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# Siberian Expectations:

## An Overview of Regional Forest Policy and Sustainable Forest Management



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## ABSTRACT

Developing effective forest management brings universal challenges to all countries, regardless of political system or economic state. The Russian Federation is an example of how economic, social, and political issues impact development and enactment of forest legislation. The current Forest Code of the Russian Federation (1997) has many problems and does not provide for needed progress in the forestry sector. It is necessary to integrate economic, ecological and social forestry needs, and this is not taken into account in the Forest Code. Additionally, excessive centralization in forest management and the forestry economy occurs. This manuscript discusses the problems facing the forestry sector of Siberia and recommends solutions for some of the major ones.

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# **1. INTRODUCTION: RUSSIAN FOREST POLICY**

## **1.1 Background**

Developing effective forest management is a challenge to all countries, regardless of political system or economic state. Russia—with a fifth of the world’s softwood resources, and still emerging from the remnants of a Soviet-style economy—is no exception. The last 15 years have seen the collapse of the Russian forest industry as it struggles to adapt to a new political and economic environment.

To do so, Russia must overcome a plethora of institutional problems in its system of governance, forest legislation, transportation, land ownership, forest management structure, and marketing. Many of these problems are endemic to the Russian economy as a whole; thus, reforms in the forest sector must correspond to the broader ecological, economic, and social goals of the State. In particular, since current legislation exacerbates problems of forest ownership, management and utilization as well as mechanisms of their development, we believe special attention should be paid to reformation of Russia’s Forest Code.

Given its size and the complexity of the problems facing Russia’s forestry sector, we believe it makes sense to focus our examination of these issues on a regional scale. Forty-two percent of Russia's forests and 9% of the world's forests are located in Siberia. About 20% of Siberian forests are located in Krasnoyarsk Krai in east Siberia (a kraï is an administrative geographical unit of the Russian Federation similar to a state in the United States). The maps of Siberia are included in chapters 2 and 3. Because Krasnoyarsk Krai holds such a large percentage of forests, its work toward efficient forest utilization is a very important task (Sokolov 1997). This has traditionally been an area dependent on forestry, and even with the recent decline in the timber industry, forestry remains an important contributor to the regional economy of Krasnoyarsk Krai. Its forest sector also has the potential for increased production and exports, based on sustainable forest management. It is an area with tremendous potential, although realization of its potential will require new regimes and reforms.

In this publication, we present our own interpretation of institutional problems facing the forest sector of Siberia in general and Krasnoyarsk Krai in particular. Additionally, we give recommendations for improving institutional structure while taking into account future socio-economic development as well as ecological requirements and limits of the forests.

## **1.2 Forest Management and Institutional Structure of the Forest Sector**

The founder of forest management theory in Russia, M.M. Orlov, divided Russian forest management into two categories: management personnel organization and forest management methods (Giryaev 1999). Three levels of forest management were clearly outlined and this structure prevailed during 200 years of Russian forestry history.

The structure contained the following main levels:

- a central administrative organ
- provincial, regional, and republic administrative-observational units
- local executive units

In pre-Revolution Russia, the central administrative organ was the Forest Department, an agency under the Ministry of State. The Forest Department director reported directly to the Minister. There were eight divisions within the Forest Department, of which the most important included the divisions of inspection, forest management, forest protection, forest organization, forest works, and forest utilization.

The local executive arm of forest management was the forest district, or *lesnichestva*. Forest districts were managed by forest inspectors—one inspector would typically manage five districts. The forest inspectors reported to the provincial forestry offices, which were under the aegis of the provincial governor. However, in reality, only some forest inspectors reported directly to the provincial forester, having some degree of autonomy. This flexibility allowed the foresters to manage more locally.

Pre-revolution forestry was profitable and provided income to the Russian treasury. Until 1917, income from forest utilization largely exceeded expenses. In 1913, for example, the expenses for forest management amounted to only 35% of forest income obtained by the State treasury. The Bolshevik revolution in the winter of 1917 dramatically altered both the structure and implementation of Russian forest management. By 1918, Russia's vast forest resources were nationalized, and forest managers would retain little autonomy in their management at the local level.

Under the Soviet government all forest administration, management and ownership was centralized. In 1929, the system of forest districts was abolished, and replaced by a system of complex forest units called *leskhozy* (forest enterprises) and *lespromkhozy* (integrated forest harvesting enterprises). These units functioned as the local executive organs of State forest management and forest harvesting, respectively. The *leskhozy*, literally translated as forestry enterprises, were really organized in much the same manner as agricultural collectives. All management decisions were centralized, top-down. The *leskhozy* harvested wood, procured machines in a centralized fashion to perform forest work, and provided the wood supplies and forest products prescribed by a forest management plan. Foresters ceased to be independent forest keepers. In essence, forest districts were transformed into collective plots (*uchleskhoses*).

During this period, however, the forest income generated from the *leskhozy*'s industrial activities greatly exceeded the funding that they obtained from the budget. Thus, the *leskhozy* were profitable enterprises, and the forest sector as a whole was positive for the State (Giryayev 1999).

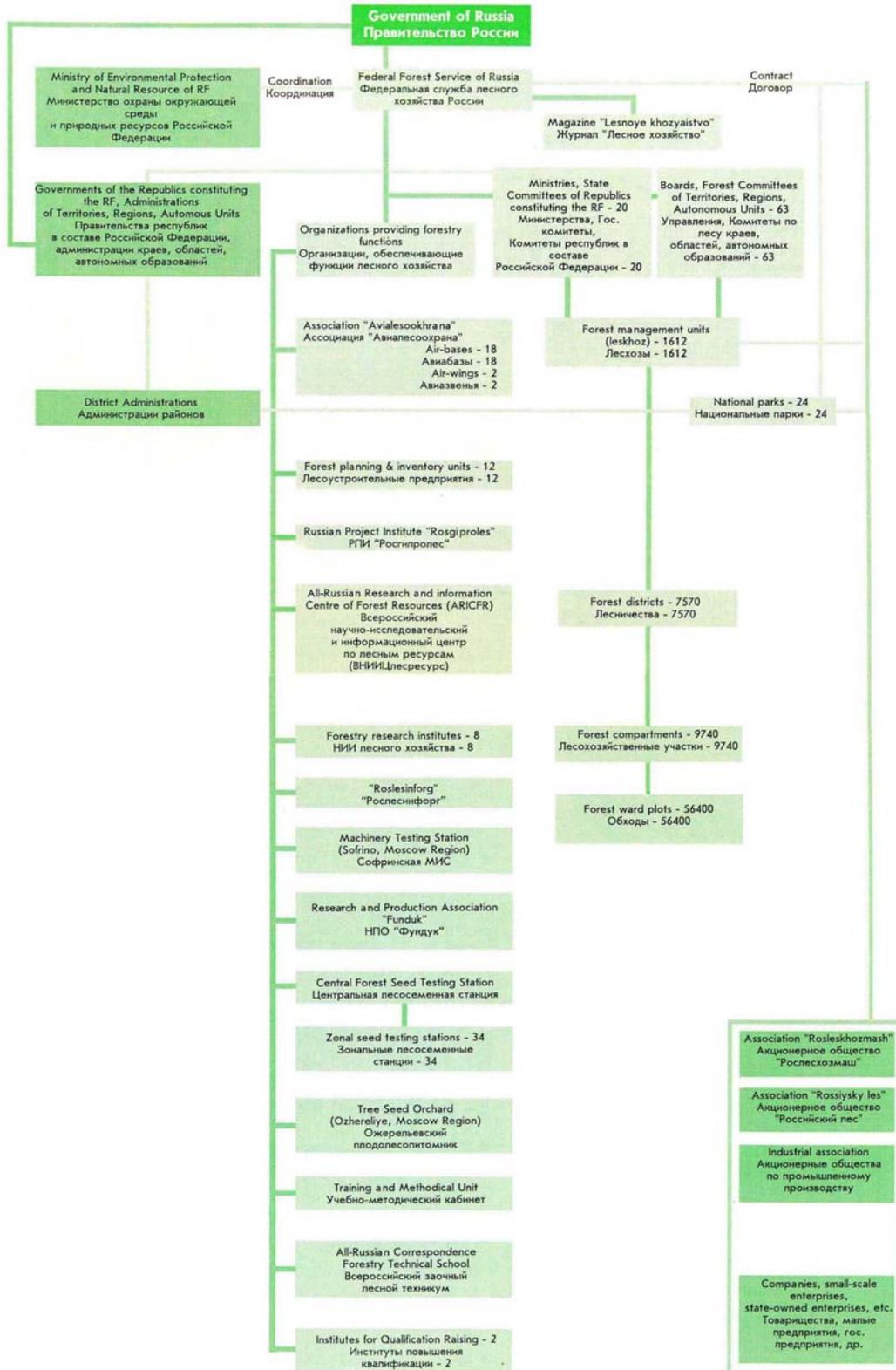
This system of forest management remained largely intact—with some nominal changes in the governmental bodies of forestry branches—until the post-Soviet nineties, when two important changes occurred. First, in 1993, while the administrative and monitoring authorities of the forestry enterprises were legislatively strengthened, the *leskhozy* lost the rights to cut and process wood from final fellings (harvests). Only one important executive function—the harvesting and

processing of wood obtained from intermediate cuttings is still left with the *leskhozy*, allowing them to earn some money of their own.

Second, the Russian Federation (RF) Forest Code of 1997 resulted in the organizational structure illustrated in Figure 1.

**Figure 1: Organization of State management of Russian forests (Russia 1994).**

**SCHEME OF MANAGEMENT OF THE NATIONAL FORESTRY IN THE RUSSIAN FEDERATION (RF)  
СХЕМА УПРАВЛЕНИЯ ЛЕСНЫМ ХОЗЯЙСТВОМ РОССИИ**



Although this revised structure borrowed some elements from pre-Revolution Russia, its chief flaw is that the forest districts remain dependent on central command. This dependence does not allow for effective forest management, as it does not allow foresters the flexibility to respond to local climatic and social conditions. (Note: At the time of publication, the Forest Service is part of the Ministry of Natural Resources of the RF, but the internal organization remains quite similar to that shown in Figure 1).

Table 1 illustrates that modern forestry, which still retains the centralized aspect of Soviet-style command, is unprofitable for the State. In 1997, the forest income amounted to less than 50% of the budget funding for forest management. The resources produced and spent by the *leskhozy* for their own needs are not taxed.

**Table 1.** Receipts and expenditures of Forest Service of the Russian Federation (*Rosleskhoz*) in 1997 (Giryayev 1999).

<b>Income</b>	<i>Million Rubles</i>	<i>%</i>	<b>Expenditures</b>	<i>Million Rubles</i>	<i>%</i>
Timber lease Charges	913	44%	Leasing	2017	59%
Mobilization of internal funds	1158	56%	Mobilization of internal funds	1392	41%
<i>Total</i>	2071	100%	<i>Total</i>	3409	100%

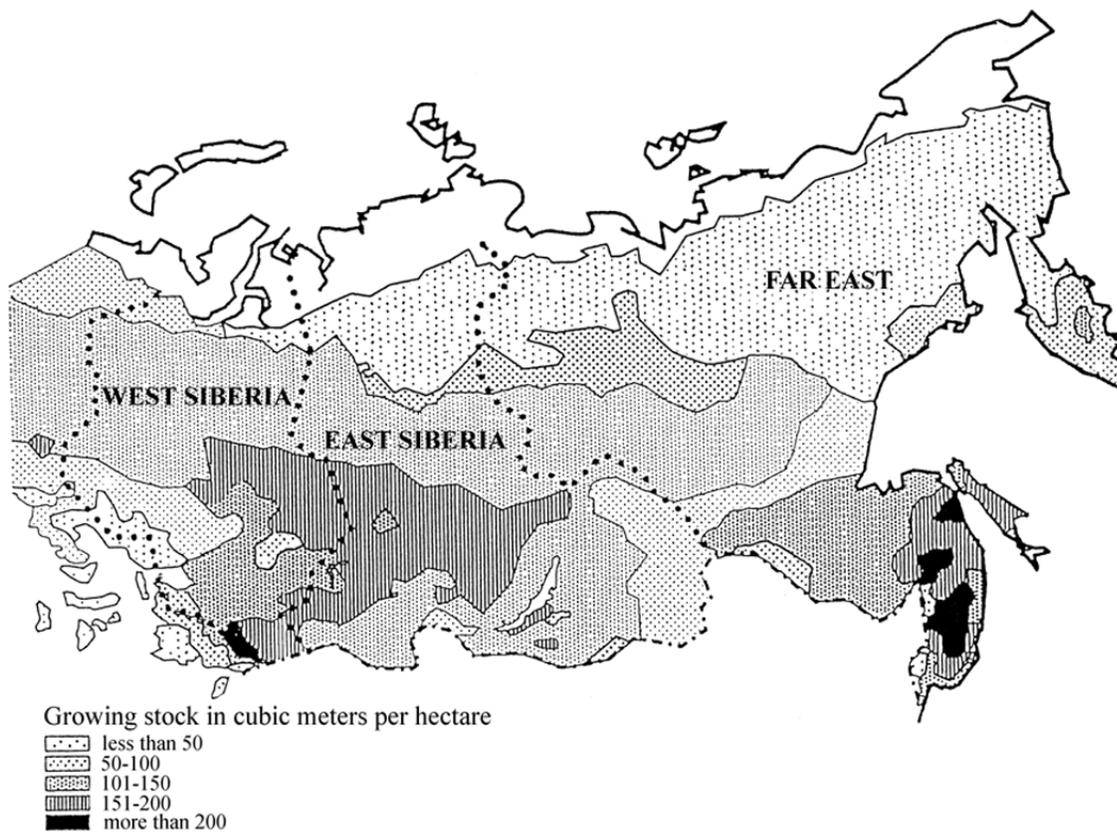
Today, forest management is expected to be gradually reshaped from the command-administrative system of the Soviet times, based on complex forest enterprises and centralized planning, to a market oriented system. However, a hard centralization of forest management nevertheless remains a clearly negative ingredient in the existing Russian forest management system.

## 2. CHARACTERISTICS OF FOREST RESOURCES AND FORESTRY IN SIBERIA

### 2.1 General Characteristics

Siberia is the Asian part of Russia and is a vast region. Siberia encompasses the area from the Ural Mountains to the Pacific Ocean (nearly 8000 km) and from the Chinese and Mongolian borders to the Arctic Ocean (nearly 3500 km). The total area of Siberia is 1276.6 million hectares, which is about 30% larger than the continental United States. Approximately 48% of Siberia (605 million hectares) is forest. Nearly 450 million hectares are covered with coniferous species. The forested area of Siberia constitutes about 20% of the world's total forested area and nearly 50% of the world's total coniferous forest. Nearly 65% of Siberian forests are located in permafrost areas and over 60% are classified as mountain forests (Figure 2).

**Figure 2:** Economic regions and growing stock of Siberian forests (Danilin 2001).



The total growing stock of stem wood is 61.4 billion m<sup>3</sup> and 51 billion m<sup>3</sup> is made up of coniferous species. Nearly 63% of the growing stock is classified as mature and overmature forests. Significantly, a majority of the indigenous Russian people (nearly 40 different tribal groups) live in the Siberian forests.

In terms of carbon (C), Alexeyev et al. (1995) have estimated that nearly 94 billion tons of carbon are accumulated in Siberian forests. Isaev et al. (1995) estimated carbon accumulation to be over 170 million tons annually for this region, which could be significantly increased by implementing sustainable forestry.

## 2.2 Forest Resources

Siberia is divided into three major economic regions: West Siberia, East Siberia and the Far East. The percentage of forest cover (Forest Fund) is 53%, 57% and 45%, respectively, in these regions (Figure 2).

Forest resources are classified in different ways in Russian statistics. The Forest Fund consists of areas currently covered by forests, as well as areas not covered by forests but which could be used for forestry production under certain conditions. The Forest Fund is divided into:

- Forest Land—either covered by closed forests called Forested Areas, or areas temporarily not covered (termed Unforested Areas, which may include harvested areas and burned areas) (Tables 2 and 3)
- Non-forest Land—areas which are not suitable for forest production under current conditions and areas with other land-use functions such as agriculture.

**Table 2:** Extent of the Siberian forest resources (Danilin 2001).

	<b>Russia</b>	<b>Siberia total</b>	<b>West Siberia</b>	<b>East Siberia</b>	<b>Far East</b>
Total Area, million ha	1707.5	1276.6	242.7	412.3	621.6
Forest Fund, million ha	1182.6	973.2	150.6	315.4	507.2
Forest Land, million ha	884.4	710.6	95.5	255.2	359.9
Forested Area, million ha	771.4	605.1	90.1	234.4	280.6
Growing Stock, billion m <sup>3</sup>	81.6	61.4	10.8	29.3	21.3

**Table 3:** Distribution of forested area and growing stock over major tree species. Forested Area (FA) is expressed in million hectares and growing stock (GS) in billion cubic meters (Danilin 2001).

Species	West Siberia		East Siberia		Far East		Total	
	FA	GS	FA	GS	FA	GS	FA	GS
<b>Coniferous (total)</b>	56.3	6.8	180.2	24.9	199.7	17.6	436.2	49.3
Pine ( <i>P. sylvestris</i> )	28.7	3.0	32.1	5.5	12.0	1.2	72.8	9.7
Spruce	5.4	0.6	12.4	1.8	13.7	2.4	31.5	4.8
Fir	3.8	0.5	9.4	1.6	1.8	0.3	15.0	2.4
Larch	5.9	0.6	102.8	11.6	168.8	12.9	277.5	25.1
Cedar ( <i>Pinus sibirica</i> and <i>P. koraiensis</i> )	12.5	2.1	23.5	4.4	3.4	0.8	39.4	7.3
<b>Hard deciduous (total)</b>	-	-	-	-	10.6	0.9	10.6	0.9
Beech	-	-	-	-	6.6	0.6	6.6	0.6
Oak	-	-	-	-	4.0	0.3	4.0	0.3
<b>Soft deciduous (total)</b>	21.7	2.8	31.2	2.8	12.7	0.8	65.6	6.4
Birch	17.0	2.0	26.4	2.1	11.6	0.7	55.0	4.8
Aspen	4.7	0.8	4.8	0.7	1.1	0.1	10.6	1.6
<b>TOTAL</b>	<b>78.0</b>	<b>9.6</b>	<b>211.4</b>	<b>27.7</b>	<b>223.0</b>	<b>19.3</b>	<b>512.4</b>	<b>56.6</b>

Note that Table 3 includes only major species and does not take into account shrubs and other coppice, which are accounted for in Table 2. According to the inventory definitions, shrub-dominated lands are regarded as forested areas only in regions where closed forests are unable to grow due to climatic conditions. In Table 3, it can be seen that conifers are the dominant species group throughout Siberia. Pine is the main species in West Siberia, but in other regions larch dominates. Overall, larch is the most common species in Siberia. Additionally, soft deciduous species (mainly birch and aspen) are quite well found throughout Siberia. Hard deciduous species such as beech and oak are only represented in the Far East.

Siberian forests grow under rather severe climatic conditions and are often poorly stocked (Pozdnyakov 1986; Danilin 1995; Danilin et al. 1996a,b; Sokolov 1997; Abe et al. 1998). More than 30% of the forested area is considered low density, with basal area only 30%-50% the levels of normal stands. In these low density stands timber stock is less than 80-100 m<sup>3</sup>/ha. The majority of these forest stands are located in East Siberia and the Far East. More than 40% of the Siberian forests are growing on poor sites, predominately in the Far East.

## 2.3 Harvesting

The annual allowable cut (AAC) in Russia is given for final felling of commercial wood, which includes wood for industrial and fuel uses. In recent years the actual harvest has been declining and is currently only 30-33% of the AAC. In 1997, the AAC was 382 million m<sup>3</sup> from forests managed by the forest authority, and was allocated as follows: coniferous 261 million m<sup>3</sup>, hard

deciduous 6 million m<sup>3</sup> and soft deciduous 115 million m<sup>3</sup>. The actual harvest in recent years was about 126 million m<sup>3</sup> for all the RF.

In Siberia, a 10% reduction in the AAC (about 20% for hard deciduous forests) is expected. In the Far East, the AAC for coniferous forests is estimated to be maintained at the present level and it is projected to increase by 29% for soft deciduous forests. The calculations concerning AAC only employ the commercial forests, hence the reason for low AACs in relation to the existing growing stock. Non-commercial forests and reserves (179 million hectares) will not likely be harvested in the next 20 years but will continue to produce non-timber benefits.

Significant problems with current forest harvest methods exist. First, the areas harvested are concentrated along developed transportation networks. For example, conifer stands along the Trans-Siberian Railroad are systematically being over cut. Second, there were and still are few incentives or penalties promoting improved forest utilization. The stumpage fee is extremely low merely because volumes and penalties for poor utilization are minimal. Third, labor costs and forestry investments are increasing; this results in "high-grading" of the forest for its best timber resources in order to increase profits.

Approximately one million hectares of forest are harvested in Siberia annually. Ninety-five percent of harvests are large-scale clear cuts, and are located in populated areas of the south and Far East where timber resources are overexploited. In some districts, the AAC is substantially exceeded. In particular, the pine forests are significantly affected by over harvest. In contrast, larch and broadleaved forests are underutilized. The result is a steady increase in the broadleaved sector of the forests, and no silviculture program exists to reverse this trend. Forests are also subjected to high-grading, which has a negative influence on the future species composition of the forest from an economic standpoint.

Inefficiencies in harvest and transport cause excessive amounts of timber to go to waste. Although it is beneficial to leave some biomass on harvest sites after logging, over 30% of the total harvest is left on site. The average waste of industrial conifer wood from harvest ranges from 30 to 60 m<sup>3</sup>/ha, and may be 70 m<sup>3</sup>/ha in the Far East plus an additional 20 m<sup>3</sup>/ha of logging slash. These high levels of biomass can create conditions prone to higher rates of insect infestation, diseases, and fire damage. The conclusion made by Sheingauz (1989) for the Far East is that for every 3 m<sup>3</sup> of wood felled, 1 m<sup>3</sup> is left on the cutting site. Transportation, which usually occurs by river rafting, results in further losses. In total, up to 60% of total harvested timber is lost due to inefficient harvest and transport. Obviously, these losses are great and much work needs done to refine current processes.

The use of heavy harvesting equipment in Siberia causes damage to the site. This damage includes changes to the soil moisture regime, increases in surface water run off, and increases in soil compaction as well as impacts to other ecological processes. Heavy harvesting equipment has a particularly negative impact in mountain and permafrost regions. For example, skid trails do not support regeneration for a period of 10 years or more and frequently cause significant erosion problems.

Historic over cutting in south Siberia resulted in a significant exhaustion of forest resources in the region. In the past, these south Siberian towns often relied strictly on the timber industry for economic stability and are now experiencing social and economic disruption. The current deficit of timber resources has resulted in the underutilization of a large stock of logging equipment and manufacturing plants that no longer operate at full capacity. Both of these factors are contributing to rising unemployment rates. Unfortunately, the equipment and plants cannot be transferred to other regions.

With large integrated manufacturing plants, problems are just as acute. When the local timber supply is exhausted, timber must be hauled for longer and longer distances or plants face shutdowns. Unemployed workers have limited options for relocation. Siberia is heavily dependent on the timber economy; thus, unsustainable forest practices have serious ecological, social, and economic consequences.

## **2.4 Stand Management**

For a more detailed look at Siberian forest resources, fiber supply and forest sector activity is given below using the East Siberian region as a case study. The East Siberian region represents one-third of all Russian coniferous forest area and 40% of the concomitant growing stock. Additionally, highly productive, high quality pine forests grow in this region in the Yenisei-Angara river basins (Sokolov et al. 1993, Danilin et al. 1996a). Nearly 20% of the national broadleaved forest is also located in this economic region.

It is important to note that in East Siberia not all of the harvest is captured by the Forest Service data collection system. Only between 85% and 90% of the harvest flows from within the monitored system.

## **2.5 Growth Potential**

The total growth potential of East Siberia is estimated at 361 million m<sup>3</sup> per year. However, not all of this growth is available for use or development. Site condition, remote location, lack of transportation, and other factors may make harvest economically and ecologically unfeasible. Approximately 95 million m<sup>3</sup> could be utilized in the short to medium term; and approximately 70% of this forest is coniferous (Backman 1985).

## **2.6 Roundwood Harvest**

Round wood harvest in East Siberia provided 93 million m<sup>3</sup> in 1989, 69 million m<sup>3</sup> in 1992 and 46 million m<sup>3</sup> in 1993. Conifers account for over 90% of harvested wood. The dramatic decline in harvest levels over time is not representative of lessening developmental pressures. As a whole, East Siberian forest resources are not being rapidly depleted, but there may be regional imbalances taking place. This is particularly important to note because harvesting tends to become more concentrated in response to increasing economic pressures in more heavily populated areas (Backman 1995).

## 2.7 Intermediate Stand Treatment

Intermediate stand treatment involves age-related thinning, pre-commercial thinning in young stands, commercial thinning, and selective sanitation harvest. These treatments are used for selecting preferred species for further growth, improving wood quality, providing wood for consumption, and reducing risk of loss due to fire, insects and diseases.

Over 11 million hectares are in need of intermediate treatment and 30% of this area is in need of pre-commercial thinning. Commercial wood from sanitation harvest could yield 0.6 billion m<sup>3</sup>. However, it is not economically feasible to treat all of these areas. The most significant factors preventing treatment include lack of an adequate transportation network, as transportation of wood generally occurs by rafting only. Additionally, high transportation costs, scattered locations of treatment areas, long distances to manufacturing plants, and lack of a market for small diameter wood also make pre-commercial thinning difficult. Thus, from a possible annual thinning volume of 96 million m<sup>3</sup>, only 8% of the volume is accessible under present economic conditions. Of these accessible areas, about 50% are in need of pre-commercial thinning and 5% are available for selective sanitation harvest.

## 2.8 Forest Regeneration

Approximately 800,000 ha are clear-cut annually in East Siberia. The majority of harvested stands are suitable for natural regeneration by conifers. However, some areas are regenerated as plantations (Pisarenko et al. 1992). As a general rule the ratios between natural regeneration and plantations are as follows:

- northern and middle taiga - 70:30
- southern taiga - 50:50
- mixed forests - 30:70
- forest steppe- 5:95
- steppe - 0:100

In the Novosibirsk and Omsk regions (West Siberia), plantations cover 60% to 70% of reforested areas. Natural regeneration is often insufficient due to serious site damage caused by inappropriate logging method, inadequate assistance for natural regeneration, and inefficient forest fire protection.

The forest regeneration system in Siberia includes:

- establishment of forest plantations in stands where natural regeneration is not expected
- assisting existing natural regeneration of the forest understory
- exposure of mineral soils to promote natural regeneration
- encouraging the natural regeneration of commercially valuable tree species
- converting soft deciduous young forests to coniferous or hard deciduous forests

Tree survival rates in these reforested areas are low due to low quality of planting as well as forest fires. In the last 3 years, over 300,000 ha of reforested areas were destroyed, roughly

10% of the accumulated total. In the Far East, only about 50% of the planted areas have survived. Research suggests that an increase in regeneration of 1.2 to 1.5 times is necessary (Danilin 2001).

Carbon sequestration programs have the potential for supporting large-scale reforestation throughout the Siberian Forest Fund. Based on realistic forest management programs, 50 to 80 million ha could be reforested during the next 40 years, resulting in annual carbon sequestration of nearly 2.5 tons C/ha (Kolchugina et al. 1993).

An important issue in reforestation is restoration of forestland destroyed by direct industrial influences, including coal, ore, peat, oil, and gas exploitation. Total areas of such lands are unknown but are estimated to be nearly 10 million ha. In the last 2 years, planting and sowing on these lands totaled less than 1,000 ha in all of Siberia.

There are large, low density forest stands of limited market value in Siberia, which are in need of restoration (Danilin et al. 1996b). According to inventory data, areas requiring restoration are 238,000 ha in the Far East; 107,000 ha in East Siberia; and 76,000 ha in West Siberia.

## **2.9 Harvest of Non-Timber Products**

Many non-timber products are harvested from Siberian forests, including fruits, berries, mushrooms, nuts, tree sap, and medicinal plants. Approximately 45% of all medicines in Russia are produced from plants. In the forest and bogs of West Siberia alone, more than 700 medical plant species exist and Siberian forests also provide many other important non-timber functions such as herb production, grazing lands, beekeeping, hunting, fishing, and recreation.

Siberian forests produce large quantities of non-timber forest products each year, however, only a small percentage are harvested. Approximately 2 million tons of fruits and berries, 1.5 to 4.0 million tons of mushrooms, and 0.8 to 1.2 million tons of nuts are produced annually; approximately 50% of these resources are accessible for human consumption. Currently, forest enterprises only harvest about 1% of the total harvestable stock annually. Other enterprises use another 2% of the stock, and the Siberian people harvest an additional 3%. Thus, the total harvested volume of non-wood products in these regions does not exceed 6 to 7% of its total stock.

Cedar (*Pinus sibirica* and *P. koraiensis*) forests are less than 6% of Siberian forests, but they are particularly important sources of non-timber products. (Western readers should note that, in Russia, the 5-needled Siberian and Korean pines are called cedars. The nuts being referred to in the following sentences are the seeds of these two species). About 80% of the total nut harvest is collected in these forests annually. Although the actual harvest does not exceed 2% of the production, 18 to 20 thousand tons of cedar nuts are collected annually. These important forests also provide half of the total Siberian harvest of sable and gray squirrel fur, which are very important species to the fur trade. For example, on 1,000 ha of cedar taiga, 17 times more fur is collected than on 1,000 ha of larch forests.

West Siberia and East Siberia have 37 species of fur animals. In the last 10 years, these two regions supplied nearly 90% of the total fur in Russia. There is also a substantial population of wild animals that are important for the food supply in Siberia. Experts estimate animal populations to be 168,000 moose, 554,000 reindeer, and 241,000 roe deer throughout West Siberia and East Siberia.

To increase the use of non-timber forest products and their subsequent processing, the following measures should be taken: establishment of more plantations, better organization of storage and manufacturing facilities, mechanization of the collection of plants, and use of improved harvesting equipment.

## **2.10 Forest Disturbance**

Over the past 50 years, wide-scale forest use has created significant changes in forest development. Increased size of forest fires, decreased forest resistance to insects (worsened by pollution), and increased wood extraction have resulted in ecosystem structure disturbances and forest cover modifications.

National forest inventory data from 1963 to 1988 shows significant trends in cover over central Siberia, which includes Krasnoyarsk Krai and Tyva Republic. Over this time period, fir stand area decreased by 23%, pine stand area decreased by 14% (note that, in Russia, the term 'pine' refers to 2- and 3-needle pines, primarily *Pinus sylvestris*), and broadleaf area increased by 60%. Additionally, young and middle-aged stands tripled in area, which is an indication of degradation of mature and overmature stands (Pleshikov et al. 1996). After a disturbance event such as fire or harvest, fir stands are generally replaced by early successional deciduous species such as birch and aspen. Pine forests occupy poorer sites, where stand replacement due to external factors occurs much more rarely. Development of a second tree layer composed of coniferous species is currently observed in 57% of the total forest area.

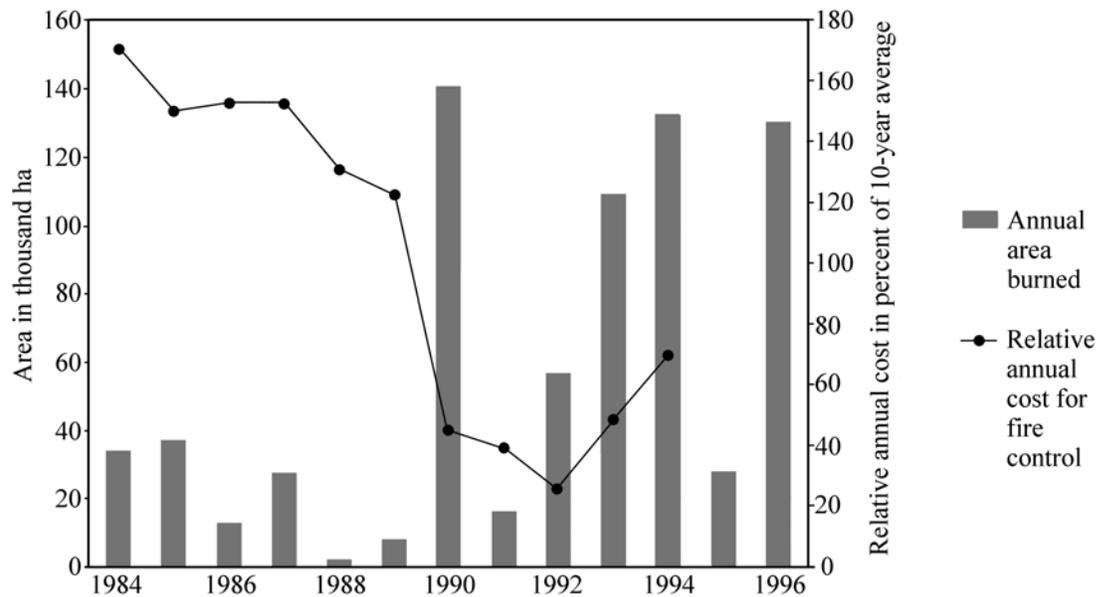
## **2.11 Forest Fires**

Forest fires are still the primary forest disturbance, and fires determine long-term forest dynamics. In the 973 million ha Forest Fund area, 590 million ha (61%) are under some form of fire protection; 78% of West Siberia, 66% of East Siberia, and 52% of the Far East are under some form of fire protection. On non-protected areas, active fire fighting only occurs in exceptional cases, such as impending danger to commercial property. On protected areas, 15,000 to 35,000 fires occur annually and result in the destruction of 0.5 to 1.0 million ha of forested area. In these areas, the average fire size varies from 15 to 50 ha (Russian 1994). Based upon current statistics and remote sensing data, the average individual fire across protected and unprotected areas causes a loss of about 100 ha of Forested Area and 2,000 to 5,000 m<sup>3</sup> of timber. Large forest fires, which account for 10-15% of the total, have the greatest impact and are responsible for 80-85% of burned areas.

Fire protection is the responsibility of the Federal Forest Protection Service and the Forest Fire Service. Aerial control is the primary control method of forest fire control, and 90% of all control in Siberia is regulated through regional Aerial Forest Control Bases. The current systems

of control do not provide adequate forest fire protection. Early warning systems to locate fires in their early stages do not exist. As a result, fires often spread to large areas. Only 45% to 50% of all forest fires in Siberia are discovered and extinguished before causing significant damage. The primary reasons for the low level of forest fire protection are lack of sufficient funding, scarce and poor technical equipment for both aerial and ground forest fire protection, and imperfect organizational structure and administration. Figure 3 shows forest fire trends in Krasnoyarsk Krai.

**Figure 3:** Forest fires in Krasnoyarsk Krai from 1984 to 1996 (Krasnoyarsk Forest 1997).



## 2.12 Pests and Diseases

In Siberia, spread of pests and diseases have increased in recent years as an apparent result of anthropogenic factors. Rapid changes in forest ecosystems under the influence of human activities are often associated with the loss of biological stability. This can lead to severe forest protection problems. Insects and diseases have the ability to quickly multiply and spread to large forest areas. Important human factors in these infestations are intensive final felling, pollution, change in hydrological patterns, and pressure from recreation.

For example, timber waste after final felling provides ideal conditions for insect and disease outbreaks. Periodic dying of fir-spruce stands has been observed in the southern part of the Far East since 1926, with estimates from hundreds to several million hectares. About 1 million ha of forested area are reported to be seriously affected by insects and diseases annually.

Vegetation cover of forest-tundra and northern taiga zones is polluted by a complex of smelters in Norilsk in north central Siberia (Krasnoyarsk Krai). This complex pumps over 2 million tons of sulfur dioxide, heavy metals, and other pollutants into the air each year. The polluted zone extends for nearly 300 km to the southeast from Norilsk. Forest cover is completely destroyed or

heavily disturbed in the surrounding area of 500,000 ha. The area covered by partially degraded forest is several times larger.

After forest fires, the predominant causes of forest stand death are insect outbreaks, industrial pollution, and unfavorable weather (Review 1993). Unfavorable weather includes very strong winds of 15-20 m/sec that result in large areas of windthrow. Such winds are observed frequently in West Siberia and the Far East. Other weather factors include droughts and excess soil moisture. In the last 10 years, control methods for combating diseases and insects have been implemented in Siberia on about 60 thousand ha annually (70% by biological methods). A forest pathological survey has been carried out on areas totaling about 1 million ha each in West Siberia and East Siberia and about 285,000 ha in the Far East. The survey found insect outbreak and industrial pollution damage in 300,000 ha throughout Krasnoyarsk Krai and the Tyva Republic (Isaev 1991).

## 2.13 Conclusions

Forest resources in Siberia have the following major features:

- *Low Productivity.* About 50% of the region is occupied by stands of low productivity with growing stock up to 100 m<sup>3</sup>/ha.
- *Fire Losses.* Annually, nearly 500,000 ha of forested areas are lost due to severe wildfires.
- *Harvesting Pattern.* Overcutting of timber has occurred along the main railroad transportation routes and close to manufacturing centers.
- *Harvesting Areas.* There has been a significant increase in the rate of harvest in remote regions.
- *Utilization.* The high grading of timber resources is widespread. There are serious losses of wood during transport from harvest site to consumer due to improper transportation methods, old machinery, and inefficient rafting.
- *Species Change.* Clearcut harvest methods combined with fire losses have resulted in a change of up to 50% of these areas from conifers to soft deciduous species.
- *Forest Health.* Large areas have decreased forest health due to attacks by insects and diseases, unsound final harvesting methods, pollution, and other factors. The area of non-regenerated cuts, burns, and dead stands is nearly 16 million ha in East Siberia alone.
- *Silviculture.* Commonly used silviculture methods are not adequate, resulting in an inefficient forest renewal program.
- *General Dynamics.* The forest resources are deteriorating slowly but significantly in Siberia. Generally, the practice of forestry in Siberia cannot be considered sustainable. The key issue in Siberian forestry is to establish a sustainable form of management that develops forest resources from ecological, economic, and social points of view.
- *Opportunities* do exist in the Siberian forest sector, and there are a number of areas that can be focused on now to promote sustainable management.

## 2.14 Suggested Areas of Focus

From a resource perspective, opportunities exist to seek new markets for the broadleaved fiber supply and to better manage and control utilization of forest resources in general. From an

industry perspective, opportunities are more likely to be found in meeting the rising demand for wood in Pacific Rim countries, due to long transport distances to markets in western Russia and an absence of a significant domestic demand. These export opportunities are strongly dependent on obtaining reasonable prices for forest products. Compared to Europe, Japanese and US markets for wood products (lumber, veneer, plywood, and paper) are much higher and have the potential to boost harvest activity.

Russia has a relatively well-developed forestry infrastructure, highly-trained scientists, a structure of forest enterprises, and some protective and regulatory measures that serve as a skeleton for rapid and productive development of the sector. What is needed are investments directed at modernization, technical support, and basic materials (especially technological) to enhance the country's capacity to promote sustainable development of the forest sector (Benderskii et al. 1998a).

In the last 5 years, most international assistance in the forestry sector (US Agency for International Development, US Forest Service, the World Bank, and the others) has been directed toward increasing forest productivity and sustainability as well as improving forest resource management. However, much can be accomplished by reducing the perceived high risk attached with private businesses investing in Russia. This includes improving financial and transportation infrastructures, information technology, and increasing labor potential and ability (Sokolov et al. 2000).

### 3. Krasnoyarsk Krai: Situation Analysis and Institutional Structure of the Forest Sector

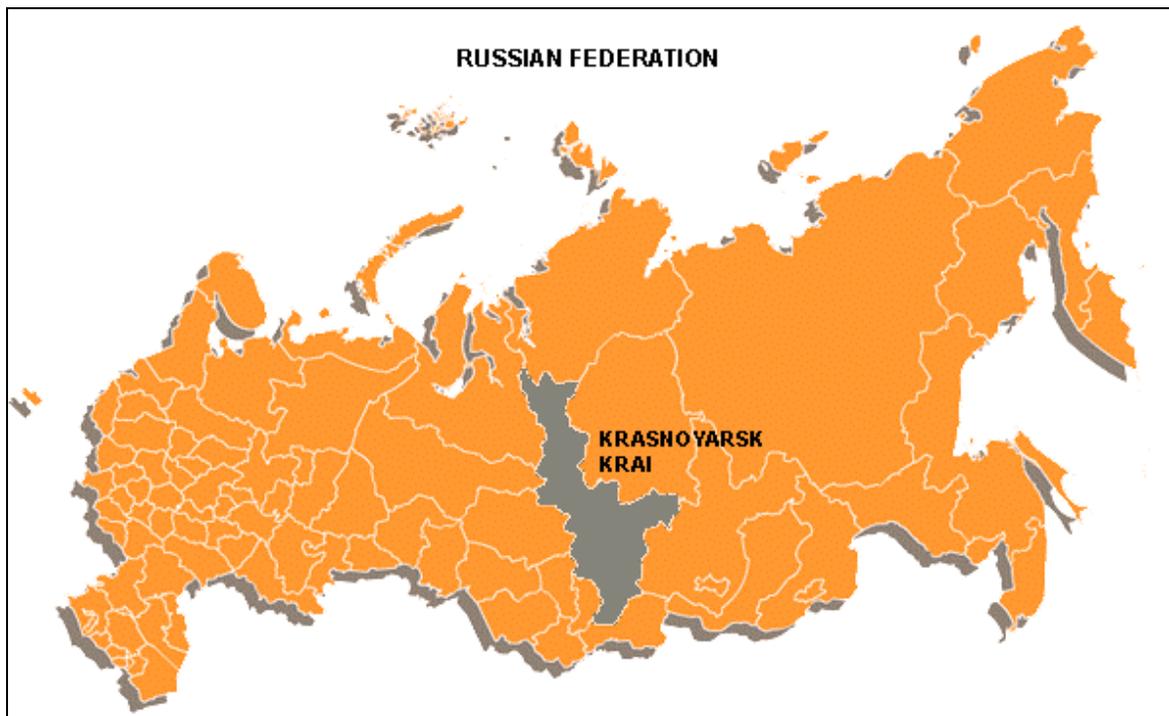
As a result of conducting case studies of the Krasnoyarsk forest sector, we present our own understanding of the institutional problems facing this sector and propose a number of recommendations for improving its institutional structure through market reforms (Sokolova 2000).

The studies and analyses were based upon a series of interviews with representatives of forest enterprises in Krasnoyarsk Krai and an investigation of the state of the region's forest resources, socio-economic situation, formal administrative system and its relation to the forest sector, and the formal and informal institutional configuration of the forest sector.

#### 3.1 Forest Fund Description

Krasnoyarsk Krai, a large territory in East Siberia, has 58.4 million ha of Forest Fund land (Figure 4 and Table 4). Approximately 49 million ha (84%) are forested. According to the Russian Forest Code, the Forest Fund is divided into three groups, Group I, II and III. Group I forests include non-commercial forests with environmental functions, including water preservation and recreation qualities. Group II forests are located in sparsely forested and densely populated areas and are protected for industrial and recreational reasons. Group II forests primarily consist of forests with limited economic value. Group III forests include commercial forests primarily situated in densely forested regions.

**Figure 4:** Map of Krasnoyarsk Krai (Krasnoyarsk Forest Management 1997).



**Table 4.** Comparative characteristics of the Krasnoyarsk Forest Fund lands in 2000 (Krasnoyarsk Krai Forest Management 2000).

<b>Forest Fund Area</b>	Forest Fund area of Krasnoyarsk Krai (million ha)	Share of Russian Federation Forest Fund area, %
All land area	58.4	5.3
stocked land area	48.9	6.9
non-forest land area	6.6	2.0
unstocked land area	2.9	4.2
Group I	13.0	5.9
Group II	0.6	1.0
Group III	44.8	5.4

Krasnoyarsk Krai has one of the richest forest resource bases in Russia. Several valuable species grow here, including Scotch pine, Siberian pine, and Siberian larch. Birch, pine, larch, and Siberian pine (Russian cedar) are the dominant forest species (Table 5).

**Table 5:** Growing stock and main species distribution in 1997 (State Forest Account 1998).

<b>Species</b>	<b>Thousand ha</b>	<b>Million m<sup>3</sup></b>	<b>Percent</b>
Scotch Pine	9,587.0	1,703.17	25.9
Spruce	6,045.0	861.96	16.3
Larch	7,700.7	1,094.53	20.8
Cedar (Siberian pine)	8,003.7	1,577.63	21.6
Fir	5,715.0	847.58	15.4
<b><i>Total conifers</i></b>	<b>37,051.4</b>	<b>6,084.87</b>	<b>100.0</b>
Birch	10,517.1	1,001.34	82.1
Aspen	2,296.7	369.02	17.9
<b><i>Total broadleaved</i></b>	<b>12,813.8</b>	<b>1,370.36</b>	<b>100.0</b>

During the period 1995 to 2000, regional forest statistics have changed. The total forested area has decreased by 22.4 million ha, due to the secession of the Taimyr Region into an autonomous region with its own forest management system (Table 6).

**Table 6:** Dynamics of state of the Forest Fund managed by the Krasnoyarsk Krai Forest Management 1995–2000 in 1,000 ha (Krasnoyarsk Krai Forest Management).

	1995	1996	1997	1998	2000
<b>Total forest area:</b>	80,734.1	81,033.4	81,069.6	81,109.6	58,364.8
stocked area	51,439.3	51,774.7	51,871.1	51,946.7	48,900.4
<b>Conifers:</b>	36,903.7	31,717.1	37,085.2	37,051.7	35,467.8
young	2,682.7	2,724.5	2,839.3	2,845.2	2,975.1
medium	5,146.5	5,143.6	5,158.5	5,093.0	5,020.5
maturing	5,107.0	5,121.5	5,157.6	5,176.3	5,202.9
mature and overmature	23,967.5	24,027.5	23,930.3	23,937.2	22,269.3
<b>Broadleaved:</b>	12,510.3	12,713.1	12,723.7	12,838.0	12,843.6
young	1,876.5	1,891.8	1,896.9	1,950.3	1,955.6
medium	3,252.7	3,276.4	3,272.6	3,299.4	3,293.3
maturing	1,251.0	1,240.8	1,239.4	1,245.9	1,242.5
mature and overmature	6,130.1	6,304.0	6,314.8	6,342.4	6,352.2

These forests periodically suffer from fires, pests, disease, and industrial pollution (Krasnoyarsk Forest Management 1997). The damage inflicted on the forest steppe and the southern taiga in the region affect 62% to 85% of their total area. Due to a number of anthropogenic and natural factors, only 5% to 10% of virgin mature and overmature stands have been preserved.

The forestlands in Krasnoyarsk are among the most fire prone areas in Russia. From 1984 to 1997, a total of 12,953 forest fires were registered, affecting 936,400 ha of forests. Thus, on average, approximately 65,000 ha of the forested area in the region burned annually. The year 1996 was particularly disastrous, with 266,000 ha destroyed by fire and economic losses reaching an estimated 84 million US dollars.

There are also periodic outbreaks of the Siberian gypsy moth, which is the main pest in the coniferous taiga forest. The most recent outbreak occurred between 1994 and 1997; it affected 1 million ha of forestland, primarily in the Angara and Yenisei regions. Approximately 140,000 ha containing an estimated volume of 50 million m<sup>3</sup> of timber were impacted.

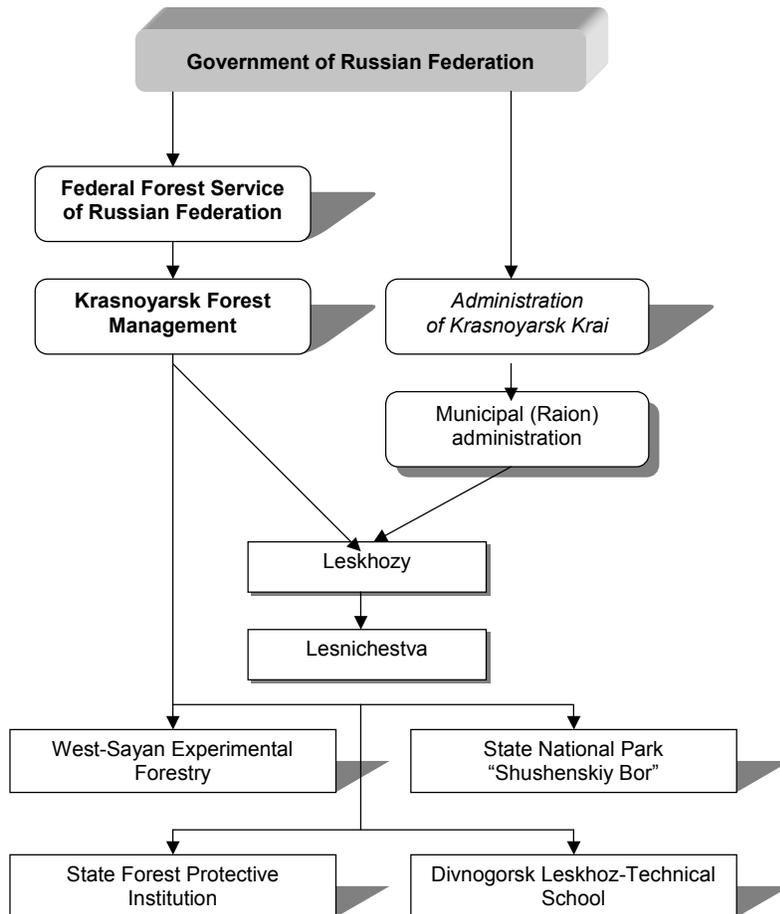
Industrial pollution of the forest is also a serious problem in the forest-tundra zone. During the last 50 years, this environment has been severely disturbed by gas and dust emissions from the Norilsk copper-nickel complex (Goskomecologiya 1997). Presently, some 500,000 ha of forestland have been heavily damaged; it is estimated that the area of partly destroyed stands is several times larger. Forest stands located up to 200 km from a pollution source are greatly damaged by these emissions and, within a radius of 80 to 100 km, forest survival is close to zero.

### 3.2 Forest Management Structure in Krasnoyarsk Krai

The Regional Forest Management makes decisions regarding forest resources use and coordinates its work with the territory departments of environmental protection, land resources, hunting, fishing, and water. Furthermore, the Management negotiates contracts with the Krasnoyarsk Aerial Forest Fire Defense, with the East-Siberian State Forest Inventory, various research institutes, and the Siberian State University of Technology.

The Forest Management of Krasnoyarsk Krai was founded in 1947 as the regional body of the Federal Forest Service of the Russian Federation (Figure 5). According to the Decree of the Russian Federation President, the Federal Forest Service of the Russian Federation was abolished in May 2000. On the 1st of October 2000, the Krasnoyarsk Forest Management was consequently reorganized to become the Committee of Natural Resources.

**Figure 5:** The structure of Forest Management in Krasnoyarsk Krai (Krasnoyarsk Forest Management 1999).



Today, the Krasnoyarsk Committee of Natural Resources (the former Krasnoyarsk Forest Management) has two departments: (1) Department of Forest Use and Management; and (2) Department of Forest Protection and Reforestation.

Forest inventories in Krasnoyarsk are primarily carried out by the East-Siberian State Forest Planning and Inventory (*Lesproekt*). This organization has 115 employees. Temporary seasonal workers are regularly used for field inventory work. The activities of *Lesproekt* are supervised by the Department of Forest Resources of the Krasnoyarsk Krai Forest Management.

The State Forest Protection in the region has a clear structural and territorial division. There are 56 *leskhozy* consisting of 244 forest districts (*lesnichestva*), 450 forest compartments (*uchastki*) and 1,500 forest tending plots (*obkhody*). There are 324 chief foresters (*mastera*) on the staff of the *leskhozy*, and the air fire fighting brigades have 340 employees.

The basic division in this organization is the forest fire protection units of the *leskhozy* and commercial forest users, among them 104 fire-chemical stations. During summertime, more than 200 mechanized groups are maintained by the State Forest Protection to fight forest fires. There is coordination between all these units. The Krasnoyarsk Air Forest Fire Defense (*Avialesookhrana*) has 27 strategic subdivisions in Krasnoyarsk Krai, in the Evenkia, Tyva, and Khakassia districts. The Krasnoyarsk Air Forest Fire Defense patrols the forests of the region from the air; when it discovers a fire, units are dispatched. The *Avialesookhrana* has 650 to 700 parachutists and rapellers at its disposal. It also has a training center and leases up to 50 airplanes and helicopters.

The State Forest Protection Center of Krasnoyarsk Krai is responsible for the coordination and implementation of a unified forest protection policy against insects and diseases. It has departments for forest protection, soil-chemistry, expeditions, and an entomological laboratory. The center employs 46 specialists. The Department of Forest Regeneration of the Regional Forest Management deals with reforestation problems. There are 45 permanent and 15 temporary forest nurseries in the region.

### **3.3 Industry Background**

In the beginning of the 1990s, more than 90% of all enterprises in wood harvesting and processing were privatized. As a result, a great number of production cooperatives and small enterprises appeared, followed later by private joint-stock companies. The joint-stock companies are to a substantial part owned by top managers in the forest industry. In such cases, the enterprises are usually profitable, while the integrated harvesting companies (*lespromkhozy*) are not.

Many highly specialized enterprises were privatized and lost their market under the new conditions. Private intermediary trade organizations appeared and grew. This had a destabilizing effect on regional forest industrial production. The result was that only a small share of the new enterprises (primarily those oriented towards export) managed to adapt to the new conditions, work independently in the market, and reconstruct their production to products with a real demand.

In 1995, the "privatization for money" stage began. Former State enterprises belonging to the forest industrial complex had to offer more than 51% of their shares for sale on the stock market. This was the beginning of a redistribution of the forest enterprises.

In the course of economic reform, the forest industrial complex was never at the center of interest of federal authorities. The previous State management of forest industrial branches and enterprises was decentralized. At the regional level, offices for the reconstruction of the forest industrial complex were established to help restructure enterprises and attract investments. At the federal level, between 1992 and 1996, the responsibility for creating a sector development strategy was shuffled from one authority to another. Currently, the coordination of this activity rests with the Ministry of the Economy, a Deputy Minister administration controlling the forest sector, and with the Ministry's Department of Forest Sector Economics.

According to data provided by the Russian Federation Ministry of the Economy, 69% of all forest industrial enterprises suffered losses during the first 11 months of 1998 despite privatization. Accounts payable by the forest industry amounted to 2.3 million US dollars, while accounts receivable were only 678 thousand US dollars. The debts of the forest sector to the State exceeded 872 million US dollars. This is equal to more than half the annual volume of forest sector production. Only 5% of all forest enterprises were able to increase their efficiency during 1998.

In the early 1990s, Russia was the second largest commercial wood producer in the world, producing more than 300 million m<sup>3</sup> round timber per year. The forest sector contributed 3% of the total national income and guaranteed work for two million people. By the end of the 1990s, the harvesting capacity had decreased sharply to 85 million m<sup>3</sup> in 1997 and to merely 72 million m<sup>3</sup> in 1998. This capacity decrease was primarily caused by economic recession but also by the social and political instability characterizing the transition period following the collapse of the former Soviet Union. It should also be noted that the pace at which institutional structures and forest management regimes have been formed does not match the general pace of the country's economic reforms, particularly in terms of forest sustainability.

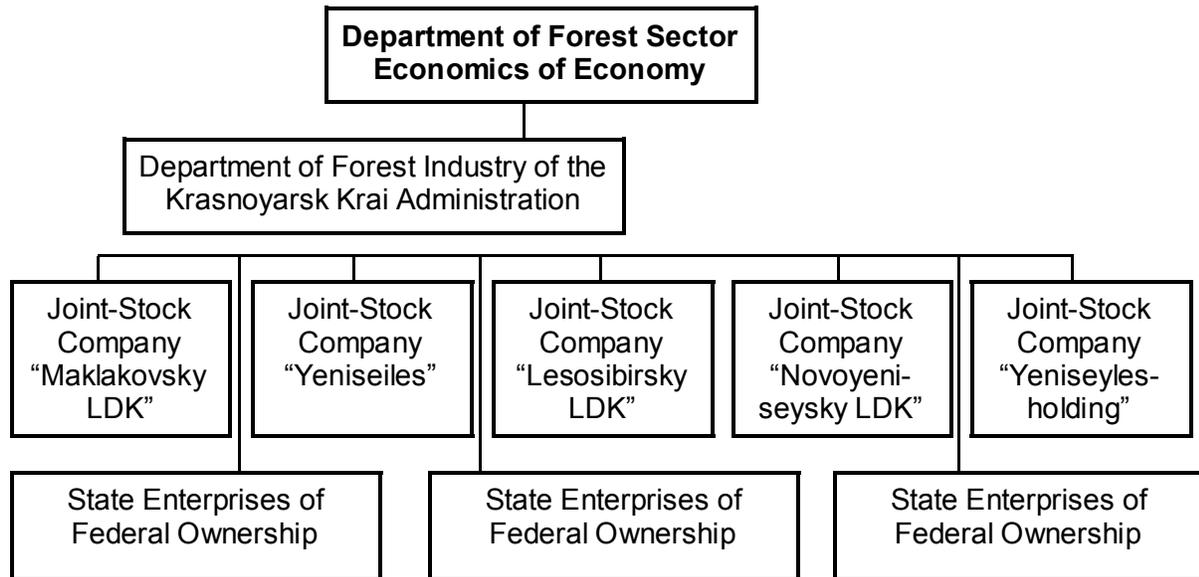
### **3.4 Industry Organization**

The structure of the forest industrial complex of Krasnoyarsk Krai is typical of Russia. The Krasnoyarsk forest complex contains some large holding companies, five regional State enterprises, and 31 federal State enterprises among others. In 1996, total production in the region reached about 364 million US dollars. The share of the joint stock companies of this total was 75%.

The formation of a united production structure, as depicted in Figure 6, was based on technology and location. At the same time, enterprise members of this organization must meet several important criteria:

- They should have a stable financial base.
- They should produce a large share of the total volume of forest products in the territory.
- They should be operating "closed circle" production, including both wood harvesting and wood processing.
- They should own a large share (more than 25%) of all establishments in the branch and be willing to follow agreed-upon financial, market and investment policies.

**Figure 6:** The Krasnoyarsk forest complex (Krasnoyarsk Forest Management 1997).



Since 1992, the transition to a market infrastructure and economy has caused problems for the region's forest industry. At the beginning of 1993, a Committee for the Development of the Forest Industrial Complex was formed within the Krasnoyarsk Administration. This committee elaborated a territory Program for Reconstruction of the Forest Industrial Complex in order to reorganize the forest enterprise sector and to stimulate investments. However, the program was discontinued in 1997 due to lack of funding. In 1998, a new governor for Krasnoyarsk Krai reorganized the committee into the Department of Forest Industry.

The Department of Forest Industry determined that the current status in the Krasnoyarsk forest sector is critical. Accounts payable by forest enterprises exceed their accounts receivable by three times. Seventy-six percent of all forest sector enterprises are unprofitable.

A quick reorganization of enterprises in Krasnoyarsk has occurred to attempt to solve some of the above mentioned problems. This reorganization process often includes the establishment of new enterprises based upon the old ones. The assets of the old enterprise are then transferred as an investment to the newly formed company. Thereby, the new company has no debts and a new owner. This means that the old enterprise - by owing shares in the new enterprise - now has a real source for paying off its debts. The new enterprise - with no debts - becomes attractive for investors.

### 3.5 Socio-Economic Situation

In 1997, the population of Krasnoyarsk Krai was slightly over 3 million people. Of these 3 million, about 2.3 million (74.1%) lived in urban areas, while close to 0.8 million (25.9%) lived in rural areas. The population density in the region, 4.2 inhabitants/km<sup>2</sup>, is much lower than in European parts of the country. Russians comprised 88% of the population.

In the early 1980s, increasing birth rates coincided with improved government support for families with children, resulting in the highest birth rate in the last 20 years in 1986. However, since 1993, falling birth rates and continuous high mortality have caused a population decrease in the region (Table 7). This long period of birthrate decline has made the process of population aging practically irreversible. The proportion of children under 14 years of age decreased from 25.5% in 1991 to 22.4% in 1996. Along with a steady increase in people over 60 years of age, the population's age structure is "far-gone" in the words of the Sverdlovsk governor E. Rossel. This will certainly lead to further population decreases (Goskomecologiya 1997).

**Table 7:** Natural population change in Krasnoyarsk Krai, 1991-1996 (per 1,000 inhabitants) (Krasnoyarsk Sanitary and Epidemiological Inspectors Center).

		Year					
		1991	1992	1993	1994	1995	1996
Birth rate	<i>Krai</i>	13.0	11.4	10.0	10.4	9.8	9.4
	Russia	12.1	10.7	9.4	9.6	9.3	8.9
Death rate	<i>Krai</i>	9.8	11.0	13.5	14.9	13.9	13.2
	Russia	11.4	12.2	14.5	15.7	0.5	14.2
Population Change	<i>Krai</i>	3.2	0.4	-3.5	-4.5	-4.1	-3.8
	Russia	0.7	-1.5	-5.1	-6.1	-5.7	-5.3

Infant mortality, the level of which is often taken as an indicator of the health and social prosperity of a society, continues to increase in Krasnoyarsk Krai, exceeding the average for Russia as a whole (Goskomecologiya 1998). Average life expectancy, which is often seen as an indicator of the health status of a society, reached the lowest point in 1993, 59.2 years overall and 53.9 years for men. In 1996, life expectancy had improved again to 61.2 years, but it still lagged behind the Russian average by 3.3 years.

### 3.6 Wages and Employment in the Krasnoyarsk Forest Sector

As of January 1, 1996, 64,700 people (or 4.7% of the total workforce) worked in the Krasnoyarsk forest industrial complex. Currently the forest industrial complex includes 800 forest harvesting enterprises (60 large), more than 100 sawmills, 2 fiberboard factories, and a pulp and paper plant. One-fifth of the Krasnoyarsk forest enterprises are considered to be large, 45% are middle-sized, and 35% are small enterprises.

As of 1999, 53,330 people were working in the forest industrial complex, including:

- 1,680 people directly engaged in cutting
- 3,400 working skidding tractors
- 6,390 drivers of log truck drivers for long-distance timber transportation
- 1,000 operate logging terminals

- 10,200 work in cutting areas and at landing sites
- 1,300 work in road construction and road maintenance
- 18,000 people work with primary wood processing, mainly saw milling
- 4,300 are occupied with machine repair and technical services
- 5,500 people do subsidiary work
- 1,140 people are professionals, engineers or managers

The Krasnoyarsk Forest Management of the Committee on Natural Resources employs 5,183 people, including 4,462 people who are paid by the State budget. Of the total number of people employed by the Regional Forest Management, 1,589 people work as managers and specialists, including 580 people with higher education, 879 with special secondary education, and 130 people are workers.

Training of personnel for work in the Krasnoyarsk forest complex is offered by the following special secondary schools and universities: the Divnogorsk Forest-Technical School, the Kansk Technological School, the Krasnoyarsk College of Wood Working Industry, the Siberian State Technological University, the Institute for Further Professional Forestry Training for Siberia and the Far East (in the town of Divnogorsk), the Krasnoyarsk Institute for Further Professional Training of Key Personnel and Specialists for the Forest and Pulp and Paper Industry.

Training of employees in the forest sector has traditionally focused on the production process rather than on solving market problems and business management. Recently, specialist training in the field of market economics and management has been introduced.

The main social problems in the forest sector and other branches of the Krasnoyarsk economy are related to unemployment and wage arrears. According to data from the Krasnoyarsk Committee of State Statistics, 69,400 people were unemployed in the territory in March 1999. The existing unemployment level in different branches of the economy varied between 2.6 and 10.9% as of 1997. Officially, the number of unemployed in the forest sector was 245 to 1,973 people. Unemployment in the country reached, on the whole, 3.7% or 1.029 million people at the beginning of September 2001 (Goskomstat Rossii 2001).

During the period of 1995 to 1998, there was a sharp employment decrease in the forest industrial complex. The decrease was greatest in production areas, indicating an even greater decrease in productivity. The forest industrial sector has experienced the most rapid employment decrease among all branches of heavy industry (Sokolov 1998). The average monthly salary is the basis on which consumer budgets are formed for workers. Traditionally, workers in the forest sector have been underpaid, and salaries in the sector have lagged behind other branches of the economy. According to the Krasnoyarsk Forest Management, the monthly salary in forestry was 97 US dollars in 1997.

Salaries only covered 49.5% of the cost of living. Compared with the average wage in industry as a whole, wages in the forest industrial complex decreased from 85% of the average in 1991 to only 49% in 1996. In 1996, average wages in the forest industrial complex was 90 to 130 US dollars. Simultaneously, wage arrears are a constant problem. Wages are often paid out in consumer goods, which are usually expensive but of low quality. Under such circumstances,

the importance of other means of subsistence increases. People grow vegetables in their gardens, fish, and hunt. People in Krasnoyarsk Krai earning their entire living by such subsistence activities related to the forest number around 5,000.

Sixty percent of the inhabitants in Krasnoyarsk have their own gardens or *dachas*. The income from activities based on these gardens and *dachas* was estimated to be 17% of total family income in the 1980s. According to a recent inquiry, inhabitants of *lespromkhozy* get at least 50% of their means of living from the secondary economy (at least if they own a cow) (Vladyshevskii et al. 1998).

### **3.7 Aboriginal Peoples**

Aboriginal peoples have experienced a constant decrease both in absolute and relative numbers. The aboriginal population in the Krai has decreased by 15% since 1959 and, currently, there are 14,800 aboriginals. In the competition for the use of more valuable and accessible forests, the aboriginal peoples have had to cede to the Russian migrants.

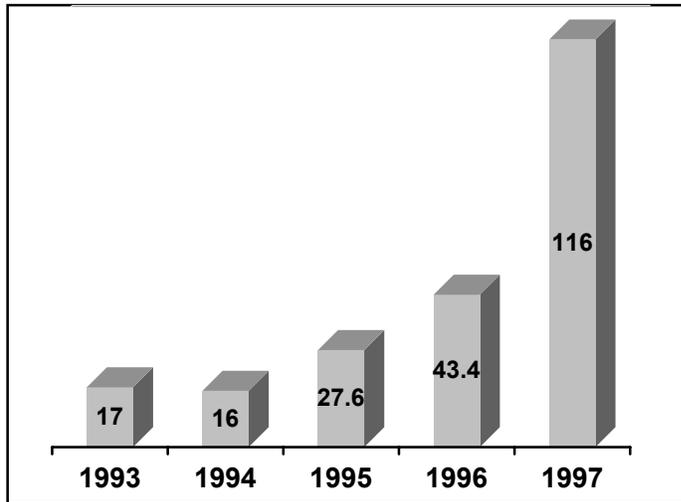
According to the Russian Forest Code, the interests of aboriginal peoples must be taken into account in forest leasing and other forms of forest utilization. The situation for aboriginal peoples has always been a declared priority for the Soviet government, and it has continued to be so in the new Russia. Legislative regulations, however, never improved the conditions of life and did not help maintain the culture of the aboriginal population. Presently, in order to improve their situation, land has been given for free to the aborigines: 2.5 million ha of Forest Fund lands belonging to Norilsk city was allocated to the aborigines for hunting and fishing.

### **3.8 Forestry Budget and Activities**

According to the Russian Forest Code, the Forest Fund is federal property. The federal budget is the main source of funds for forest management. The regional budget finances reforestation measures. Land use taxes and timber lease charges go both to the federal budget and to the budget of the Subjects (administrative units and republics) of the Federation such as Krasnoyarsk Krai. This allows for some forest income to be used for purposes other than forest management.

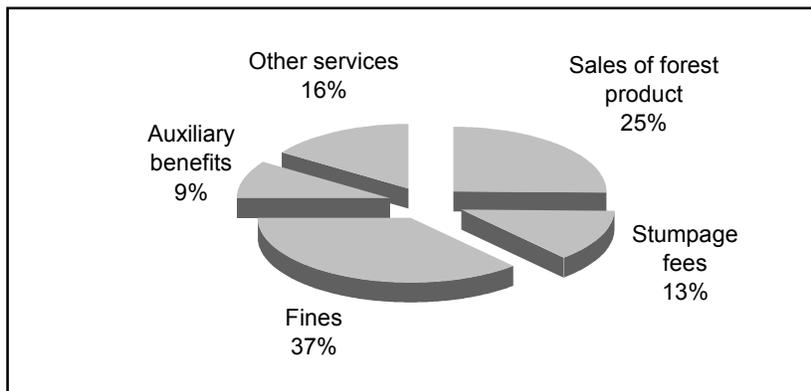
Figure 7 shows the extent to which forest management measures are funded by the revenues from commercial activities of the *leskhozy*. In 1997, they were even left with a "profit" after all forest management activities were paid for.

**Figure 7:** Share of Internal Funds in the Total Expenditure of the Krasnoyarsk Forest Management in percentage (Krasnoyarsk Forest Management 1997).



This situation is best put by the chairman of the Krasnoyarsk Forest Management of the Committee on Natural Resources, Vladimir Vekshin, who said in an interview: "Foresters have been instructed to manage the forest resources of our territory, but neither federal nor local authorities meet their obligations and give us the necessary funds for doing so. Therefore, the harvesting capacity of the *leskhozy* has steadily increased through various cutting methods and foresters have already become the major loggers in the region" (Krasnoiarskii Rabochii 1999). For example, in 1996 forest product sales were responsible for 25% of the *leskhozy* income (Figure 8).

**Figure 8:** Origin of Incomes of the Krasnoyarsk *Leskhozy* in 1996 (Krasnoyarsk Forest Management 1996).



In 1990, the annual expenditure per hectare of forest area in East Siberia amounted to 0.02 US dollar, of which 0.01 US dollar were operational costs. This sum is not enough to cover costs of standard forest regeneration. Calculations for some of the *leskhozy* in the region have shown that

between 0.1 to 1 US dollar/ha should be spent to maintain the forest in a satisfactory condition (Sokolov et al. 1994).

Harvesting sites with a total wood volume of 7.6 million m<sup>3</sup> were examined in 1998 (Goskomecologiya 1998). The level of forest legislation offences decreased compared to 1996. So, for instance, there was a 10% decrease in “destroying growth and young forests”, a more than 24% decrease in “areas left uncleared from slash”, and a 16% decrease in “areas where crushing of debris at logging sites has not been done”. The volume of harvested wood left on the cutting sites decreased by over 40%, while the volume of unbarked wood left for the summer period decreased by 35.5%. Forest offenders were to pay 6.6 million US dollars forfeits for revealed offences of Wood Delivery Rules.

On the average in the region, total fines per cubic meter of harvested wood amounted to 0.9 US dollars. The annual decrease in the exposed forest offences is explained by the reduction of forest exploitation capacity and the strengthening of State control of the loggers' maintenance of nature protection technology used on harvesting sites.

Clear cutting decreased from 1992 to 1997. Thinning also decreased; in 1997 thinning was performed on an area of only 12,700 ha. The only task performed in full was selective sanitary cutting, which was performed on a total area of 5,600 ha. This is related to the shrinking funding of forest preservation, the difficulty to sell small volumes of commercial wood from thinning, and a deterioration of the material and technical provision of *leskhozy*.

According to the Forest Fund Account of 1998, there are 1.8 million ha of forest lands in need of reforestation due to harvest, pests, and fires. Of this area, close to 190,000 ha can be naturally regenerated, 400,000 ha should receive assisted natural regeneration, and 405,000 ha should be regenerated by planting. The forest cultural fund, the area accessible for economic use, covers 132,600 ha of these areas. Planting has recently been decreasing. In 1997, actual forest regeneration capacity in the region was only 69,900 ha, including 9,300 ha by planting. The capacity for planting work has decreased by about 40% compared to 1993, primarily due to lack of funding.

In 1997, the area of reforestation exceeded the area of harvesting by 62,700 ha. Forest regenerative work efficiency is measured by the annual increase in young coniferous stands. In Krasnoyarsk Krai, the areas of such stands increased from 2.6 million ha in 1993 to 2.8 million ha in 1997. This tendency warrants some hope for an improved Forest Fund structure in the future.

### **3.9 Wood Harvesting and Processing**

Harvesting volumes in the Krai have decreased sharply in the last 10 years. A total of 7.4 million m<sup>3</sup> were harvested in 1997 (Table 8), which is only 29.5% of the volume for 1988. In the last 6 years, the total harvested volume of commercial wood in the region was 55.9 million m<sup>3</sup>. The volume of harvested firewood during the same period was 14.7 million m<sup>3</sup>.

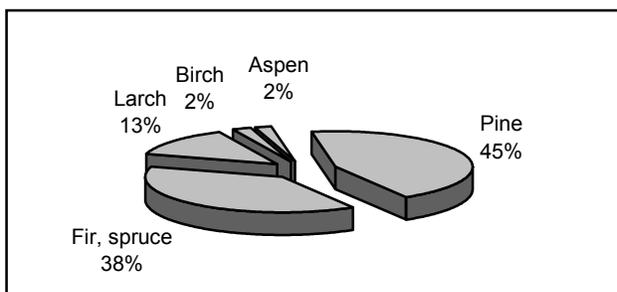
**Table 8:** Use of the Annual Allowable Cut (AAC) in Krasnoyarsk in 1992–1997 (Krasnoyarsk Forest Management 1997).

	1992	1993	1994	1995	1996	1997
Actual cutting volume 1,000 m <sup>3</sup>	15757.8	12805.4	8420.0	9044.0	7599.3	7374.3
Actual cutting of conifers, 1,000 m <sup>3</sup>	13972.5	11944.5	8063.0	8681.9	7269.1	7098.0
% Change from previous year	-5.6	-18.7	-34.2	+7.7	-16.0	-3.0
AAC 1,000 m <sup>3</sup>	56384.0	56384.0	52085.4	51572.4	52902.8	53122.4
Conifer AAC, 1,000 m <sup>3</sup>	36605.4	36605.4	32073.2	31630.9	32021.4	32197.2
% use AAC	27.9	22.7	16.2	17.5	14.4	13.8

In 1996, 82 plots with a total area of 4.4 million ha were leased for harvesting. Although the AAC was 9.7 million m<sup>3</sup>, only 1.2 million m<sup>3</sup> was actually harvested by leaseholders. The Lower Angara river area of the Angara-Yenisei region has been the main harvesting area. Unfortunately, detailed data for the period of 1998 to 2001 are not available for this territory. Approximately 65% of all harvesting in Krasnoyarsk Krai occurs in this area, and 63% of the Krai AAC is located here. Recently, only 17% of the AAC of the Lower Angara river area has been used.

Harvesting methods depend on site conditions. In most cases, tree-length harvesting is used rather than the short-length harvesting method. Analyses show that crosscutting at the upper landing as well as manual short-length harvesting methods are the most efficient methods of clear-cutting. Waste volumes average 5% (Krasnoyarsk Forest Management 1999). The predominant harvested tree species are pine, fir, spruce, and larch (Figure 9):

**Figure 9:** Harvested Tree Species Distribution in percentages (Department of Forest Industry of Krasnoyarsk Krai).



Forest product volumes began to fall in 1990. Since 1992, the transition towards a market economy has resulted in a deterioration of enterprise performance, and most enterprises went into an economic crisis. Due to the general economic situation in the country, timber and paper production volumes decreased by 50% to 66% in the period between 1989 and 1995, lumber volumes were reduced below the level of 1950, and paper and paperboard were reduced to the level of 1965 (Table 9).

**Table 9:** Forest Commodity Output in Krasnoyarsk Krai from 1991–1996 in current prices (Department of Forest Industry of Krasnoyarsk Krai).

Product	1991	1992	1993	1994	1995	1996
Round timber, million m <sup>3</sup>	14.0	11.6	8.8	6.4	6.4	5.4
Million US dollars	6.6	24.8	58.0	55.7	121.4	136.9
Lumber, million m <sup>3</sup>	4.0	3.1	2.5	1.9	1.9	1.6
Million US dollars	5.8	37.3	78.1	55.9	136.9	118.9
Market cellulose, 1,000 tons	13.6	11.3	8.9	4.8	5.4	-
Million US dollars	0.1	0.4	0.7	1.0	3.0	3.2
Paper, 1,000 tons	99.4	77	55.9	41.9	52.4	50.2
Million US dollars	0.9	2.6	4.4	8.8	38.9	31.2
Cardboard, million m <sup>2</sup>	823.2	654.4	432.2	334.3	575.9	394.2
Million US dollars	1.1	3.3	5.0	10.4	29.6	36.2
Fiberboard, million m <sup>2</sup>	26.5	26.0	27.3	28.0	37.4	37.5
Million US dollars	0.1	0.9	1.8	3.0	13.7	11.8
Furniture, million US dollars	1.3	5.6	14.5	12.3	21.8	31.5

Total furniture and fiberboard production increased due to increases in production capacities. A new technique to produce lumber and furniture boards from solid wood/cabinet wood was introduced. This production was competitive on the world market. For example, the largest wood processing plant in the region, "Lesosibirsk LDK", which produces lumber and fiberboard, exports 73% of its products to countries in Western Europe and North Africa (Sokolova 2000). Small specialized private enterprises have begun to appear.

After a long decline in the industry, culminating in September 1998, life has again come back to the Russian industry. In March 1999, production volumes in the forest, wood processing and pulp and paper industry increased by 7.5%. The increase in exports of pulp, paper, paperboard, and plywood as well as the development of furniture production, wallpaper, and paper products replacing imports have played a decisive role (Rossiiskaia Gazeta 1999).

There are still large obstacles to overcome in the forest products industry. The state of the market, the systematic rise of railway and sea transport tariffs, and the cost of electric energy

make the situation serious and can render even the most competitive forest export production unprofitable.

### 3.10 Transportation

Historical analysis of forest usage in Krasnoyarsk Krai reveals accessibility is a primary factor in whether or not forestland can be considered an economic resource. Based upon current transportation systems, only about 40% of the forests are accessible as economic resources. Vast areas of natural ecosystems in the north of the region remain untapped to the present day. However, huge forest areas along railways in the southern parts of the region suffered severely from clear-cutting from the 1950s to the 1970s. In the future, areas suitable for harvesting may become smaller, as harvest tends to occur only in areas with the best timber resources that are located along available regional transport routes.

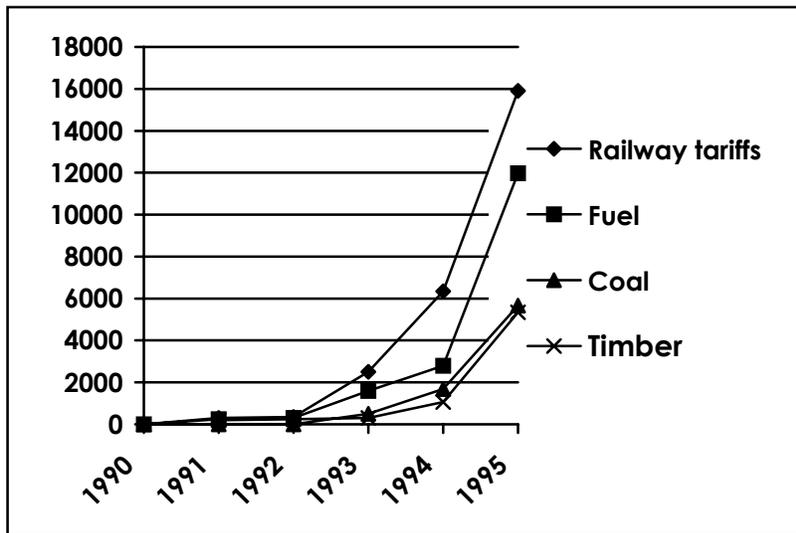
The total length of all kinds of ground transport roads in Krasnoyarsk is 36,701 km. This number includes 24,557 km of dirt roads, 6,054 km of automobile roads with hard surfaces, 5,327 km of winter roads, and 763 km of railways. Of these roads, those used year round total 9,689 km. The density of roads suitable for transporting wood is 0.047 km/km<sup>2</sup>. Wood is transported an average of 100 km from the harvest sites to processing plants (Department of Forest Industry of Krasnoyarsk Krai).

During the ice-free period, the largest rivers in the territory (the Yenisei, Angara, and their tributaries) are used for floating large volumes of wood with rafts and bag booms. Harvesting and rafting is performed by *lespromkhozy* in the Boguchany, Motyginino, and Yeniseisk districts. The total volume of wood transported by rafting in 1997 was 1.7 million m<sup>3</sup>, and the total length of rivers used for floating was 3,739 km (Goskomecologiya 1998). Despite the government mandate making drift floating illegal in some areas, some forest harvesting enterprises still employ this method of timber transport (Goskomecologiya 1998).

There are four seaports located along the Yenesei River in the north - Dixon, Dudinka, Igarka and Khatanga. Ten years ago the goods turnover at these ports was 133,000 tons, and presently it is only about 20,000 tons (Krasnoyarskii rabochii 1999). The capacity of these ports has drastically decreased during the last 10 years. For instance, at the end of the 1980s, around 2 million m<sup>3</sup> of export-lumber was transported through Dudinka Seaport and out via the North Sea Route. Today, the volume has decreased to about 100,000 m<sup>3</sup>. The situation is similar in other seaports.

The transportation sector is currently being restructured. The regimes under which enterprises have so far been operating (input prices, transport costs, wage levels, and solvency requirements) are currently changing, resulting in an increase of unit production costs. Between 1990 and 1995, the railway tariff, for example, increased 15,910 times, the price of round timber increased 5,530 times, and railroad ties 5,567 times (Figure 10) (Sokolov 1998).

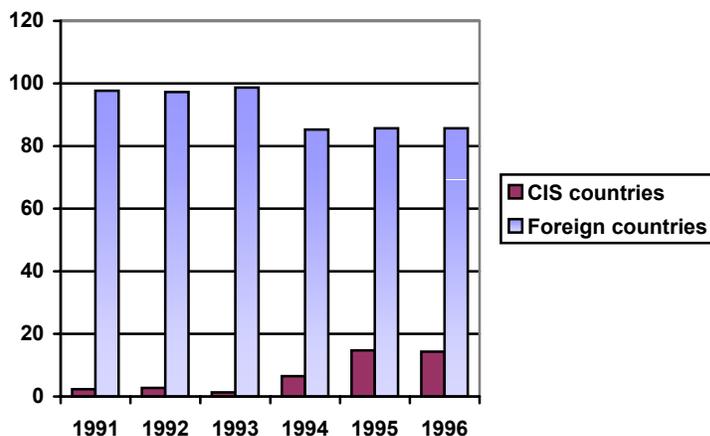
**Figure 10:** Growth of railway tariffs and energy resources costs as compared with timber costs for Russia (in roubles) (Sokolov 1998).



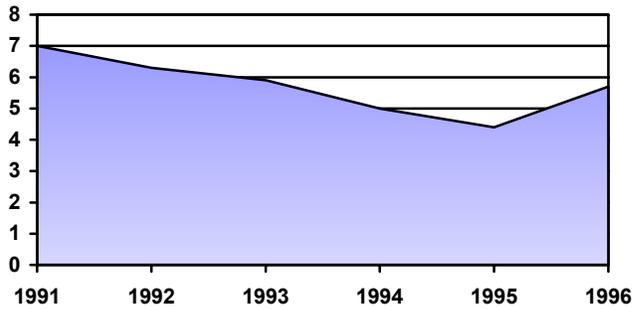
### 3.11 Forest Product Markets

One of the main reasons for the forest industry crisis is the recent loss of traditional markets for the sawmill and wood processing industry (Middle Asia, Kazakhstan, Transcaucasia, Northern Caucasus) as well as the loss of the export market for lumber to East European countries and Cuba. The wood supply to these countries was regulated by the State on the basis of clearing and barter (Figure 11). The export share of the forest industry in the value of the region's total export was only 4.7% as of March 2, 1999 (Figure 12) (Department of Forest Industry, Krasnoyarsk Krai Administration).

**Figure 11:** Structure and Dynamics of Forest Product Exports in percentage (Department of Forest Industry of Krasnoyarsk Krai ).



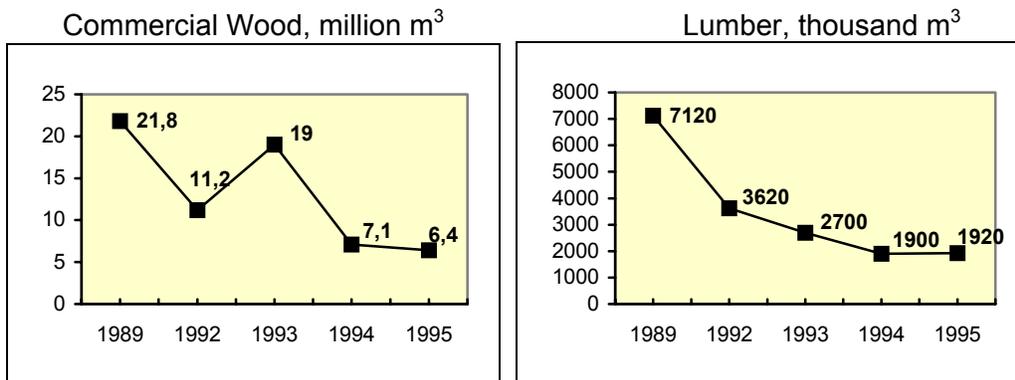
**Figure 12:** The Region's Share in Russia's gross output of the forest complex (Department of Forest Industry of Krasnoyarsk Krai).



Since 1994, there has been a steady increase in product supplies in the region. The volume of saw timber export increased by more than 3.5 times in 1995 compared to 1993 (from 54,400 to 168,000 m<sup>3</sup>). This increase in exports did not compensate for the decrease in lumber exports (which is the main forest export product in the territory) in the period 1991 to 1993.

In 1995, lumber exports reached only 50% of the 1990 volume (Figure 13) (Benderskii et al. 1998b). The regional economy is heavily dependent on raw materials exports. The region exports up to 2.5 billion US dollars worth of goods per year. Little is reinvested in Siberia, however, causing a general degradation of the regional economy (Governors 1999).

**Figure 13:** Production of commercial wood and lumber in Krasnoyarsk Krai 1989 to 1995 in m<sup>3</sup> (Sokolov 1998).



Outmoded equipment in the wood processing enterprises precludes any quality improvements. Therefore, one can conclude that reconstruction is advisable for forest exporting enterprises, since they need to extend their markets because round timber exports are becoming less profitable. Transportation of round timber and lumber to the borders of Russia and the Far Eastern seaports increases production costs by 150 to 200 times, which drastically reduces their competitiveness on the world market.

According to forecasts made before the August 1998 financial crisis, the total wood demand in Krasnoyarsk was predicted to increase by 2.8% per year until 2010. The demand for pulpwood will increase by 4.6% per year, the demand for paper by 4.3%, and for veneer by 4.4%. The demand for lumber will only increase by 1.6% per year (Department of Forest Industry, Krasnoyarsk Krai Administration).

According to government data, Russia loses about 26 billion US dollars per year due to imperfect expert assessments of the quantity, quality, and costs for goods and raw materials to be exported. The Central-Siberian Chamber of Commerce and Industry was given the right to perform this task in Krasnoyarsk Krai. According to data provided by the experts (there are about 600 such experts in the territory), only 5% of the forest products exported have been assessed by experts. Around 80% to 90% of the export currency earned is "lost" in China, Japan, and South Korea (Krasnoyarskii Rabochii 1999).

Taking into account the vastness of the region and high transportation costs, the production of value added products becomes more profitable and important than the export of raw materials. Currently, regional enterprises do not make the best use of their potential capacities for forest industrial exports.

### **3.12 Investments**

Investments in the region are generally determined by the political and economic situation in Russia. Despite the "Complex Program of Stimulating Domestic and Foreign Investments," which was initiated in 1995 by the Russian government, conditions still remain unfavorable. The disintegration of the banking system has drained cash from the economy. The regional economics minister, Svyatoslav Petrushko, has estimated that the August 1998 crash cost the region 150 million US dollars. Any foreign investment that still trickles into Russia is devoted to producing goods in the richer parts of the country, not in sparsely populated Siberia (Russia 1997).

Investment problems in the territory's forest industrial complex are determined by three different factors:

- *National (federal) factors.* This includes macroeconomic factors and domestic and foreign political conditions (such as inflation, budget deficit, tax legislation, export-import balance, authority, and stability).
- *Industry-wide factors (specific for the forest industrial complex as a whole).* The most important problem in this area is the absence of a clear and generally used mechanism for obtaining Forest Fund lands for long-term utilization (long term lease and concession). No less than 10 acts are needed to be approved at the federal level in order to establish a long term lease and concession.
- *Regional factors specific for the forest industrial complex of the territory.* This includes remoteness from foreign (both western and eastern) markets; weakly developed transport and technological infrastructure; and the small number of forest sector enterprises that possess sufficient capital, staff, and infrastructure to attract serious investments.

The majority of forest industrial enterprises in Krasnoyarsk are beginning to address these problems. The problems of investor guarantees are the most difficult barrier today.

A financial analysis of the Krasnoyarsk forest sector shows the following (Benderskii et al. 1998a): For the period 1992 to 1996, investments in the regional forest sector declined both relatively and absolutely. This was reflected in a decreased number of workers and poor financial results for the sector. The "barterization" of all financial relations both within the forest complex and with partners outside the complex is of special importance. This resulted in a narrowing of the active market and a reduction of financial relations. Calculations of the Institute of Economics and the Organization of Industrial Production of the Siberian Branch, Russian Academy of Sciences indicate that the amount of money channeled through banks to regional budgets decreases by 0.4% when the number of barter agreements increases by 1%. The direct financing of harvesting enterprises by wood processing companies constitutes a new approach to the settlement of economic relations in the sector.

Analyses of the distribution of incomes and costs between enterprises indicate that the use of relatively low raw material prices leads to a redistribution of value added products to the processing branches (Benderskii et al. 1998a). Such a practice distorts the structure of value creation and hampers the reproductive possibilities of harvesting enterprises.

Thus, in order to achieve sustainable forest utilization in the territory, focus should be on the allocation of investments to profitable processing enterprises, such as that producing quality value added products with a stable demand. These products include woodworking products (fiberboard and furniture); products of the pulp, paper, and forest chemical industries; and others. Without investments in these industries, the forest complex will not be able to fully finance forest regenerative and productivity efforts. It is also necessary to approve regional legislation to facilitate formation of an efficient and stable basis for financial, tax, and tariff regulation for the benefit of forest investors.

### **3.13 Forest Enterprises and their Institutional Problems**

Like the Russian economy in general, the forest industrial complex is in a long-term difficult economic, technical, and social crisis. Unprofitable enterprises are likely to go bankrupt. There have been no large investments made in the Russian forest sector since the end of the 1980s, which has caused a sharp reduction in the number of operating harvesting enterprises (Russia 1997). It has also led to an underutilization and aging of wood processing enterprises. The depreciation of main capital assets in the complex as a whole has exceeded 50% (Sokolov 1998). In combination with poor technical service (or no service at all), the depreciation has resulted in a decreased quality of the main capital with simultaneously increased negative environmental effects due to sewage spills and decreased labor safety. The dismantling of the State social security system has left employees with weak occupational protection.

Only during the last few years has a market infrastructure begun to form for the forest industrial complex of the country. The first signs of true competition have appeared, and the mechanism of demand and supply has begun to operate. At the same time, the economic crisis continues to exacerbate the deterioration of the enterprises.

This situation depends on many factors. Most forest industrial enterprises have a social responsibility to their employees, and forest work has a seasonal character. This puts great strains on their financial situation. This is especially difficult under the current economic conditions with increasing costs of fuel, energy resources, and transportation.

The socio-economic standard of life of employees in the forest industrial complex has deteriorated. Before 1993, the average salary in the forest industry was the same as other branches of the economy or lower. In 1994, the average monthly salary in the forest industrial complex was more than 73% below the gas industry and almost 55% below the coal industry. Today, this difference is even larger (Vladyshevskiy et al. 1998).

The enterprises' financial situation is also negatively affected by inflation, payment arrears, and by the extremely imperfect taxation policy. Taxes have been sizably increased, mainly due to the introduction of new forest taxes. There are a number of branch-specific circumstances, such as the technological need for large log storages due to the seasonality of harvesting, the interdependence of forestry related subindustries, and the geographic location of the forests. Currency gains from the export of paper products have been reduced. Russia has lost forest markets and prestige in the world arena.

The management of the forest industrial complex has practically been destroyed at all levels. Technology, production, and cooperative links and relations, which were developed over many years, have now been broken. The present structure of Russian forest industrial production is imperfect and does not match the level of developed countries. Products of mechanical wood processing dominate, and the level of chemical and chemical-mechanical wood processing is far from satisfactory, amounting to only 33% of total forest production, compared with 60-65% in progressive developed countries (Russia 1997).

In leading forest countries, the export of paper products contributes largely to national income. For example, in Finland, 87% of all paper and paperboard produced are exported, as is 80% of all veneer, 56% of lumber, and 33% of fiberboard and edge-glued panels. Similarly, in Sweden, Canada, and the USA, large shares of wood products are exported. In Russia, only 3 to 5% of produced paper is sold abroad (Sokolov 1998).

The forest industrial complex of Russia was built in the period of centralized economic management. Its recent production collapse, and the breakdown of all supply and demand links are because:

- The main forests are found far away (in Siberia) from facilities for wood processing (pulp and paper factories, fiberboard, edge-glued panels and furniture manufacturers), located in sparsely forested areas (like the Central European part of Russia and Middle Asia) for the purpose of developing these areas, and the artificial cooperation of the Soviet republics.
- The scale and type of investments made by the State was dictated not by the market, but by a central plan.
- The forest industrial complex suffered greatly from rapid privatization, collapse of the Soviet Union, introduction of market-set prices, and price increases in transportation.

The rich renewable forest resources, the high level of research, the production and technical potential of the forest sector, and the large domestic and foreign markets together open great opportunities for Russia. It should be possible to develop an advanced forest industrial complex with a potential to lift the national economy to its proper level of socio-economic development.

All of what has been said above about the Russian forest sector as a whole is also entirely relevant for Krasnoyarsk Krai in particular. Here, the situation is furthermore aggravated by the fact that the total value of commodity output per hectare of forest land for the region's wood production is 33% to 56% of corresponding income in the forest regions of the European part of Russia and 50% to 80% lower than in Finland.

In 1995 and early 1996, the rate of production decrease slowed, and there was a measure of stabilization for some enterprises and plants. Consequently, there seems to be a chance that the situation in the regional forest industrial complex could stabilize and even recover.

The main reasons for the current crisis in the Krasnoyarsk forest industrial complex are:

1. The badly planned and hastily executed privatization of the forest sector, with the complete loss of State management of forest enterprises both at the federal and the regional level.
2. The reduced construction activities in the region (resulting in a decreased demand for lumber, and semi-finished products).
3. The almost complete loss of traditional markets for lumber and processed wood products from the region (reduced demand from Middle Asia, Kazakhstan, Transcaucasia, and the North Caucasus).
4. The loss of the export market for lumber in the East-European countries and Cuba, to which deliveries used to be regulated by the State.
5. Enterprise leaders' lack of experience of working under the new market conditions (assessing the market situation, knowledge of contractual relations, basic juridical knowledge, pricing, and banking). Previously, such functions were always performed by State organs without any participation of the enterprise management.
6. The organization of the enterprises' work under barter conditions, with many mediators and "false firms" inside the enterprises themselves during the first reform stage (1989 to 1994). This caused great losses for the enterprises due to asset stripping. Income was spent on welfare for workers rather than production development. During this period, money could be obtained on good conditions through the banks (which was also done by many "clever" intermediary actors at the expense of the enterprises) and production could have been modernized (Department of Forest Industry). For example, an enterprise in the town of Lesosibirsk installed new capacities for the production of fiberboard, furniture, and edge-glued panels from revenues of its barter trade.

7. Due to the government's policies, an irreversible price increase on all goods and services began. This led to artificial cost increases in forest enterprises when they reduced production while keeping all workers and increasing material costs. This process has not yet been brought under control by the Russian government, the Krai Administration, or the legislative bodies. Prices on most forest products exceed world market prices. Therefore, even forest exporting enterprises work at a loss, while low priced forest products are imported and sold on the regional market.
8. Most forest enterprises are insolvent due to the government's policy of mutual offsets, the large discount credit rates provided by the State, and the imperfect tax system.
9. There is a lack of management competence in most traditional forest enterprises under the new market conditions. Privatization in the forest sector resulted in an uncontrolled situation, which gradually became almost absurd. Most forest industrial leaders, especially leaders of closed joint-stock companies and associations of limited responsibility, did not know how to stabilize production. Some enterprise owners were conservative. They thought that working well was not profitable because of the high taxes. At the same time, they founded new subsidiaries and strengthened in every possible way the commercial structures that they had established earlier. They often supported production and supplied these organizations with wood for export. Sizable profits based on the work of the forest industry were accumulated in just these subsidiary structures.

## 4. Public Forest Policy

### 4.1 Legislative Development Trends

Globally, political and economic motivations are increasingly impacting forest management, particularly in the East. Siberia is no exception. These forests do not belong to forest specialists or to politicians and business managers. Because they are located in the boreal zone and are of such large size, they are an essential element of global ecosystem stability. These forests play a large role in maintaining a healthy natural environment; consequently, their condition should be of concern to the entire population. In this larger context, it becomes clear that the public, as the most impacted group, should participate in forest management decisions (Teplyakov and Sheingauz 1999).

One of the major components of State democratic development is public involvement in political decisions. It is commonly known that if there is no public or mass media interest in a problem, politicians rarely show interest in the problem (Teplyakov 1999).

Forest management based on cooperation can function best when there is a political will, and social justice measures are in place. Also, forest resource user groups should be legitimately represented. There also needs to be an agreement between interested participants as to who should utilize forests. This is particularly relevant for the poor in regards to land rights.

Russia is transitioning from a command system of administration to a democratic system. Sprouts of substantial public involvement are beginning to appear in the process of managing natural resources. Development and enforcement of new statutory and administrative acts are required. In many federal and territory organs of the executive authority, there are no public relations departments. This gap creates communication problems and, as a consequence, weakens public influence on natural resources decisions.

The process of public involvement begins with simply informing the public about problems facing the administrative and managing bodies. Add education and the chance that politicians will be understood greatly increases. Once the public accepts the task of creating dialogue with decision makers, conversations begin which often result in mutual understanding and support. For the first time, the public received access to the State's records of the Forest Fund during *perestroika* (reformation) and *glasnost'* (a key component of *glasnost'* was freedom of speech and information, including accountability of authority). Despite these events, problems still exist with access to information and the "transparency" of regional and local decisions.

Historically, the Russian public was, and sometimes still is, the simple supernumerary in decision making. A series of laws were altered to increase public involvement in developing discussion and decision making, yet the normative legal base remains poor. The public tends to have information, wants to be heard, and wants to participate. This is especially true in regards to environmental problems and forest use. Thus, laws requiring public involvement such as "About Access" are indispensable.

The model RF law, "About Access to Ecological Information," was created in 1997 (10th plenary session of Assembly of the States, order No. 10-7). This law marked the beginning of a series of events making public involvement opportunities available, including access to information. This law coincides with the Orkhuss Convention of the Ministers on Environment (June 1998), a United Nations document, and pertains to public access to information, justice, and involvement in solutions to many ecological problems. Unfortunately, Russia has not joined the Orkhuss Convention, whose purpose is to provide access to ecological information and promote public involvement in decision making (Teplyakov 1999). However, dialogue related to these issues is beginning. Various meetings, conferences, seminars and published materials in Russia and abroad recognize that developing partner relations between State and public entities needs to occur. Discussion of these problems can be found in regional studies of the World Bank, at regional and national seminars of the International Union on Nature Conservation (IUCN), and in other prominent arenas (Russia 1997; Teplyakov 1999).

The Russian Federation constitution guarantees each citizen freedom of thought, word, and mass information, and the right to join activities of public associations. Each citizen has the right to search, gain, develop, and distribute information by any legal methods (The Constitution 1997). However, until now, no examples of public involvement in forest management existed. It is vital that legal acts providing methods for public involvement in forest management decisions are created. This will bring definition to the consultation process, allow managers to better understand public social needs, and give the public better knowledge of forest management problems (Teplyakov 1999).

The major issue preventing positive public involvement in the forestry sector is the level of citizen knowledge, in spite of a series of new legal acts that have improved access to information. Included are the federal acts: "About Ecological Expertise" (1995), the Forest Code of Russian Federation (1997), the Comments to the Forest Code of Russian Federation (1997), the Forest Legislation of Russian Federation (1998), a decree of the Russian Federation on "Order of granting to the citizens and legal persons of the information about Forest Fund being federal property" (1997), the List of Information about Forest Fund of Russian Federation given free and for fee (1998), order of Forest Service (In October 1997, No. 143), the Forest Code of Khabarovsk Krai (1998) and the Forest Code of Krasnoyarsk Krai (2000). Additionally, there is a series of departmental documents of the Federal Forest Service of Russia, including the "Concept of Sustainable Forest Management at Russian Federation" (1998) and "Criteria and Indicators of Sustainable Forest Management at Russian Federation" (1998).

The Federal law, "About Ecological Expertise," allows citizens to express their opinions by conducting public ecological expertise meetings and by realization of diverse rights. According to article 19, citizens have the right to present in writing research and opinions on ecological aspects of proposed activities to authorized State organs. Ecological experts employed by the State must take these written public opinions into account when making related decisions (Bogdan 2000).

According to this same law, citizens may also solicit public ecological expertise of the issue at hand, and this can occur at the same time or later. Public expertise could be organized under the citizens' initiative and public entities, as well as under the initiative of local government. Thus,

public entities utilizing this law have the right to gain documentation on ecological expertise meetings, in the amount defined by Federal law. Additionally, the public has the right to information on the normative-technical specifications used when conducting State ecological expertise. They are allowed to participate as observers through their representatives in expert commissions of State ecological expertise and in discussion of the conclusions of public ecological expertise (Article 22 of the Law). The decisions (conclusions) of public ecological expertise can be published via mass-media and can be transmitted to local government, organs of State ecological expertise, customers, and other interested groups (Bogdan 2000).

In a separate initiative, the International Union of a Nature Conservation (IUCN) is developing a project called "Creations of framework conditions for public involvement in management of Russian forests." This IUCN project seeks to develop legislative guidelines and recommendations, create conditions conducive to public involvement in forest management and conservation, and create a framework of cooperation for interested participants. Additionally, this project hopes to assist Russia in joining the Orkhuss convention. This project seeks the cooperation of the Federal Forest Service of Russia, the State Committee of Russian Federation on Environmental Protection, legislative and executive authorities, scientific entities, universities, mass media and other interested organizations (Teplyakov 1999).

## **4.2 Decision Making and Planned Results**

In order to create a mechanism for public involvement in Russian forest management, it is necessary to first learn and perfect the Russian normative legal base. Secondly, a network of experts on forest management should be formed, and thirdly, a broad coalition of interested Russian parties should be built by conducting roundtables, seminars, and meetings. The public should be asked to participate by the media. Also, legislative representatives, local specialists, and federal agencies need to be educated on how to deal with public interaction, as this is a relatively new concept in Russian government. Developing guidelines and recommendations for incorporating public input will help to eliminate gaps in participant interaction. Additionally, consulting with specialists from other countries with experience in public participation would be very beneficial (Teplyakov 1999).

An important step towards public involvement is embodied in the new forest laws in Khabarovsk Krai and Krasnoyarsk Krai . For the first time in Russia, these articles statutorily define the role of citizen involvement in sustainable use, protection, and growth of forests. These statutes were developed in collaboration with leading Russian scientists, as well as foreign experts and specialists from the US Forest Service and consulting firms from Norway, Finland, Canada, and other countries.

The Forest Code of Krasnoyarsk Krai defines the rights of citizens and public associations in regards to forest management and resource use. According to article 35, citizens have the following rights:

- to establish and participate in public associations dealing with problems of efficient utilization and conservation of forests

- to take part in meetings, pickets, demonstrations, petitions, referendums and public lectures on problems of forest conservation and to express their opinions in the forms of letters, complaints, and applications on forest stewardship problems
- to take part in forming volunteer fire organizations
- to obtain information on the state of the forest and the effects of economic activity on forests

Public ecological organizations have the following rights:

- to propagate programs in forest conservation, to protect the rights and interests of citizens and communities in forest conservation, and to involve citizens in forest care activities on a voluntary basis
- to perform works in protection and regeneration of forests; to assist the State organs in fighting forest protection violations, to establish public foundations for forest care; to voluntarily spend resources for forest protection, conservation, and regeneration with the consent of the federal forestry organ and *leskhoses*
- to make recommendations to their representatives to take part in the State and public ecological expertise
- to obtain information on forest protection, conservation, and regeneration
- to organize meetings, pickets, demonstrations, petitions, referendums and signature collection, and to give suggestions for discussing forest conservation problems

The State organs and local governments now must take into account the suggestions and recommendations of citizens and public associations (Forest Code 2001). Non-governmental nature protection entities (NGOs) are actively involved in forest management at this level. These NGOs include IUCN, Greenpeace, International Social-Ecological Union and its regional representations, and Friends of Siberian Forests (Krasnoyarsk) among others. Skillfully using available nature protection legislation, NGOs are actively engaged in seeking ecological knowledge and educating the public on sustainable development. NGOs also educate citizens on their rights, including judicial and legal rights, and they also conduct scientific research and publish environmental information (Teplyakov and Sheingauz 1999).

Article 36 of the Forest Code of Krasnoyarsk Krai regulates the process of conducting public hearings that pertain to forest usage, protection, and restoration. Public hearings concerning Forest Fund utilization, conservation, protection, and regeneration can be organized and conducted by territorial organs, local governments, territory administration of the federal forestry organ, forestry enterprises, or public organizations for the purpose of education and discussion. These hearings must be publicized at least 1 month ahead of time. The public hearings can be conducted at the expense of the Krai administration or local budgets and other legal means.

Article 37 of the Forest Code of Krasnoyarsk Krai concerns education, including teaching the general public about Forest Fund utilization, conservation, protection, and forest regeneration. The purpose of public education is to encourage care for nature, efficient utilization of forest resources, forest protection and regeneration, and fire prevention. Additionally, school programs, public hearings and discussions are provided for in this article. The territorial administration oversees education programs in collaboration with the local governments. The program financing is at the expense of the Krai budget and other legal means.

Citizens and public organizations have the right to access information on forest condition, utilization, conservation, protection, and regeneration except in certain cases. These exceptions include information which has restrictions established by the law, commercial secrets, and confidential information. Public information is given at the expense of the Krai and local budgets with minimal cost to the public, so long as this information is used for social and economic development of the Krai , monitoring and assessment of the forest, education, or research.

In the above-mentioned articles of the Forest Code of Krasnoyarsk Krai, the public is granted a broad spectrum of rights in forest management and forest policy. However, mechanisms of realization of these rights are still required to be formulated and put into work.

## 5. Forest Law Project of Krasnoyarsk Krai

### 5.1 Contradictions

Under current forest policy, various stakeholders interact in a complex relationship, including the State, Russian Federation subjects (i.e., krais, republics, and territories), local governments, governing forestry bodies, environmental protection agencies, forest users, aboriginal peoples, and the general population. Currently, a monopoly exists regarding forest ownership and legislation. Forest policy formation rights belong to the State and federal government. The actions of these governmental groups are often disorganized. As a result, some federal laws (such as laws regarding the Forest Code, water, animals, and specially protected natural areas) contradict each other. Obviously, this causes misunderstandings between the various institutions organizing forest use and management. These misunderstandings must be cleared up in order to have an effective method for forest management. Changes are needed in the appropriate federal laws by method of legislative order.

The Forest Code of Russian Federation (1997) is essentially the department document of the Federal Forest Service of Russia. The Forest Code retains the previously strong central-bureaucratic system based on forests as federal property. The Forest Code contradicts the Constitution of Russian Federation (Article 9, item 2) according to which land and other natural resources can be in private, State, municipal and others property forms. The Forest Code also contradicts the Civil Code of the Russian Federation.

Problems related to this forest ownership monopoly have already been discussed. However, special attention should be paid to the lack of efficiency in the actions of the forest owner. The State does not guarantee financing of forest protection and regeneration at the scale that is needed. The finance system used in the Forest Code does not correspond to present day principles of sustainable forest management. As a result of the State's absentee landlord status, there has recently been a lack of responsibility in managing forest policy, a lack of enforcement of forest legislation, and a lack of interest of forestry workers in increasing profitability. Technically, the forest belongs to all people; but, in reality, no one takes responsibility for its care. Legislative approval of different property forms is needed in order to annul the monopolistic rights of the State. This change will introduce competitive elements for the best sustainable, multi-purpose use of the forest.

A paradox has developed. Forests on the eve of maturity in all respects (maximum growing stock, high wood quality, high value) are in worse health than maturing and middle-aged stands. Where intensive "forest tending" occurred, forests were damaged by cleaning and sanitary cuts. The best commercial trees were selectively removed instead of lower quality, diseased, and whip trees. This high quality wood was given free of charge to be processed into consumer goods by the *leskhoses* and forest districts. The people nicknamed these cleaning cuttings "cuttings of profit." To make the situation worse, even greater losses occurred due to planting and young forest treatment by unqualified workers. Forestry became less of a science and more of a simulation. Work towards improvements in forest composition and stand age structure, increase in productivity, marketability, and profitability is conducted irregularly or not at all (Karpov

1991, 1992; Giryayev 1991; Moiseyev 1992; Shutov 1992; Sokolov et al. 1994; Sokolov and Semechkin 1995, Sokolov 1997).

The State entrusts forest governance to a specially authorized body - the Forest Service, Ministry of Natural Resources of Russia. Thus, as the forest manager, the Forest Service must form federal and regional forest policy while taking into account current population and forest needs. Occasionally, many forest users and the "green" movement criticize the Forest Service. This is primarily due to an increase in logging, which has coincided with a lack of forest protection work and flagrant violation of rules regarding cleaning and sanitary cuttings. Critics believe that the Forest Service performs commercial logging under the pretense of cleaning and sanitary cuttings. This type of logging results in unequal competition with other forest enterprises and hampers stable development of the industry. Critics call for a radical change in the forest government system.

One example of poor management by the Forest Service involves the areas designated as "tree-bush" areas. According to Article 11 of the Forest Code, tree-bush vegetation is located on agricultural lands. The Forest Code does not recognize these areas as forests, even though they are forested and used by the population. In Krasnoyarsk Krai, these areas are quite numerous but relatively small in size (up to several hectares), and these forest plots are located among agricultural lands. Total area of these plots is similar to agricultural lands. These tree stands have common forest forming species, such as bird-cherry, snowball, and willow, as well as shrubs. These plots have high economic significance for the local people, who use them to gather forest products such as firewood, berries, mushrooms, and animals. Because of technicalities in the Forest Code, these tree-bush areas fall under multiple definitions of forest, including plots, wooded area, agricultural land, and others. As a result, the Forest Service does not recognize these areas and does not enforce forest laws or actively manage the areas. Thus, this is just one more example of a loophole in the forest legislation that needs to be eliminated in order to promote more effective management.

## **5.2 The Forest Law Project of Krasnoyarsk Krai**

In 2000, The Development of the Forest Code of Krasnoyarsk Krai became a cooperative project of the Institute for Sustainable Communities at Montpelier (ISC, Vermont, USA), the United States Agency for International Development (USAID) and the International Forestry Institute (Krasnoyarsk, Russia). This project aims to promote sustainable forest management for multiple uses, including social, ecological, and economic ones. Forest resources must be used in a sustainable manner. They must be protected, restored, and conserved, while also increasing forest productivity and satisfying the needs and demands of society. This is best done using scientifically proven norms and rules. (Editor's note: at the time of publication, the authors expect the Krasnoyarsk Forest Code to be adopted by the Krai government later in 2003).

The major objectives of the proposed Forest Code are:

- to determine the rights and responsibilities of all forest users in regards to sustainability
- to save and to increase the social, ecological and economic potential of forests

- to provide sustainable forest use within boundaries of forest enterprises, administrative regions, and the territory as a whole

Public relations and the economy are rapidly changing in Russia. As constitutional improvements occur, it is inevitable that forest legislation will also be improved. It is important that science-based methods of forest economics remain as consistent as the process of forest restoration itself. Previously tried and unsuccessful methods of forest policy and legislation should not be tried again. Priorities need to be related to creating a stable forest economy and involve "resource turnover," which means creating a balance between forest use and forest restoration. This keeps forest resources from being exhausted. A second priority is to make timber a primary economic force, and resource turnover should involve enhancing environmental regulations and recreational functions of the forest.

The proposed law takes into consideration silviculture, geographic features, and socioeconomic conditions. The Forest Code of Krasnoyarsk Krai will be a State regional law. This law has jurisdiction over territorial governmental bodies such as the Legislative Meeting of the Krai, the Krai administration, and some local authorities. All other forestry areas are regulated by the Forest Code of Russian Federation, other federal laws, and the subordinate legislation of The Federal Forest Service of the Ministry on Natural Resources of Russian Federation. The Forest Code of Krasnoyarsk Krai will regulate forestry throughout the Territory and not just in State forests. This includes all forest owners, forest users, and representatives of forest administrations.

It is obviously necessary to increase local government interest in order to effectively manage forests sustainably and maximize income potential from the forests. At the same time, conservation, improvement in species, age and structure, environmental issues, recreation, and biodiversity must be taken into consideration. This is only possible if principles of resource turnover are employed over a long period of time, such as balanced continuous forest use and forest restoration.

The most complicated issue remains the issue of financing. A mechanism needs to be created to finance expenditures, including forest reproduction, care, and protection, planning, research, and administrative wages. These costs will obviously come from income derived from the forest. It is difficult, but vital, that the needs and concerns of all involved parties be considered and balanced. Of special concern are the foundational structures of the forest economy, such as local government, local budgets, and the general public. These groups are particularly interested in ways to increase income from forests, increasing forest use, and increasing forest restoration. Income from the forest must be allocated to and divided between local needs as well as the forest economy, reforestation, forest users, State funds for reforestation, and forest protection. Compromise between these groups is invaluable.

The Forest Code articles mirror only major aspects of forest relations, because it is impossible to cover every single concern. Disputed and complicated cases will be sent to the territorial Supervisory Council on sustainable forestry to be resolved. It is necessary that the Forest Code contain the highest possible amount of freedom of action for involved parties, especially forest users, citizens, and judicial persons enforcing forest use rules.

## 5.3 Conclusions

According to the Forest Code of Russian Federation, the participants of forest relations are the Russian Federation and its subjects, municipal formations, citizens and legal persons. These participants can be placed into three basic categories for ease of problem analysis. The three groups who greatly influence processes occurring in the forest complex are the forest economy administration, forest users, and consumers of the goods and services of the forest complex market. A solid understanding of these three groups will help create effective solutions for investments, as the forest complex will operate normally and be developed only with the coordination of development and operation of these groups. We suggest considerations for each group below.

1. Forest economy administration. Activities of the forest economy administration should promote active development of the forest complex, as well as improvements in the work of the forest enterprises. Planning, accounting, control, and growth should occur using goal oriented methods.
2. Forest users. Forest users should be permitted to use the Forest Fund for harvesting raw forest products, forming a rational land use policy, and making ecological improvements. It is necessary to justify and to introduce a specific effective organizational structure for forest users, as manufacturing subdivisions of a complex that converts natural resources into commodity outputs.

For most forest territories, effective development is only feasible when the concerns of multiple groups are integrated into policy. Natural resource groups, industry, social objects (settlements, roads, communications, and production capacities), and people must work together towards development. The forest can become a base for joining these different groups and persons, but only in the event that a uniform plan for development is created. This plan must be designed to be cognizant of conservation and available resources. Secondly, an organization must be created to justify optimal boundaries of a territorial forest complex.

This organizational approach provides a framework for uniform forest territory and solves the problem of scattered economic efficiency and forest usage in different regions of the Forest Fund. Additionally, this organization will allow conditions to form that are conducive to development of small private plants by creating a competitive environment that endorses growth in production and development. These conditions will be created by implementing services with an infrastructure nature. These services include leasing, engineering, organization, commodity sales, logistics, transportation, consulting, and implementing infrastructure (building roads, communications, and others). Specialized businesses may be created to fulfill these services.

3. Consumers of the goods and services of a forest complex market. It is necessary that the State power understands that in a market economy, the "market" concept represents a particular entity and has related composition, pattern, functions, and laws. In a forest complex, this market is not the forest users. The market is one functional block of the

forest complex, and natural resources are used by forest users to provide a commodity. This material is then available for further use by the public for consumption or for further production. As an example, timber can be used to produce over 26,000 kinds of different commodities and can boost national economies more than 15 times the initial cost. In previous years, this transformation was carried out administratively by a system of State planning (*Gosplan*) and State supply (*Gosstab*). In a market economy, this process is determined not by an organization but by the market itself.

The forest complex must be viewed as the most indispensable component of the various enterprises, services, and productions. Without understanding how vital the forest complex is, it is not possible to speak seriously about related issues of conservation, usage and reforestation.

The composition of this structural block includes timber processing enterprises, manufacturing plants, forest complex infrastructure (construction, machine manufacturing, and trade), and related services. All of these components should work in the market on a competitive basis. Specialized producers in the forest complex include scientific research organizations and project and design groups. To become valuable market subjects, these entities should also operate competitively.

It is necessary to determine what methods of influence will impact the formation of the forest market and its operation. Anti-monopoly policies and State support need consideration. For example, in Krasnoyarsk Krai wood chips should be produced and delivered to the Krasnoyarsk pulp mill and various other small and large enterprises. This would be a reflection of effective forest utilization. But the Krasnoyarsk pulp mill is the only such business in the territory, and as such it can dictate production needs and conditions to the forest complex. Naturally, it is impossible to expect positive benefits under these conditions. In the past, this type of problem was solved through centralized control by the industrial branch, during which time the Krasnoyarsk Krai produced wood chips at a rate seven times current levels.

Related problems exist with the forest complex design, research, and development services. Poor relationships between related groups exist. There are three groups of particular concern: the enterprise owners, the enterprise managers, and the labor collectives of the enterprises. Understanding and voicing the concerns of each group will assist in addressing problems.

Enterprise owners are concerned with investments and large loans, and this burden lies solely on their shoulders and competency. It is necessary to esteem holders of control shares. Owners must be certain that modernization or other development of the enterprise coincides with their and other shareholders views on strategy.

In terms of investments, enterprise managers are concerned with and responsible for reshaping investment and financial policies, devising current and prospective economics, taking responsibility for decisions, and organizing modernization steps.

The labor collective of the enterprise is a separate subject of the complex. This subject is allotted, as well as the manager and owner, rights within the legislative framework. Because

social tension exists in the forest regions and enterprises, it is necessary that workers see opportunities for improvements in their living conditions.

Under the current law, functions of State administration and forest management are granted to one department: the Federal Forest Service of Russian Federation and its subordinate local structures. This is immediate cause for concern. The separation of State control and management of the forest economy is necessary. A second strategic mistake in the current law and proposed corrections is that the State budget gives complete priority to forests and the centralization of the forest income in the State budget. Once again, this organization is securing a monopoly and skewing the financing of the forest economy. In our view, it is necessary to allow for multiple patterns of forest ownership: State, municipal, and private. World and pre-1917 Russian forestry practice has demonstrated the advantage of having competitive patterns of forest ownership.

Finally, in the forest law, it is necessary to designate a portion of forest income for forest protection, security, and reproduction of forests while leaving ample profits for financing the forest economy. The forest acts of the Subjects of the Russian Federation such as Krasnoyarsk Krai should be constructed while utilizing the fundamental principles discussed in this chapter, while considering natural and socioeconomic conditions.

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