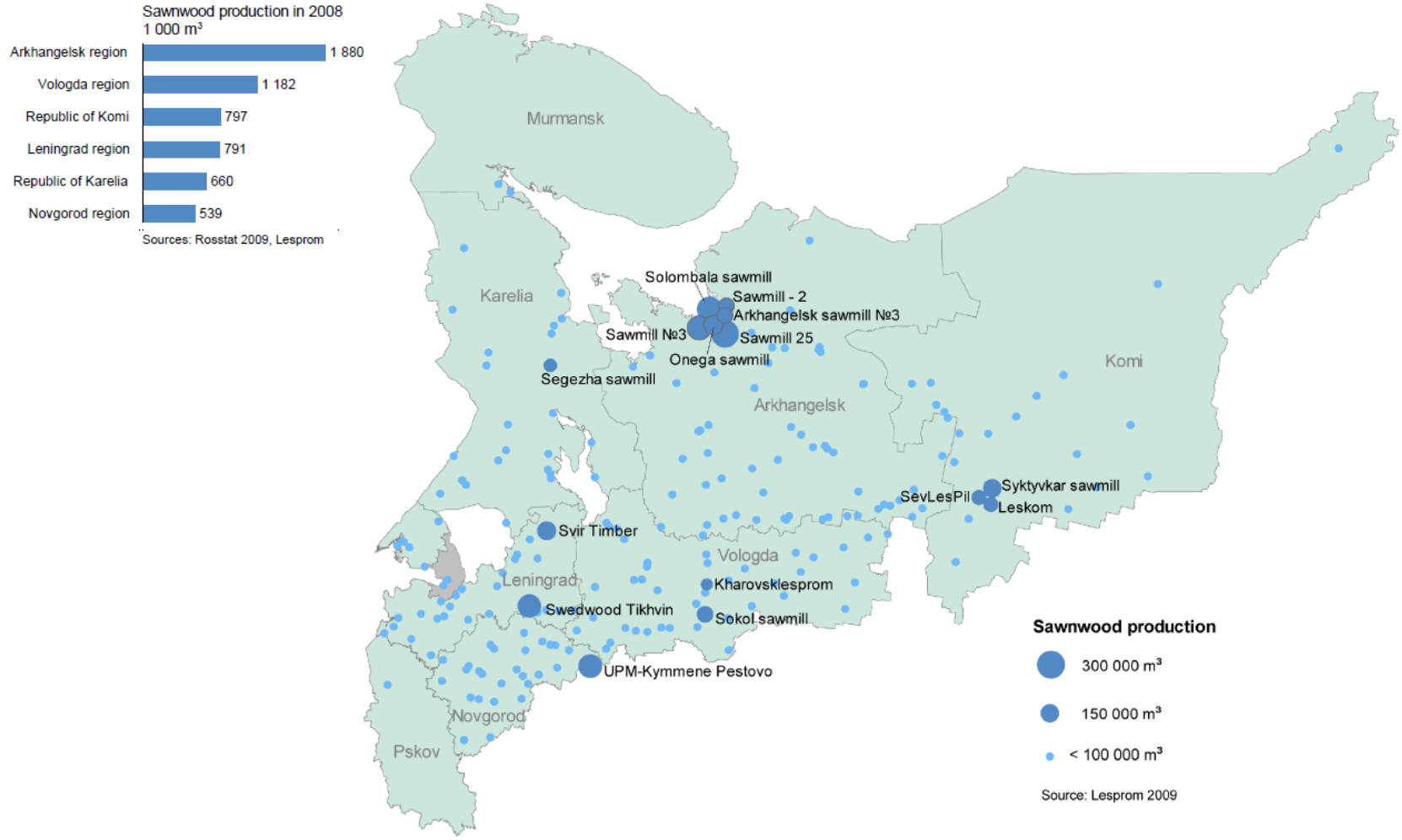
Annex 1

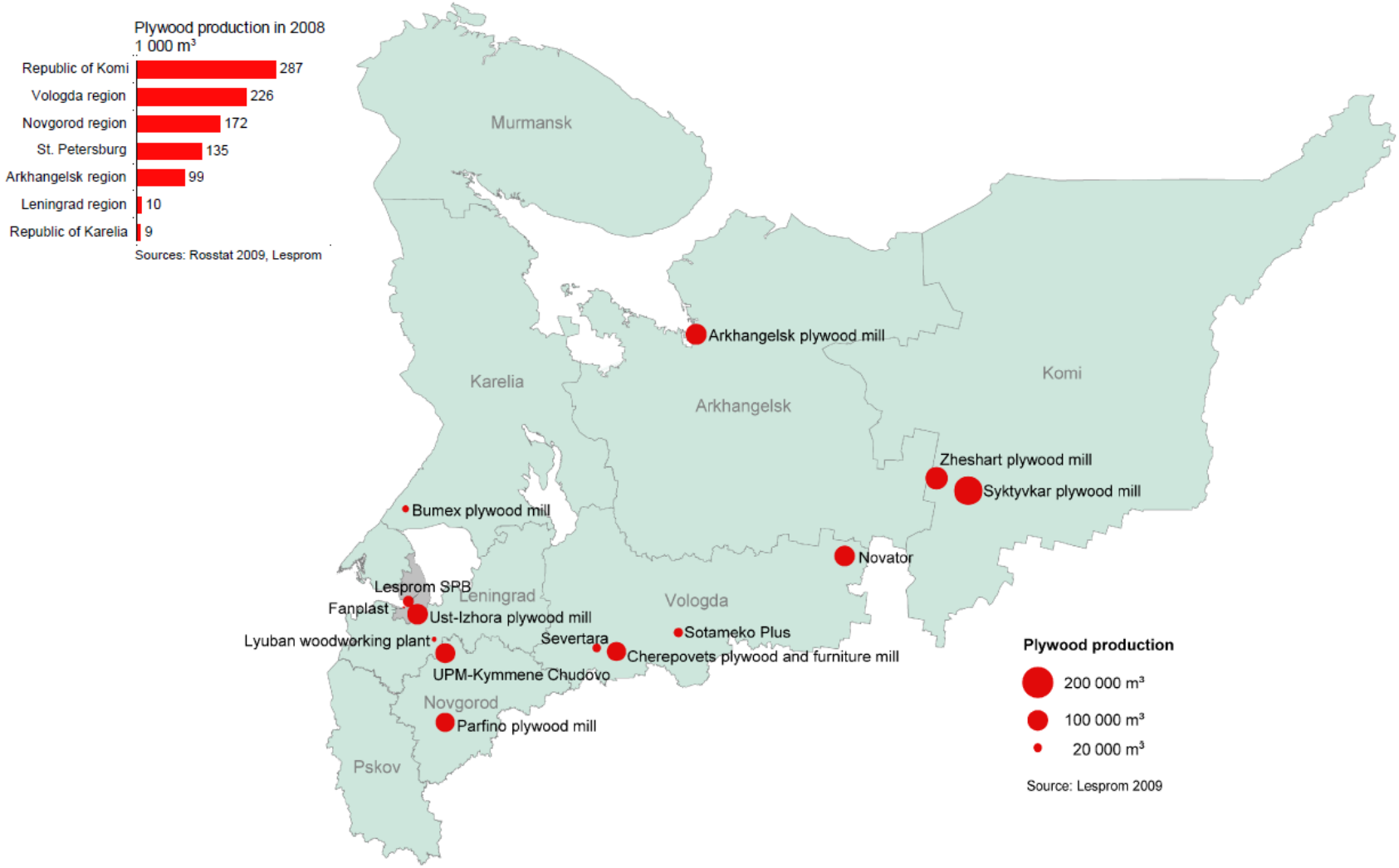
Overview of the wood processing industries in Northwest Russia

Source : Atlas of the forest sector in Northwest Russia- working paper 2009

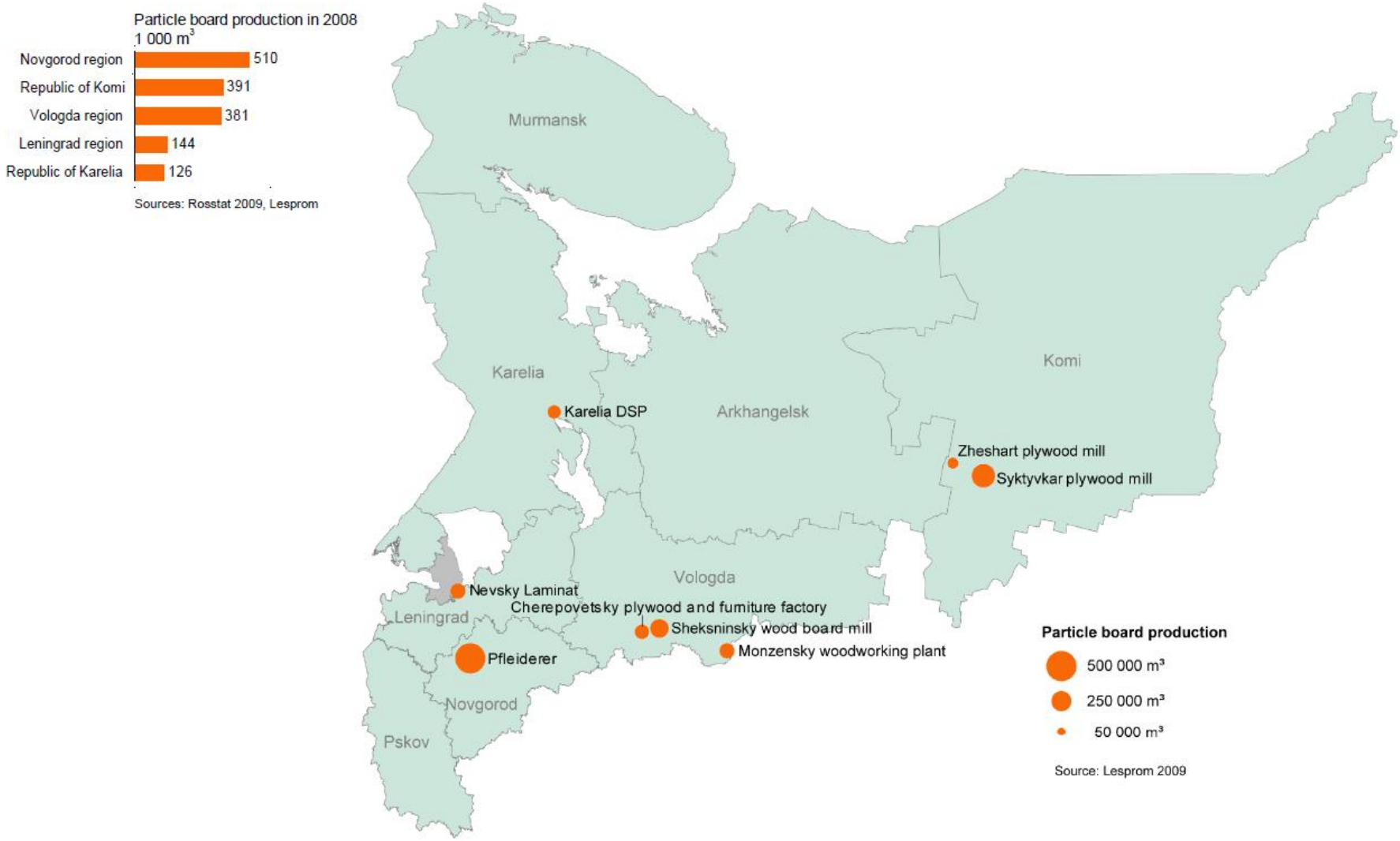
Sawnwood production and sawmills



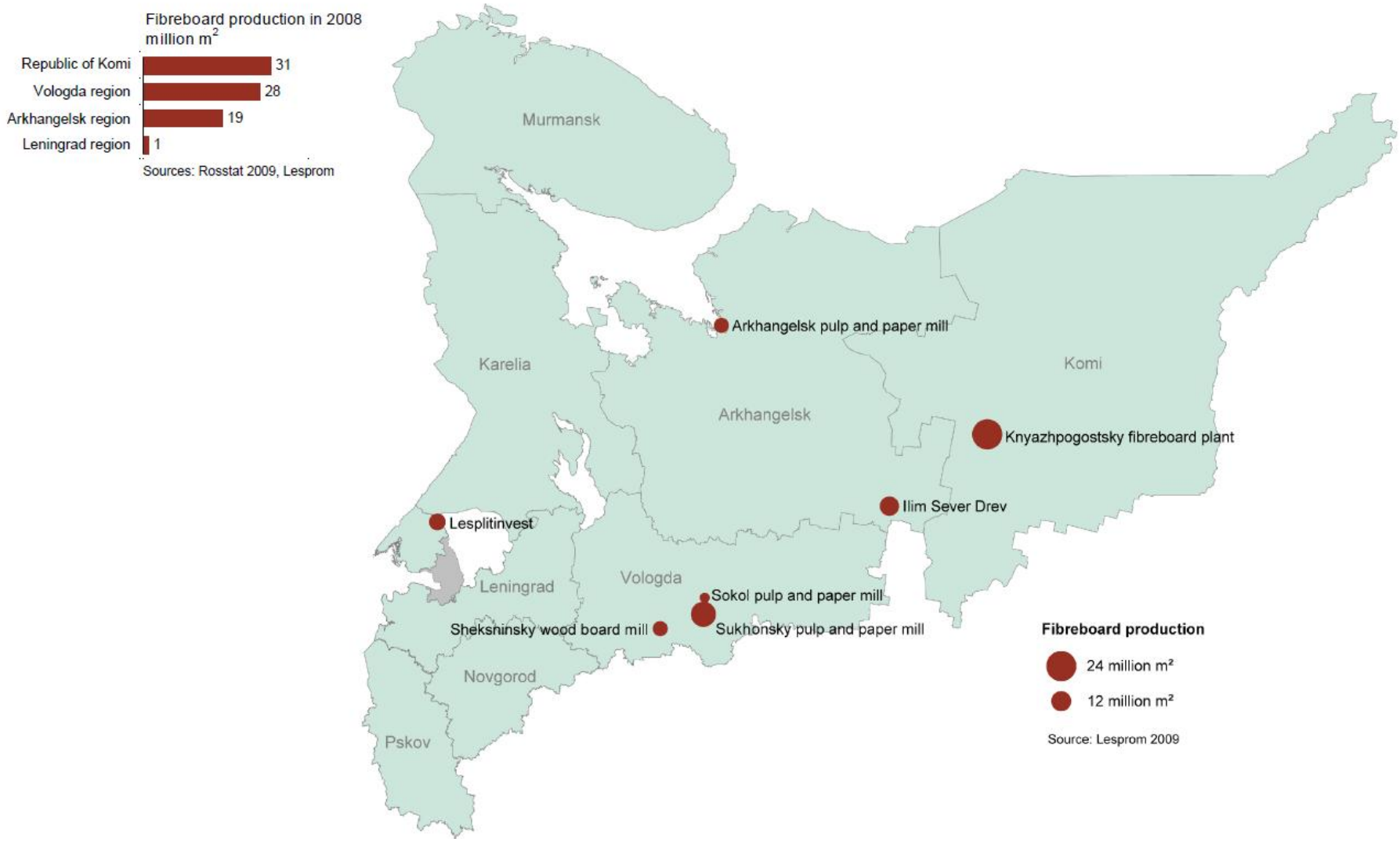
Plywood production and producers



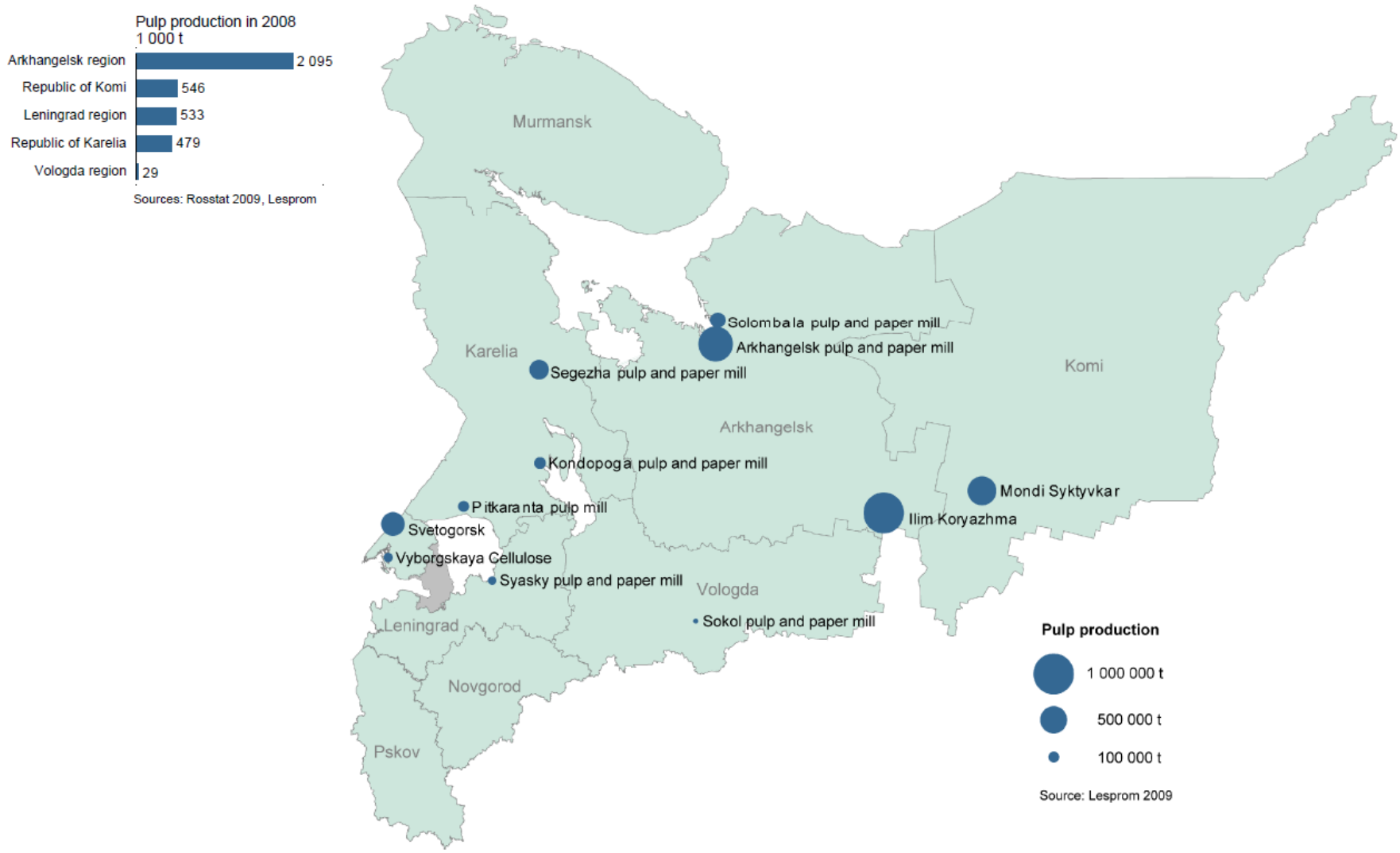
Particle board production and producers



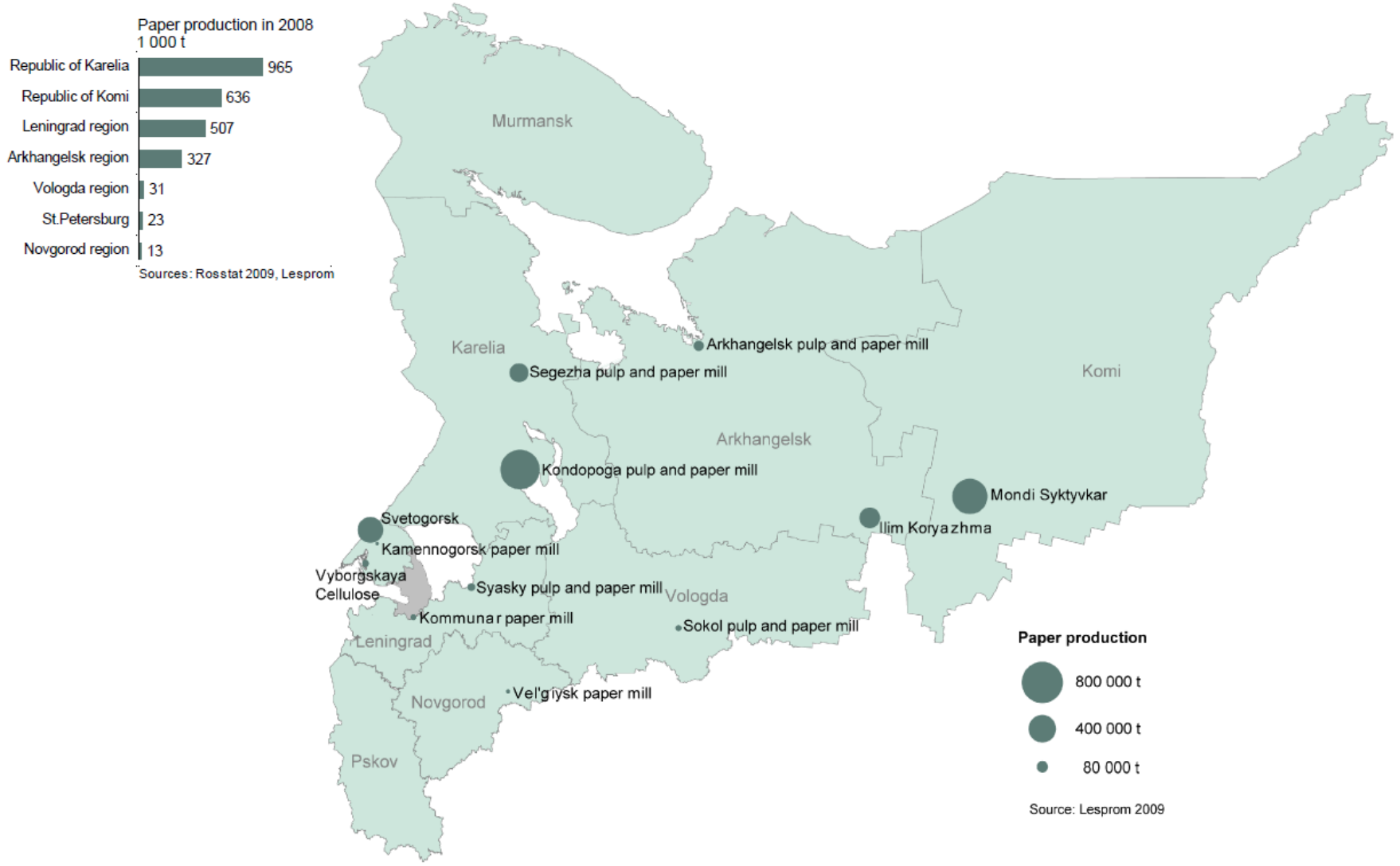
Fibreboard production and producers



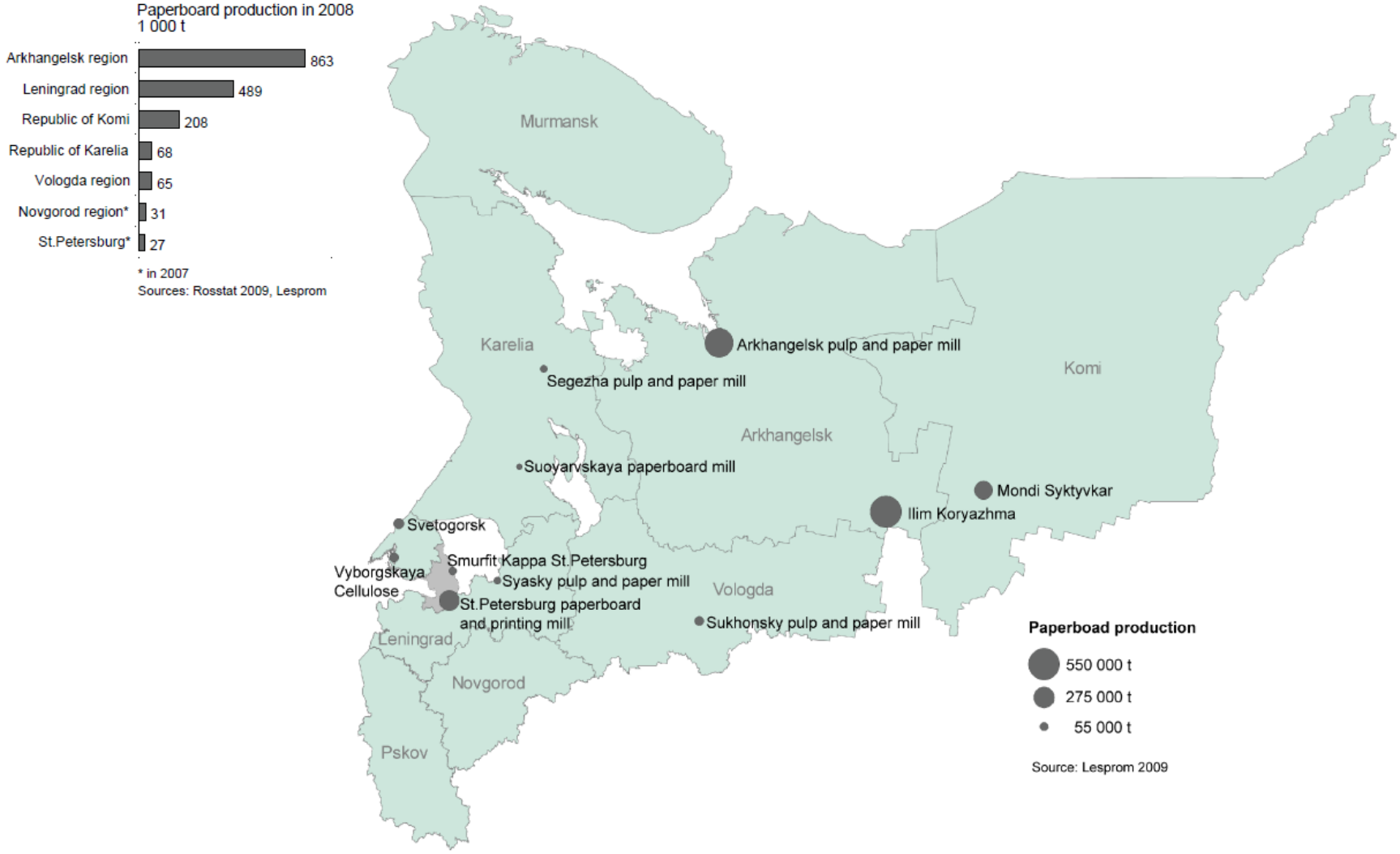
Pulp production and pulp mills



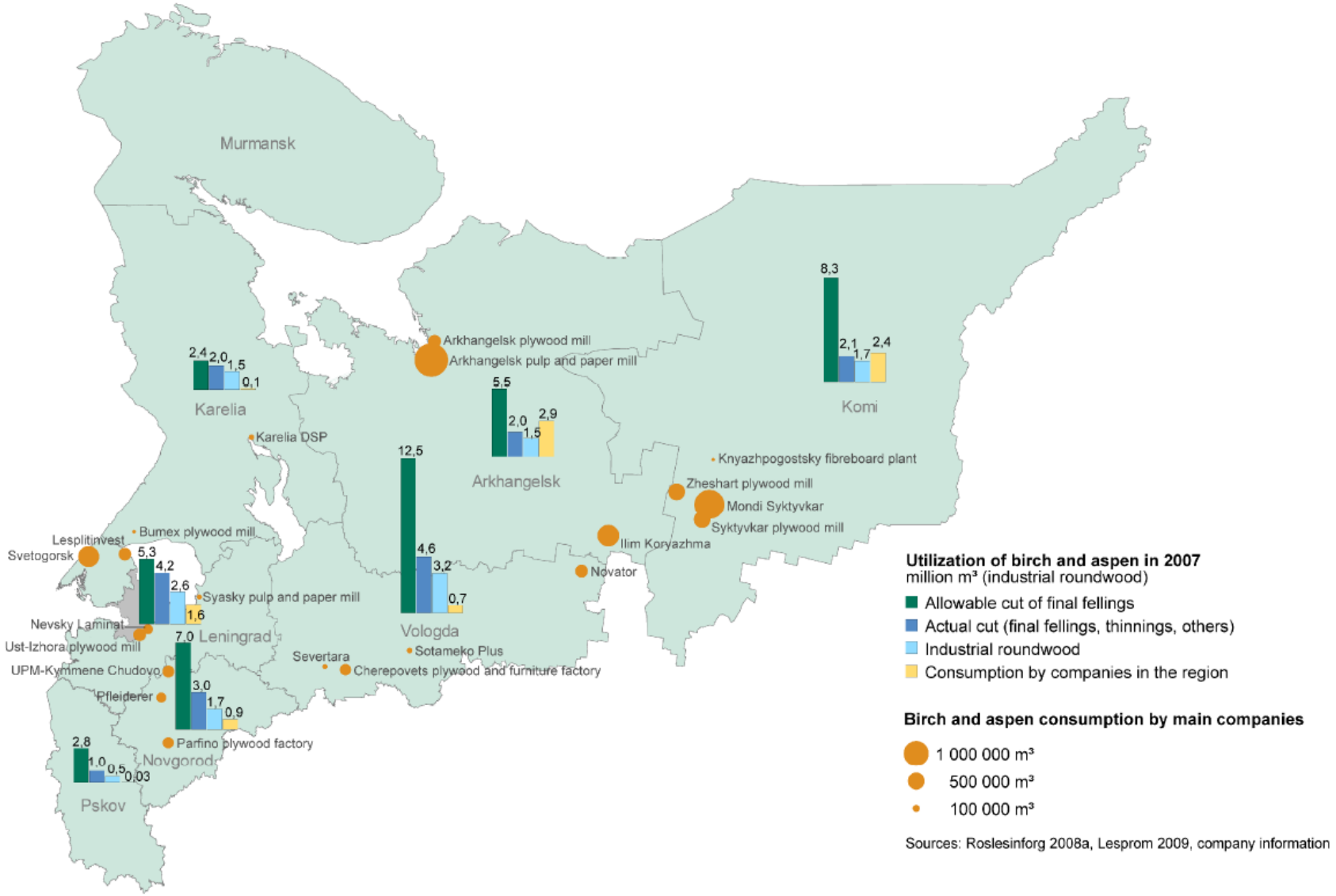
Paper production and paper mills



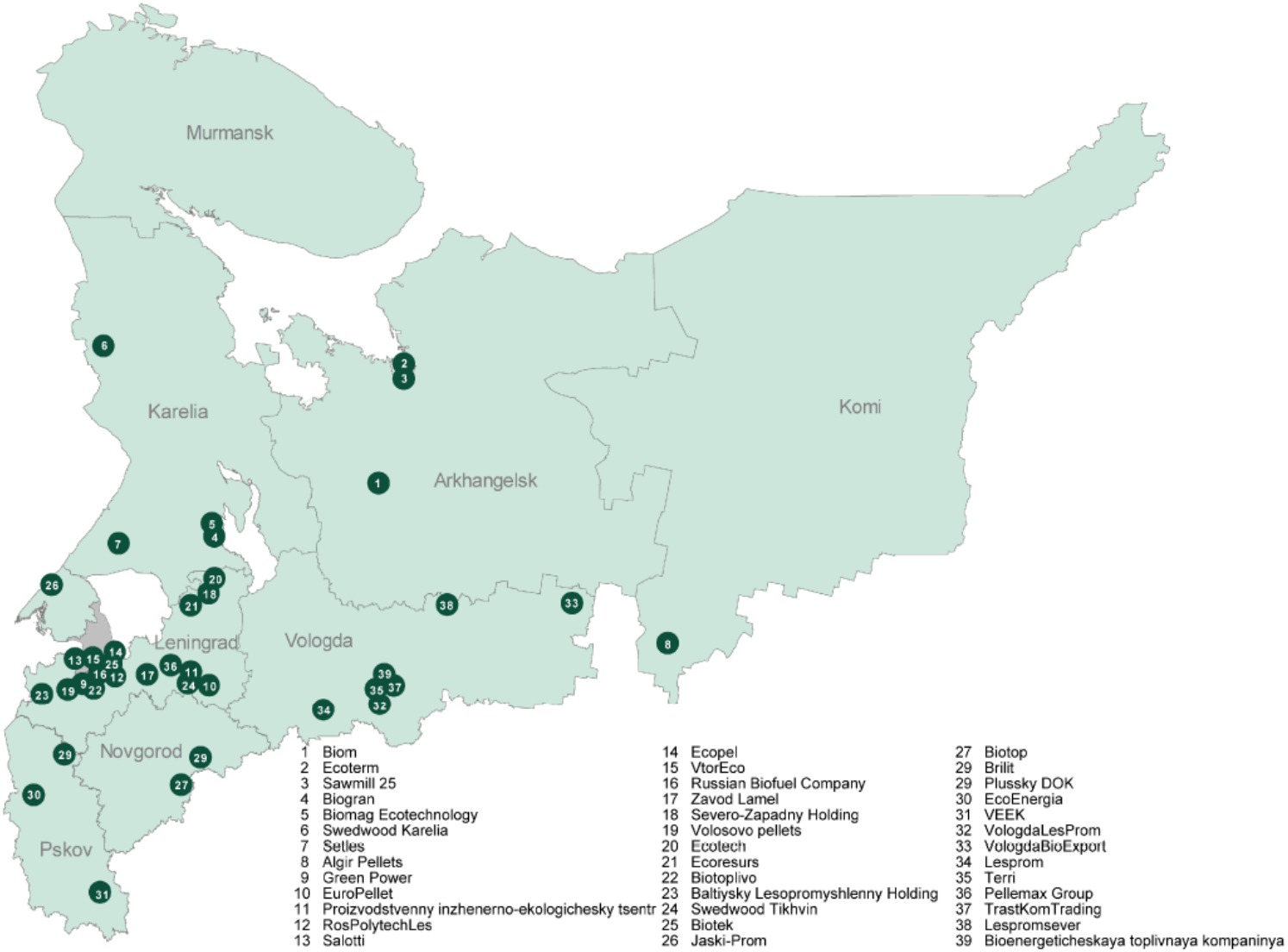
Paperboard production and paperboard mills



Utilization of birch and aspen



Wood pellet and bricket producers



Sources: www.wood-pellets.com, company information