This is UNEVALUATED Information

B. The Russian Occupation

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1. General Notes -- The Territory and its Administration

a. The northern portion of the partitioned Polish Kingdom, Lithuania, became a part of the Russian Empire. It was called the Province of Lithuania and was subdivided, first into two and later into three government divisions, Kaunas, Vilno, and Grodno.(1) Three divisions were approximately equal in population and area. In 1914 the three were as follows:

Government Area	Area (Sq Km)	Population	Population per Sq Km	Ethnic Group
Kaunas	40,260	1,857,100	45	Primarily Lithuanian
Vilno	41,981	2,075,900	47	Primarily Slavic
Grodno	38,647	2,048,200	52	Entirely Slavic
Suvalki	12,162	718,000	54	Primarily Lithuanian

The fourth area shown on the table, Suvalki, a part of Poland until 1914, was populated by Lithuanians and its northern portion and was included in the later Republic of Lithuania. A narrow strip of land along the Baltic including the villages of Palanga and Sventoji, belonged to Kaunas until 1819 when it was attached to the Latvian populated government of Kuronia.(2) It contained about 4050 people, living on 85.5 sw km, and its administration was changed for ethnic reasons.

b. The Republic of Lithuania (1818-1940) was formed of the three areas of Kaunas (100%-40,260 Km^2), Vilno (9.6%-4,045 Km^2), and Suvalki (69%-8,367 Km^2).(3) Later additions to this area included the 85.5 sq km on the Baltic given to Kuronia in 1819, and a portion of East Prussia amounting to 55,670 sq km which later became the Antomomous District of Klaipeda. Separate statistics for this latter part of the country's history are not available (with the exception of those for Kaunas) so that figures cited below are those of historical Lithuania under the Czars.

c. Each government division was divided into counties and the counties into townships. Each township was made up of a certain number of communities and the communities of a certain number of villages. The head of each area government was appointed by the Czar and his seat was located in the major city of his area. Other administrative officials were located in the larger towns, to serve the county, township, etc. requirements. The Russians treated Lithuania differently than the Poles had. They considered, not without some reason, that Lithuania was an ancient and integral part of Russia which had been taken away temporarily by Poland. The Lithuanians are not Slavs but are more closely related to the Slavs than to other ethnic groups in Europe, and the old Grand Duchy of Lithuania was under strong Byzantine, Orthodox Church, and Slavic influences. There was considerable intermarriage among the Lithuanian, Ruthenian, and Russian nobility. This had not always been the case, however. When the Tartars held power in Russia, the Lithuanian Dukes were ambitious to seize control over all the Russian-Orthodox world. The defeat of the Tartars and the rising power of the Russian Czars, however, changed this and forced the Lithuanians to unify with the Roman-Catholic and Western oriented Poles.(4) The previous trend toward the Ruthenization of the Lithuanians (the official language had been Ruthenian) was halted by the new Polish influences. By 1795, these influences were very strong. Most of the nobility, holding 80% of the large estates, were Polish. Most of the clergy were Polish and a considerable number of the townspeople, even in primarily Lithuanian Kaunas, were Polish. The Russians, therefore, considered themselves to be the deliverers of the Lithuanians.

d. While Lithuania became part of Russia, Poland retained a certain autonomy (until 1830). Lithuania had Russian laws but Poland kept its own laws (Code of Napoleon). Following 1863, Russian laws were stricter for Poles and Jews in the Russian Empire than for

Lithuanians. This is reflected in the forestry codes.

2. Sources

(a) According to documents of the Russian Central Committee of Statistics dating from 1908, there were no reliable agricultural or forestry statistics in Russia until 1880.(5) Information on the earlier periods comes from older figures and is subject to error and inaccuracies. There were no Russian forestry statistics at all until 1800. The general survey of the Russian Empire (1775-1804) provided data for 28 separate provinces including the Baltic provinces. Some forestry data was recorded during the survey, but it was inadequate and inaccurate.

(b) The first data on all of the Russian forests was included in the annual reports of the Russian governors of the various provinces, who based their summaries on the research of Russian General Staff Officers during the 1860s. Lithuania was one of the provinces surveyed by the military during this period.

(c) The first forest atlases were drawn in 1873 (second edition 1878), and were based on the surveys of the 1860s. The first serious statistical surveys to determine land usage were made in 1881 and additional studies were made in 1887. Most data which exist were for the Russian State Forests. Their areas and annual productivity have been recorded since 1840. Organized data for all private forests, large estates, and peasant properties have existed only since 1888. None of the information mentioned above was uniform and it is impossible to correlate it. Not until 1893 did foresters in the state forests make uniform reports on the types of forest stands, the age relationship of the trees, and the type of forest economy.

(d) In 1895, the Ministry of Agriculture and State Properties ordered a detailed study of the state forests. The most important results of this study were published in 1896, but most of the material was never published. Many statistics on the Russian forest economy were included in the book of J J Surozh, "Lesa, Lesnoy Khoziaistvo i Lesnaia Promyshlennost Rossii", 1908, Varshava, pages I/154, II/180-191.

(e) In considering available source material for studying Lithuanian forests, there are three important periods:

1. Prior to 1840 no data or statistics exist.

2. 1840-1888, a real if primitive forest economy began to develop in the state forests. The Act of Sustained Yield enforced in all Russian forests, produced some statistics.

3. 1888-1914, an increasingly important forest economy with adequate statistical sources.

3. Forest Property Relationships and Policies Since 1795

(a) Property rights to agricultural and forest lands in Russia, as in Poland and Lithuania, were granted by the higher to the lesser nobles or sold. Large areas were donated to monasteries and churches. Feudalism did not develop because the positions held by appointed officials were not hereditary. Russian forests were historically public land. In 1649 the Czar's Imperial Guard had a right to use any forests for their own needs. Up to the reign of Ekaterina II (1762-1796) forest property rights were not absolute. Czar Peter I (1689-1725) took over control of all valuable forest properties, no matter in whose possession they were. They were placed under admiralty direction and their valuable tall timber, vital for naval use, was made state property.(6) The noblemen who owned the properties were forced to establish forest administration units charged with heavy responsibilities for the material in the forests and subject to the regulations of the Navy (with punishment up to and including the death sentence).(7) (In 1719, Czar Peter I gave the populace permission to go into any forest to cut fire wood, because the price of fuel had risen abnormally high.)

(b) The Czars following Peter I, especially Ekaterina II, radically changed property regulations including those governing the forests. Ekaterina cancelled all of Peter I's restrictions and recognized absolute property rights over the forests. In Russian all large forests and estates of the clergy were expropriated by Ekaterina. The same expropriation was extended to the new Lithuanian province in 1841-1843.(8) Responsibility for the peasant population which had owed allegiance to the clergy (approximately 900 thousand in Russia) was transferred to a special committee set up to govern the crown-peasant group.

(c) Following the Russian annexation, the forests in Lithuania of the former royal farm estates became state forests. The huge hunting estates formerly owned by the Polish Kings also became state forests. The Lithuanian nobles who swore fealty to the Russian Czar were allowed to retain their private forests without restriction upon them. The situation in these forests and in the forests of the peasants remained practically unchanged. The right of entry remained in many forests of the nobility and was extended to state forests because portions of the latter had been expropriated from the clergy and nobility and were burdened with "servitudes". (The right of servitude was cancelled in 1831 but was revived again in 1863 after the Polish insurrection.)

(d) After the insurrections of 1831 and 1863, the Russian administration began the colonization of the lands expropriated from the Polish nobility with Russians. The forests of these estates were primarily made state property. Poles suspected of being revolutionaries were forced, in many cases, to sell their property very cheaply to Russian bureaucrats and nobility. The right to buy property was taken away from people of Polish origin (the Jewish population had never had the right). The ratio of property ownership in Lithuania in 1795 was almost 100-0 in favor of the Poles over the Russians, but by 1918 had declined to three to one, still in favor of the Poles.

(e) In addition to the confiscation of their property to the advantage of the Russian nobility and colonists, the Polish landholders were forced (by economic necessity) to sell their properties. They could sell to the peasants (Lithuanian peasants had the right to buy not over 85 hectares of agricultural and forest property) or to other landholders including the Russian nobility. A brisk sale of forest property for conversion to agricultural purposes was in order until the Act of Sustained Yield in 1888 put a stop to the practice. From this act dates a more progressive and realistic forest economy for Russia and Lithuania.(9)

(f) Peasant forests were used as the peasants desired, both before and after 1861, the date when the peasants were freed. The peasant forests had long been stripped of their timber so there was no considerable change in them after 1861. Together with personal freedom, the peasants received land for common use including large acreage in state forests. The peasants promptly sold the valuable timber thereon and converted the land to agricultural purposes. As a result of these changes and other attrition, forest area and density sank very considerably from 1795-1888. Peasant forests were generally so poor and sparse that they were not considered to be forests and had no forestry supervision. This situation, without significant change, lasted through World War I.

4. Forest Legislation

(a) The Grand Duchy of Lithuania except when it was united with Poland always had its own laws and legislation. The most important was the Code of Lithuania (Statut Litovskii) which contained all laws enforced in Lithuania since 1530. The first edition contained only a few articles on forests and forestry but subsequent editions had special chapters dealing with forestry problems. The Russians retained the Code of Lithuania until it was superseded by the Code of Russian Laws (Svod Zakonov Russkoi Imperii) of 1840. Peasant forests were governed by the Linthuanian Code until this date. State forests and those expropriated by the Russians were under the Russian Code from the beginning of Russian rule, and the first Russian Governor of Lithuania wrote the first instructions for managing state forests in 1796.

(b) Russian laws did not exist in codified form until 1840. Law was despensed in the form of various orders, instructions and decisions. Attempts at codification were made during the reigns of Ekaterina II and Alexander I but they failed. Forestry regulations were published in the Code of Forest Regulations (Svod Ustava Lesnogo). Editions were issued in 1842, 1857, 1876, 1893, and 1905. This code included all regulations and orders issued since 1649 and still is in force. It was a systemization and not a revision of the existing laws, since there was no thought of reforming forestry policies. Real changes which did occur in the forest economy came from below, not from the top. They were the results of new times and changing situations. A committee was formed in the forestry department of the Russian Ministry of Agriculture and State Properties in 1911 to amend the forestry code, but it succeeded only in reworking it and not in changing its essentials. After two years of work (1911-1913) the project was brought before the Russian Parliament, but the beginning of World War I interfered with its acceptance and execution.(10)

(c) The Forest Preserve Law of 1888 was the most important step taken towards a serious foundation for the Russian forest economy. Former regulations in the Code of Forest Regulations were far behind the requirements of the country's advancing economy. The Code was supplemented, however, by circulars and orders which taken together made up a secondary code. The dual Code was burdensome and awkward and made proper forest management difficult.

5. Forest and Land Usage

(a) In 1881, land usage in European Russia (excluding Finland and the Kingdom of Poland) which included ten Russian government areas, was as follows:(11)

Land Usage	Farm Land		Meadowland & Pasture		Forests		Waste Land		Total	
	Million Hectare	%	Million Hectares	%	Million Hectares	%	Million Hectares	%	Million Hectares	%
Total	117.4	26.2	71.3	15.9	173.3	38.8	85.5	19.1	447.5	100
Crown & State Lands	3.0	1.7	2.9	1.6	112.9	64.3	56.7	32.4	175.5	100 39.2
Private Estates of the Nobility	132.7	27.2	27.9	23.3	45.1	37.6	14.3	11.9	120.0	100 26.8
Peasant Lands	81.4	53.8	40.6	26.6	15.4	10.1	14.5	9.5	152.0	100 34.0

(12)

(b) In 1899, land usage in the Lithuanian Provinces was as following:(13)

Govt. Area	Farm Land %	Forest %	Meadow Land & Pasture %	Waste Land	Forest Total area (Million Hectares) 1903	- Forest Ownership - %				Forest Density % 1903
						State	Crown	Private	Peasant	
Vilno	40.3	27.6	19.2	13.0	0.99	39.5	-	57.9	2.6	29.3
Kaunas	36.2	22.3	32.7	8.8	0.66	30.8	-	69.2	-	23.6
Suvalki	60.0	25.4	(Included in Forest Land)	14.6	0.64	75	-	25	-	27.1

(c) The State lands in European Russia and Lithuania were used as follows in 1899:

Area	Forest %	Farmland %	Wasteland %
European Russia	53.1	0.5	46.4
Lithuania	65.4	1.8	32.8

The low percentage of farmland is explained by the fact that the most useful farm land was distributed to the peasants emancipated in 1866.

(d) Another source gives slightly different data for the year 1887 but the picture is not significantly different:(14)

Govt. Areas	Farmland		Meadow Land & Pasture		Forest		Other Uses		Wasteland		Total	
	1,000 Hectares	%	1,000 Hectares	%	1,000 Hectares	%	1,000 Hectares	%	1,000 Hectares	%	1,000 Hectares	%
Kaunas	1,443	36.7	1,112	28.3	908	23.1	143	3.6	326	8.3	3,932	100
Vilno	1,557	40.5	609	15.9	1,076	28.1	107	2.7	491	12.8	3,843	100
Suvalki	1,429	47.1	705	20.4	846	22.8	153	2.9	462	6.8	3,595	100

(e) Areas of true forest in Lithuania in 1911 were as follows:

Govt. Areas	Areas W/in Boundaries		Forest Areas W/in Bound.		Forest Ownership W/in Boundaries							
					State		Private		Peasant		Other	
	Km^2	1000 Hectares	1000 Hectares	% of Density	1000 hect	%	1000 hect	%	1000 hect	%	1000 hect	%
Kaunas	39820	3982	620.3	15.79	158.3	25.51	460.1	74.17	-	-	1.9	0.3
Vilno	42210	4221	1015.3	29.04	285.8	28.16	70.73	69.68	20.1	1.97	2.0	0.2
Suvalki	12410	1241	221.5	14.07	180.6	81.55	35.0	15.80	1.3	0.59	4.6	2.06

(f) Russian forest economists and statisticians figured the relative abundance of forest products by comparing the supply with the demand.(15) The supply was deemed abundant when there was more than one hectare of forest per person; adequate if there was one-half to one hectare per person; and inadequate if there was less than one-half hectare per person. In measuring forest density they considered 15% density and under to be inadequate; 15-34% adequate; and above 35% abundant. In Lithuania in 1899 and 1911, the relation of forest area and density to population was as follows:

Govt Area	1899 (16)			1911 (17)		
	Forest Density %	Forest Area per Person (Hectares)	Annual Wood Supply per person Festmeters (18)	Forest Density %	Forest Area per Person (Hectares)	Annual Wood Supply per Person Festmeters
Kaunas	23.6	0.52	1.8	15.8	0.33	1.0
Vilno	29.3	0.64	2.25	29.0	0.48	1.44
Suvalki	27.1	0.44	1.55	14.1	0.17	0.51
		Average	2.10		Average	1.3

It can be seen from the above table that the wood supply situation in Lithuania in 1899 was on the borderline between an adequate and inadequate supply (based on the Russian measuring stick) but that by 1911 the supply was definitely inadequate. Because of non-uniform distribution of the forests, the Kaunas area (Telsiai, Ponevesh, and New Alexandrovsk -- later Zarasai counties) and the Suvalki area (Vilkavishis county) already suffered from a scarcity of wood as early as 1857. Peat was used in these areas as a substitute for fuel wood.(19)

(g) In the Vilno area, state forests were widely distributed in small forest areas. Larger tracts of state forest lay in the central portion of the area on the boundary between Troki and Lida counties. Private forests were concentrated primarily in the northern portion of the territory (Svienciany county) and in the southeast (Dzisna and Oszmiana counties).

(h) In the Kaunas area the state forests were concentrated around the city of Kaunas. Private forests were uniformly distributed over the area with a larger concentration to the north.

(i) Large state forests were located south of Suvalki city and east of Augustov, and in the northern part of the area. Private forests were uniformly distributed throughout the territory.(20)

(j) The average size of state forests in Lithuania was 5,500 hectares. Smaller areas were handed over to the peasants for farming use.(21)

(k) The composition of state forests in Lithuania as of 1899 was as follows:(22)

Types of Forest Stands	Government Areas					
	Vilno		Kaunas		Suvalki	
	1000 Hectares	%	1000 Hectares	%	1000 Hectares	%
Pine (Pure or Predominant)	146.3	59	42.9	27	145.2	80
Spruce "	63.8	26	63.8	41	33.0	17
Evergreen (Deciduous)	1.4	-	29.7	19	1.1	1
Birch (Pure)	6.6	3	4.4	3	-	-
Oak "	4.4	2	-	-	-	-
Alder "	6.6	3	2.2	1	1.1	1
Other Deciduous	1.2	1	9.6	5	0.5	-
Non Reforested	12.1	6	2.2	1	-	-
Totals	242.4(23)	99	154.8	97	180.9	99

(l) It may be concluded that in general the state forests of Lithuania were in good shape at the end of the 19th Century, except for the Vilno area where there were large areas which had not reforested.

6. Division of the Forests by Age Classes(24)

(a) Age relationships in state forests at the end of the 19th Century can only be estimated from comparison between annual cuttings and wood production. At the beginning of the 19th Century, only fallen and dead wood was taken from state forests. About the middle of the century some cutting of live timber began. The income in European Russia from all state forests for the years 1819-1837 averaged only 500 thousand rubles per year. From 1838-1858, it averaged only 1,100,000 rubles. Only after 1860 was there an interest in obtaining an income from the state forests. In 1866 they earned seven million rubles. As a result of the conservative use of these forests, they were primarily composed in the 1850s of ripe or over-mature trees. From 1866-1885, the average annual cut of timber from the pure forest areas of the state forests rose to 0.22 festmeters of timber per hectare and from 1886-1898, to 0.25 festmeters per hectare. During these years it was estimated that state forests were 80% composed of ripe or mature stands, but that private forests, on the other hand, were 80% young growth.(25) The private forests were logged very heavily from 1870-1890 because of high demand, high prices, and low supply from the state forests.

(b) The use of the state forests in Lithuania was much greater than the use of those in Russia. Statistics from 1878 show that in the Kaunas area 0.75 festmeters of timber per hectare per year were taken from state forests; in Vilno 0.80 festmeters; and in Suvalki 0.30 festmeters.(26) The figure applied to the Russian state forests (80% ripe or over mature timber) cannot be used to describe the Lithuanian state forests because they were logged more intensively. Lithuanian state forests in 1914 formed stands probably somewhat more mature than normal. The first forest estimates made by the Lithuanian government (in 1920-21) showed that the stands were 3% more mature than normal. The survey and research of 1937 criticized the earlier estimate as exaggerated. It may be roughly said that the Lithuanian state forests of 1914 were normal.(27) The private (landed gentry) forests were like the private forests in Russia, about 80% young growth.

7. Properties of the Trees in State Forests

(a) A study was made in 1901 of the main types of trees growing in ripe stands in state forests. The results concerning size and dimensions were as follows:(28)

Tree Type Location	Age	Diam (cm) at Chest Heights	Height (m)	Height to First Dry Branch (m)	Height to First Growing Branch (m)
Pine					
Grodno	110	40	31	15	19
Minsk	115	44	31	11	21
Lomzha	117	40	21	6	14
Oak					
Minsk	135	58	28	13	17

(b) The research of Professor Buryi in 1899 established the following properties:(29)

Tree Type Location	Age Section 2.8 M Above Ground	Specific Gravity of Completely Dry Wood		Resistance to Pressure pounds per square inch
		Average	Maximum	
Pine				
Minsk	243	0.505	0.563	692
"	184	0.450	0.477	598
Prussia	100	0.490	-	
Spruce				
Minsk	64	0.467	0.495	672
"	62	0.439	0.468	584
Prussia(30)	80	0.440		
Oak				
Ekaterinaslav	45	0.681	0.708	626
Prussia	120	0.760		
Birch				
Novgorod	52	0.649	0.671	840

Tree Type Location	Age Section 2.8 M above Ground	Specific Gravity of Completely Dry Wood		Resistance to Pressure pounds per square inch
		Average	Maximum	
Alder Viatka	71	0.467	0.466	566
Aspen Moghilev	44	0.446	0.451	582

8. Forest Yields. The subject of forest yield was not studied in Lithuania. There were no wolume tables for Vilno, Kaunas, or Suvalki, and the Lithuanian government (1930-39) used German tables for evergreens and Russian tables for deciduous trees.(31) The only available figures for areas near Lithuania are those given below. They are taken from German or Russian sources:(32)

Forest Type and Location	Average increment in Festmeters per Hectare of Normal Stands at Age 120 Years on Sites Varying in Quality From 1-5				
	I	II	III	IV	V
Pine (12 yrs)					
St. Petersburg	6.1	5.1	4.1	2.9	2.1
N. Germany	9.5	7.9	5.8	4.3	2.4
Kaunas (1940)(33)	8.5	7.1	5.7	4.4	3.0
Spruce (100 yrs)					
St. Petersburg	6.6	5.6	4.4	3.0	2.0
N. Germany	15.6	12.4	9.7	6.9	5.0
Kaunas (1940)(33)	13.2	10.5	8.3	6.0	4.2
Birch (60 yrs)					
St. Petersburg	6	5	4	3	2
Kaunas (34)	7.2	5.7	4.4	3.1	2.2
Aspen (50 yrs)					
Tula	7.9	7.0	5.4	4.0	3.3
Kaunas(34)	9.1	7.6	5.3	4.2	3.0

9. Forest Management

(a) The peasant forests and those of the lesser nobility were managed by the owner himself. The larger forests of the landed gentry were handled by "Lovchys", or forest rangers. Almost all of the larger forests were guarded by peasants.

(b) The state forests of Russia had a more formal administrative system. Historically, they had been open to every man's use. In 1762, however, those considered to have strategic defense possibilities were put under military guard. Peter I set up the first primitive system in 1722, not only in state forests but in the private forests along important rivers.(35) These areas were guarded by dragoons and special civil guards. Private forest owners were forced to furnish a Valdmeister (forest ranger) and the guards for the forests which they owned along the rivers, in order to watch not only both river banks for 20-30 kilometers but the valuable tall timber which belonged to the state. The direction for this effort came from the admiralty in St. Petersburg. A navy officer directed the operations of the forest rangers. Ekaterina II released the nobles from this obligation and recognized their right to use their property freely, but the system continued to operate in the state forests. She extended the system to Lithuania when it became a province of the Russian state. Navy officers controlled the stands of valuable mast timber and sailors supervised by pilots guarded the timber. State economists ran the other state forests and the peasant forests.(36) Peasants made up the guard force and were obligated to fight fires.

(c) Under Czar Paul I (1796-1801) the central forest management remained in admiralty hands, under a special forestry division. Forest masters and a higher rank of supervisors were appointed. The first systems of this type were set up in St. Petersburg, Kostroma, Voronezh, Kursk, Orlov, Vologda, and Pskov. Other areas including the Lithuanian Province, were headed by a forest master supervisor who directed a staff of surveyors. In 1802, the Russian state established a system of ministries, and state forests were handed over to the control of the Ministry of Finance. In 1804, a forest code of laws and regulations for Russia was issued and a forestry college was established in a suburb of St. Petersburg. Another college was established in Kozelsk in 1805, and a third on Elaghin Island in 1808.

(d) The forestry department remained under the Ministry of Finance but was divided in 1811 into two sections, state forests and naval timber forests. In 1826, a new system of administration was introduced under which territorial and district supervisory forestmasters, forestmasters, sub-forestmasters, and forestmaster-scientists ran the forests. State forests were placed under the control of local government units and sub-divided into forestmaster districts. Peasants still made up the bulk of the forest guard but were supervised by range riders. In 1837, European Russia had 400 professional range riders and 462 other forestry professionals.

(e) A permanent guard was established in 1832 and compensated for its service by not having to pay taxes and by the right to use 33 hectares of farm land. 1837 begins a new era in the economy of the Russian forests. In that year control of the state forests was given to a new agency, the Ministry of State Properties. A total of 507 foresters of various rank (including only 84 trained professionals) and 42 thousand forest guards (80% appointed for only one year) served in European Russia under this Ministry. Prior to 1837, damage in the forests was extensive and the prevailing conservation system was hopelessly inadequate. For example, in the Kazan area, forest damage was estimated to be as high as 15 million rubles per year, and the situation was not much better in other areas.(37) Income from the state forests was negligible, about 500 thousand rubles annually, and expenses were approximately 400 thousand rubles.

(f) In 1843, the Ministry of State Properties divided the forestry department into six divisions. At this time the Corps of Foresters was put under military discipline but in 1867 it reverted to a civilian organization. The number of forestry personnel increased each year and by 1903 there were 3,715 professional positions (69 vacant) in European Russia. 87% of the foresters were professionals.

(g) As of 1914 the central forestry administration was set up in a very formal, centralized manner.(38) /See end of report for availability of a chart of the Russian Forest Administration./ The forestry department was in charge of enforcing forest laws and regulating all questions regarding the forests; supervising the activity of the forest conservation committee; collecting forestry statistics; directing forestry policies throughout the country; and educating professional foresters. The department had eight divisions and was sub-divided into 17 bureaus. The survey division and the Forest Institutes were directly subordinated to the Ministry of Agriculture and State Properties. Fifty senior surveyors and 235 surveyors served in the survey division.

(h) In 1910, there were 49 territorial divisions in the Russian Empire.(39) Each of these divisions had a local Bureau of the Ministry of State Properties which represented that agency in its fields of responsibility. The Bureaus supervised the forest masters and gave them their orders.

(i) In the Lithuanian Province, the Bureau Offices were located in Vilno (serving the areas of Vilno and Kaunas - 560,000 hectares), and in Suvalki (serving Suvalki and Lomzha - 362,000 hectares).

(j) The most important unit in the administrative system was the forest master district. The size of each district is the best measure of the intensity of the forest economy in that area. The number of districts and the size of the forest within the Russian Empire varied from year to year as follows:(40)

Year	Forest Districts	Total Area of State Forests
1866	599	308,000,000 hectares
1899	741	407,000,000 "
1893	761	-
1902	1161	253,000,000 "
1903	1232	308,000,000 "
1908(41)	1261	-
1915(41)	1549	-

As of 1889, the average district in Siberia was 350 thousand hectares. In 1909, the average district in European Russia was 90 thousand hectares. The Lithuanian Province in 1857 had 21-23 districts averaging 35,000-38,000 hectares each.(42) Because of the high population of Lithuania and the accessibility of the forests, timber was sold rapidly and the area of the forest districts decreased constantly. By 1899, the average forest district was:(43)

Kaunas	17,600 hectares
Vilno	24,200 "
Suvalki	14,300 "

The districts varied in size because of the unequal distribution of the forests. In Kaunas, the forests were scattered in small stands, while in Vilno, there were large, solid areas of forest. The number of districts was increased in 1914, but many new districts were not staffed because of a shortage of trained foresters. In 1914, there were about 50 districts in Lithuania with an average size of 15-20,000 hectares. Individual districts varied in size from 9-25,000 hectares.

(1) Each forest district was directed by a forest master or ranger. Supervisory forest masters were subject to professional examination as early as 1798, and all forest masters had to pass examinations after 1802.(44) In 1837, 84 of 507 foresters had been professionally trained. The best trained men served in the most important, accessible forests and in the forest institutes. In remote areas the foresters, even in 1915, were non-professionals. The number of trained men in Russia was never adequate and this was one of the major reasons for the failure of the Russian forest economy. For long years, the Russian forests produced almost no income. Relative figures were:

Year	Income	Expenses
1800	250,000 rubles	?
1805	283,930 "	99,940 rubles
1825	541,456 "	220,000 "

The productivity of the forests remained at this low level until 1837. Actually, considering the vast reserves of valuable timber, Russia had no forest economy at all.

(1) As the number of trained foresters grew, the forest districts grew smaller and the central forest administration got more and better educated personnel. The state was driven, by the shortage, to set up forest institutes. Lithuania had a comparatively high number of forests, though not an adequate number. Religious discrimination was invoked against Roman Catholics in Lithuania, who couldn't get a job as a forest master even if they were formally trained. The Russian policy to "russify" the Baltic Province extended to the forest master system. When the Russians withdrew from Lithuania after World War I, the Russian forest masters went along and left Lithuanian forests without professional manpower.

10. Forestry Education

(a) During Ekaterina II's reign, German forest masters held the most important central and local positions.(45) They were of little help, however, because they were poorly trained and did not speak Russian.(46) In 1773, a class in forestry was opened for 10 hunting pages at military school. In 1779, four students of the St. Petersburg naval college went to England to study forestry as it applied to ship building. In 1800, the naval college established a special forestry division to train 35-50 students. The plan failed, however. The most important step forward was the establishment of a "Practical Forest School" in a suburb of St. Petersburg, the Crown Village (Czarskoie Selo). The school was moved into St. Petersburg and later became the Senior College of Forestry. It still plays the most important role in training the foresters of Russia.

(b) Many schools were opened, closed, and opened again to train men for forestry on a lower professional level (guards, etc.). These were usually located in rural areas as a part of the facilities of a forest district. In 1908, for example, there were 33 of these lower level institutions plus the Senior College of Forestry in St. Petersburg, and forestry divisions at agricultural colleges in Moscow and Pulawy (Poland). From 1908-1915 an additional 11 lower level schools opened and the enrollment of those in existence was increased to about 15 or 20.(47)

(c) The forestry colleges had a very large number of students. In 1908, the Senior College, for example, had four hundred, and Pulawy 150. At the same time, Hungary had only 150, Eberswald (Saxony) 76, Gmunden 78, Tharandt 69, Munich 63, and Ithaca (US) 35. While Russia was training so many foresters on a high level, however, it was not training enough men for the practical everyday purposes of forestry. The lower level schools each had only about 20 students. This situation is a rather typical disadvantage of the Russian education system.(48)

(d) The Russian Government spent about two thousand rubles per person for the college students' educations and about 750 rubles per person for the lower level students. From 1838-1887, 1914 persons were graduated from various courses, 1638 of them on the forest master level. During the period 1903-1908 about 150 persons graduated from the forestry colleges each year. Refesher courses for forest masters were established beginning in 1912.(49)

11. Forestry Salaries

(a) The salaries paid Russian forestry officials, both in the central and local administrations, were miserably low. Growing requirements of a higher standard of living and the rising costs of living put these officials in a very bad plight. The educated professionals preferred assignments to work with other professions at higher salaries. Of the 408 persons graduated from 1905-1911, only 286 went to work in the forests.(50) Salaries were set in 1872 and unchanged until 1912. The salary range during this period was from 600-1050 rubles (about US$300-525).

(b) In addition to their salaries, officials in the forests received supplements in the form of fuel wood, free dwellings (or additional payment for one), and 33 hectares of land for their use, tax free. Officials in the cities received special additional payments. From 1837, forestry personnel received a certain percentage of the increased income from the areas under their direction. Added up anyway, however, forestry personnel were poorly paid and this fact alone was sufficient to hinder progress. The raise in 1912 increased forestmasters' salaries to 1600-2700 rubles a year plus the additional supplements; forest inspectors' to 2800-3000; forestmasters' assistants' 600-1000; and estimators 1200-1500. An annual salary of only 100-250 rubles was paid for secretaries to assist the forest masters, but in Lithuania, Roman Catholics could be hired for this job. The experience these people gained helped the young Lithuanian Republic very much after the Russians left the country. In 1912, the secretaries' salaries were raised to 480 rubles per year.

(c) The prices paid for commodities during the year 1911 provide an indication of the financial plight of the foresters:(51)

100 Kg of Wheat	-	7 rubles
100 Kg of Rye	-	5 "
100 " " potatoes	-	1.8 "
1 work horse	-	75 "
1 cow	-	48 "
100 Kg of beef	-	30 "
100 " " pork	-	36 "
1 man's suit (woolen)	-	12 "
1 pair men's shoes	-	2 "
1 cubic meter of fuel wood	-	4 "

12. The Standards of Russian Forestry

a. The influence of German forestry policies were very strong in Russia. The first Russian forestry books were translated from German, and until 1850, almost all rules and regulations for the forest economy were taken from the Germans. After 1850, however, there was a trend away from the blind copying of the German ways. The forest colleges, which had great influence in Russian forestry as a result of the large number of students they graduated, led the way in liberating Russia from the German policies. Silviculture and planning were the first areas of Russian forestry to become independent, although German ideas were later accepted and developed (e.g. Dauerwald's idea of a rapid growing system). Russian thoughts on such broad and highly developed doctrines as soil science, meteorology, climatology, forest types, etc, followed world research and there was no real independent movement in Russia in these areas.

b. The bad situation in Russian forestry would have improved rapidly (as it started to do from 1908-1914) if World War I had not begun.(52) Signs of decentralization had begun in 1896 when remote bureaus had received the right to act independently in organizing the forest guard, prosecuting poachers, and approving timber auction prices.(53) Responsibility for running the Russian forest economy was transferred in part from a few very highly placed officials to a council of forestry experts.(54)

c. The first forestry association in Russia, the "Royal Forest Association", existed from 1832-1851. Its activities were limited but during the period of its existence, it issued a "Magazine of Forestry and Hunting". A second forestry association organized in 1871 at a time when the level of Russian forestry had begun to rise. It was called the "Forest Association of St. Petersburg" and it lasted until the Revolution of 1917. It issued the "Lesnoi Zhurnal" (Magazine of Forestry) until its demise. This magazine was the most important organ to mirror and influence public opinion on forestry. It was a very important factor in the development of the Russian forest economy. Associations similar to the St. Petersburg group were later formed in Moscow, Ekaterinoslav, Orenburg, Minsk and elsewhere. All of them were designed to aid private owners to manage their forests properly. They organized meetings of the owners and forestry experts, trips to points of interest, and exhibitions and fairs. While these associations were small (50-300 members) their influence was large.

d. The bibliography of forest literature in the 18th Century was very limited. Most of the available literature came from the German work. The first book was printed in 1766 and five more followed (all translations) before the end of the century. From 1801-1888, the situation was almost as bad. The "Forest Magazine" was available from 1830 to 1850. The "Magazine of Forestry and Hunting" was available from 1855-1859. From 1871-1917 the "Magazine of Forestry" was issued, and in Kiev the "Forest Industrialist" was published from 1866-1890.

From 1890-93, the magazine "Russian Forestry" was available, and from 1898-1918, "The Forest Industry Herald". In addition, the colleges published the results of research, and from 1838-1893 about 120 original works and 20 translations appeared. After 1893, book publishing increased considerably until World War I.

e. The outstanding forest scientists of the Russian school were the doctrinists Morosov, the botanist Sukachov, the soil scientists Glinka, and Dokushaiev. While the Russian Empire sharply limited political expression, other criticism was accepted. Scientists were encouraged to express themselves freely on economic or scientific subjects.(55)

13. Forest Research

a. Forest research in Russia began in 1840, forced by the need to reforest the treeless steppes of southern Russia. At that time two forest districts were established, in Berdyansk and Velikii Anadol, and the areas were planted in trees (mainly oak). The first problem faced in these two districts was the study of the results of this artificial reforestation and of the natural conditions affecting the project. Special, low-level schools were set up in the area to educate technicians for the task.

b. In the 1870s, public opinion as mirrored in the forestry magazines, demanded the establishment of a permanent research program, not only for the steppes but for the whole empire. The concensus of the professionals, published in the "Reports of the Forest Department" (1890-1895), also agreed on the need for a research program. Following 1895, special sums were allotted to research, and special groups were assigned to study forests in 20 government areas. In addition to this official program, the state colleges conducted their own projects. The greatest overall research effort was concentrated in the southern steppes.

c. Research interests became more specific in 1908 when special districts were established to deal with special research problems. Again, most of the interest was concentrated in the steppes. Studies of the May Bug were begun in three districts, and other districts studied the seeding problems of various trees, stands, and localities. After 1909, the central forestry administration in St. Petersburg became a special advisory committee, dealing only with reforestation problems. It directed research on reforestation and made suggestions to the central government.(56)

d. The only forestry research conducted in Lithuania was that of individual forestmasters acting on their own initiative. Some very interesting research was done in Troki County on the growth of oak trees. In Marijampole County a program was initiated to plant larch seeds. These beginnings have since been very helpful to later researchers.

14. State Forest Guards

a. The guarding of the state forests against misappropriations was the duty of those peasants bound to the area. The peasants were appointed to guard duty, without having the right to protest, for periods of from one to two years. During their service, they were exempt from payment of any taxes on the land they used. In 1837, over 40 thousand persons guarded the more important state forests, of whom over 80% were bound peasants. Supervision of this group was lax because of a shortage of supervisory personnel. The system worked badly and led to many abuses. The violations in Lithuania in 1857, where control of the guard force was very difficult, were tremendous.(57) The state forests were particularly difficult to protect because they bore the last surviving stands of the tallest, most valuable timber.

b. The difficulties in protecting the forests are partially explained by the eastern concept of property rights. Under Czar Peter I, the rights of an owner in his forests were uncertain. The state considered itself a sub-owner with the right to use the forests. In ancient Lithuania, property rights were more precisely determined, but the right of entry complicated the situation. Until 1940, Lithuania applied the Russian law which characterized the misappropriation of timber from another's forest as a violation but not a theft. The taking of another's wood was only considered to be theft when that wood had been altered by human labor (cut for fuel or other purposes). The Russian Czars never changed this custom because of their political conservatism and the Lithuanian Republic also let it stand for political reasons (the desire to win peasant support).

c. Wood was enormously important to the Lithuanian peasant because of its high price and relative availability. After grain and livestock it was Lithuania's most important product. Construction in rural areas was almost 100% of wood and in towns and cities 50%-80% of the buildings were of wood. Wooden structures were easy to erect and each village or town had its own skillful builders. With a few simple tools (axes, hammers, a few drills, pit saws, and cross-cut saws) they could build quickly and cheaply. Until 1918, most buildings had simple foundations of large round stones lying on the ground. The consequent lack of ventilation and adequate support caused most buildings to last only 10-15 years. The oldest buildings lasted no more than 50 years.

d. As a result of the constant need for wood, its acquisition became one of the peasants' most important problems. Part of the fuel wood ordinarily came from his own land, the rest he took from state lands, or bought. He sometimes bought wood in order to gain access to a forest and while he was there would try to bribe the guard to allow him to take more than he was entitled to. Structural wood had a monetary value in the peasant's life. He attempted to build up a stock of it to fill his own needs and to sell if necessary or when prices were high. He even gave it to his daughters as a dowry. Wooden dwellings were built so that they could be taken apart and moved and were actually a portable part of the peasant's estate.

e. While the desire to obtain structural timber was always great, it was most readily available during periods of unrest and warfare. During the warfare of 1812, the uprisings of 1831 and 1836, and the revolutionary activity of 1905, the position of the Russian government was so weakened that the peasants invaded the forests (even openly) to cut wood for their needs and for sale. For political reasons they were never punished for these incursions, and so each succeeding invasion became more determined and widespread. In 1918, misappropriation of timber in the forests of the new Republic of Lithuania was particularly serious.

f. The attitudes and circumstances described above made the operation of an effective guard force and conservation program very difficult. The problem is not appreciably different today under Soviet rule, although the primary need is now for fuel wood. The attitude of the peasants toward the forests has its roots in an ancient religious principle; that God gave what he created to all men. If a forest owner considered his property to be his alone, he was violating a law of God, because growing timber belonged to all men. This belief held true on a larger scale as applied to state forests, too.

g. In 1795, the Russians organized a military guard force for the Lithuanian forests but after a short period of pacification replaced it with a peasant guard. The peasant guard force proved to be a failure and after 1832, the forest guard was hired. This force was paid with the use of 33 hectares of land and occasionally given a dwelling place. It received no money. The Russian government made it a policy to try to place guards in localities remote from their homes and to make them independent of the local populations. The local populations, on the other hand, resented this and actively and passively objected to it. In times of unrest, the guards were terrorized and their posts frequently burned. Guards recruited locally to watch their native forests generally were corrupted by this circumstance, even if they had originally been honest men. In order to get along with his neighbors and live in peace such a man had to agree to their misappropriations of wood.

h. In general, the operations of the peasants and occasional wood merchants was not too harmful to the forests. They took mainly dry, fallen timber or smaller trees. The guards sometimes allowed the peasants to take the wood suitable for fuel in order to gain their cooperation as agents who would report the theft of valuable timber. The forest areas were large, and the help of such informants was necessary to effectively guard them. Most of the fuel wood taken by the peasants was paid for in some manner; by services to the guard, contributions, or "treatments" (whiskey). This was still true from 1918-1940, if not to such a high degree as under the Czar.

i. A guard was able to retain his post as long as his cooperation with the peasants was moderate. If the peasants took or he gave too much, he soon lost his job. Frequently his own agents were his prime accusers, or if he had cooperated with only a few peasants, those who had not received any favors were apt to denounce him. In most cases of complaints, the guard was removed. When a guard was too strict in his duties he was often terrorized and his buildings or forest (if pine) burned. In times of unrest and revolution, the guards were the object of attack and were sometimes killed. As a result, when danger threatened, the guards were the first to flee, leaving forests open to exploitation. The situation, as described above, was true to some extent even up to 1940.

j. In 1869, the peasants were freed and the forest guard was hired. As of 1889, there were 19 thousand in the 30 government areas of European Russia, in charge of 4,000,000 hectares of forest. Each man guarded between 100-650 hectares, an average of 440. By way of comparison, at the same time a German forest guard was responsible for 880 hectares, an Austrian 1,670 hectares, and a Hungarian 1,350 hectares.(58) In Lithuania in 1857, one man guarded an average of 470 hectares.(59) In 1899, there were approximately 1,430 forest guards and 180 mounted guards in the forests of Lithuania. These guards were each responsible for the following average areas:

Vilno	550 hectares
Kaunas	440 "
Suvalki	660 " (60)

By 1899, the forest guard had already been abandoned in Prussia as unnecessary.

k. The income of the guards consisted of a small salary and supplements in the form of land, a dwelling (if available), fuel wood, and pasture. Before World War I, a forest guard received 60-180 rubles per year in salary. As a result of his low income, the guard was susceptible to bribery. This low income factor and the need for the guard to cooperate with the local populace and even live with it where forest dwellings were not available, made a failure of the policy of settling guards in areas away from their homes.

l. Range riders (Obyeshchiks) were hired after 1826 to supervise the forest guards. In 1837, there was approximately one range rider (400) for each forest district.(61) In 1869 there were two thousand; in 1903, 6,254; and the number continued to grow until 1915.(62) The average territory of a range rider was 42 thousand hectares, but this includes the large northern forests which were very sparsely guarded. In Lithuania, every range rider supervised approximately 500-600 hectares and 8-10 guards. The range rider reported to the forest master and handled legal details surrounding the prosecution of timber poachers. The range riders were poorly educated but usually had an elementary education and practical forestry experience. The guards were 70% illiterate, but were required to be able to recognize figures.(63) The range riders were also poorly paid. In 1900, they were paid 400 rubles a year and slightly higher supplements than the guard. They too were subject to bribery.

m. The range riders, guards, and clerks in forest district offices were appointed primarily from native populations and could be Roman Catholics. When the Russians withdrew from Lithuania, the range riders and clerks formed the skeleton of the new forestry service.

n. The Russian government's expenses for forest guard forces from 1866-1898 ranged from 300,000-2,800,000 rubles per year and from 6-94 rubles per person. In 1863, only 1% of the guard had a state dwelling.(64)

15. Forest Planning

a. An accurate knowledge of the forests is a prerequisite to any proper forest planning. In Russia, Peter I divided the industrial forests into regular annual cutting areas.(65) Ekaterina II ordered (1782) a general survey, the division of the forests into districts, the limitation of cleared lanes to a width of 40 meters, and the policy of leaving at least 30 seedlings on each hectare of cleared land.

b. Presumably the first real working plans were made in 1811-1837 and were applied in the best forests around St. Petersburg. The first plan to be published was issued in 1830 for the Ural industrial forests. In 1837, the forests of European Russia were divided into squares, quarters, etc. Regular use of working plans dates from 1842, when 16 government areas began to use them. Instructions on them were published in 1845 and 1854. The area under plan grew rapidly (1842 - 110 thousand hectares, 1843 - 165 thousand hectares, 1849 - 2,710,000 hectares). Progress stopped in 1849 because portions of the forests were given to the peasants and the foresters were busy on this task. In 1859, working plans were in use for a total of 3,130,930 hectares.(66) While the plans were being prepared, exploitation of forests outside the plans stopped and they produced no income. Simplified instructions issued in 1859 speeded up the preparation of the plans. By 1884, 18,400,000 hectares were under planned exploitation and an average of 418 thousand hectares was added annually.

c. In Poland (including Suvalki), working plan preparations were begun in 1816. By 1896, only 46,200 hectares in Poland had not been surveyed and all other areas were under working plans. The plans were generally poor until about 1890 when their quality improved.(67) By 1905, 20,000,000 hectares in Russia had working plans. In Lithuania in 1905, 32,120 hectares in Kaunas and 27,940 hectares in Vilno had not been included under working plans, but some areas of greater interest had already been surveyed twice. Average expenses for a survey were from 60-90 kopeks per hectare.

d. In the 1840s, the first working plan for the Vilno area was established in the forest district of Olkieniki and for Kaunas in the Rumsiskis area. These plans were sometimes revised more than once. For example, in Vilno the Labonora district plan was revised in 1850, 1873, and 1883; the Miedzyrzech district in 1850, 1857, and 1878; and the Olkieniki district in 1848, 1857, 1862, and 1888. In Kaunas, the Pieniany district plan was revised in 1850, 1861, and 1875.

e. By 1915, all state forests in Lithuania had working plans, many of which had been revised. The plans were the results of the efforts of the 560 (as of 1909) officials who had forest planning responsibilities in Russia.

f. A typical forest working plan provided for a survey of the forest, its division by soil type into specific areas (farmland, forest, meadow, etc.), further division of the stands according to age and type, computation of timber volume and yearly increment, and determination of cutting areas. The forests were divided into squares of varying size. In Vilno and Kaunas, these squares ranged in size from 100-450 hectares depending on the quality and density of the timber. The squares were smaller in better areas. In 1915, the average was 110 hectares. Borders of the squares were geographic features (creeks, roads, etc.) if possible, or cleared lanes wide enough for a horse cart to pass. [See end of report for availability of photograph of a typical forest lane.] Most state forests were surrounded by ditches (about three feet deep and 20-40 inches across at the bottom), and corners were marked by wooden posts (the sign of state owned property).

g. Until 1838, cutting was on a selective basis over all forest ranges. After 1838, selective cutting was confined to fixed areas marked with special signs.(68) Since 1854 cuttings have been determined by computation of timber volume and area.(69) In Lithuania cutting rates have been high:

Pine	at 160-180	years of age
Spruce	at 160-180	" " "
Aspen and alder	at 60-100	" " "(70)

The quantities cut were low and never exceeded the yearly increment, especially in Lithuania. Moreover, the state forests had a large backlog of mature timber which could be taken without harming the forest stands.

16. Conservation

a. Peter I issued the first conservation laws, those transferring the forests to admiralty control and establishing a forest administration. Penalties for cutting valuable tall timber were very severe. They were softened somewhat by Ekaterina II when she freed private forests from state control and obligations. The unrestricted cutting of the private forests and the conservative policy in the state forests tended rapidly to denude the private forests. This state of affairs lasted almost 100 years and seriously alarmed the bureaucracy and ruling classes of the Empire.(71) The deforestation caused considerable erosion and consequent choking of river beds with silt. All of these effects caused the state to intervene, and after long considerations a law to preserve the forests was proclaimed on 4 April 1888. It was the first important, firm step toward conservation. As a result, the state assumed control of the private forests. The law applied to all of European Russia except the remote northern swamps and forests. Its provisions were relatively mild. The owners (state or private) could not convert forest land to other use, and were required to follow simple working plans. All private forests were supervised and checked by the state.

b. The organization in charge of the conservation program was the Chief Administration of Forest Conservation which was subordinate to the Forest Department of the Ministry of Agriculture and State Properties. Its directives were carried out by territorial committees, by local forestry officials, and by local police officials. The territorial committees were appointed by the central government and included a president (the local governor); a leader of the local gentry; the president or a member of the circuit court; the director of the local office of the Ministry of Agriculture and State Properties and his assistant or a forestry inspector; and others as appointed in special circumstances. The committees were comparatively flexible and workable because their membership included all important local leaders of public life. They were responsible for the posting of the forests as timber or water-conservation preserves; for amending local forest regulations; for changing the status of local forest areas for other uses; for regulating cutting for conservation purposes; for approving new working plans; for naming areas to be reforested; and for prosecuting violators of the forest laws.(72) The Chief Administration annually spent 32% of its budget on the administrative expenses of the territorial committees and 25% to pay 80 forest masters and their assistants. Total expenses for a year averaged 138,785 rubles.(73)

c. The effect of the conservation policies was remarkable. They stopped disorder in the private forests, caused prices to rise, and awakened the interest of forest owners in maintaining their properties. Many of the owners began to experiment with fast growing trees (the attempts failed) and with artificial reforestation. Some of the private forest owners became excellent forest managers and began to receive some income from their property in spite of the enforced low cutting rates, lower prices, and lack of large timber. Some of them began to leave their timber for eventual cutting when maturity was reached. All in all, the private forest economy after 1888 improved very much. By 1914, almost all private forests operated correctly under working plans supervised by the central forestry administration.

d. The difficulties in guarding the forests against timber thieves were described above. The expenses of the guard force were a considerable burden on the state. The number of guards tended to rise as expenses rose. A guard force of 31,864 men cost the state 3,126,000 rubles, 27% of the total (11,536,000 rubles) expenses of the forestry program.(74) As said before, the Prussians had eliminated their guard as unnecessary, but in Lithuania the forest guard has remained even down to the present day.

e. In 1903, damages to the Russian forests were assessed as follows:

Theft or poaching	-	208,000	-	700	thousand rubles
Fire	-	4,000	-	700	" "
Other	-	39,000	-	100	" "

Ninety-six percent of the instances of damage were discovered and reported by the forest guards. The increased number of guards and the greater efficiency of the forestry service cut down the number and cost of forest damages as follows:

1866	-	11,000	cases	-	56,000,000 rubles
1882	-	193,000	"	-	7,000,000 "
1886	-	271,000	"	-	4,000,000 "
1898	-	193,000	"	-	6,000,000 "
1903	-	251,000	"	-	1,500,000 "(75)

f. Damage from forest fires in state forests averaged about 100 thousand rubles annually with an increase during periods of drought. In 1900, 4,373 fires were reported in an area of 1,200,000 hectares. They damaged 11,000,000 trees of commercial value and 7,000,000 of lesser worth. In 1901, fires burning in an area of 1,600,000 hectares destroyed 14,000,000 trees of commercial value and 20,000,000 of lesser value. The amount of damages in 1903 was estimated at 3,700,000 rubles. In 1903, 700 thousand trees were destroyed in an area of 200 thousand hectares with a loss of 500 thousand rubles, and during the period 1904-1908, annual losses averaged 441,723 rubles from fires over an area of 165 thousand hectares.

Fires in Lithuania occurred primarily in pine forests and peat logs. They were 95% the work of man.(76) Shepherds' (usually children 10-15 years old) fires and smudges (against mosquitoes) started many of them. The most serious fires, however, were set by peasants as acts of vengeance against guards. If they wished to get rid of an unpopular guard, they would repeatedly set fire to his forest. The only solution to this problem was the transfer of the guard to another area. Forest fires occurred occasionally as a by-product of war and unrest and were also sometimes set to force the sale of desirable wood. The system of selling timber from state forests was an involved procedure, but fire damaged wood could be obtained quickly and cheaply.

g. Most forest fires were ground fires. Top fires occurred in young pine stands but were rare. Most dangerous months for fire were from the end of April through May and June. Most fires occurred during daylight hours, were small and easily extinguished, but the fires set on purpose usually occurred on holidays, in dry weather, and in remote stands of valuable wood. As a result they caused great damage. The people of the area might sometimes be 5-7 kilometers from home (and the forests) attending church. In their absence the guards were unable to organize a defense force. In Vilno especially, the pine forests always bore the scars of frequent forest fires. The low density of these forests is the result of fires. The only protection against fire was their prevention by watchful guarding; matches were taken from shepherds and other forest users, smoking was prohibited, cut-over areas were cleared of debris, and cutting was prohibited during the summer. If a fire could not be localized, it was reported by a horseman to higher echelons of the forestry administration which would then organize a large scale fire fighting force. Fire fighting has been a duty since ancient times of the peasants who live in forest areas. The head man of the village would order out the young men (two from each dwelling) with their axes, shovels, and other tools to fight the fire.(77) In Lithuania none of the forest ranges was particularly large, so that fires could always be contained and large scale damage seldom occurred. A man could be called to fight any fire within 15 kilometers of his home.(78) He was not compensated for his efforts until recent times when he might be paid in fuel wood.

h. The Russians always allowed cattle to graze in mature or semi-mature forests but denied this access to pigs, horses, and goats. The poor quality of this pasturage was recognized but was necessitated by the low standard of living and lack of other suitable land. Even the guards and officials of the forestry administration were forced to pasture their own cattle in the forests.(79) In Lithuania, with its large population, damage to the forests from grazing was severe.

i. Damage from insects was extensive in the forests of Lithuania and European Russia. The history of this damage in particular species follows:

(1) Norway Spruce

(a) The tree is subject to attack by many harmful insects, most important of which is the Bark Beetle (Ips Typographus). It spreads very rapidly in fallen and wind damaged trees and in very old trees, and sometimes infects very large areas with resulting severe damage. In the 1880s, wind damage provided a fertile field for the bark beetle. An epidemic started in the Baltic States and spread into Russia in 1881. The hurricane of 1881 increased the danger. Removal of the debris of the hurricane from the forests was very slow and by 1889, the beetle had reached the Volga area. Damage was very great. The epidemic lasted 12 years in the Baltic States until no mature Norway Spruce remained.(80) The inefficient system of the forestry administration kept the prices of damaged wood high and thus, large quantities of usable timber spoiled in the state forests. Damage was not quite so severe in private and crown forests because they sold their damaged timber quickly at the lower prices and thus managed to save something from the ruin.

(b) In 1852 and 1853, the nun moth (Ocneria Monacha) appeared in the forests of Prussia and Poland. This nocturnal moth destroys the needles of adult spruce and usually the tree dies as a result. In 1855, the moth appeared in Suvalki, and Kaunas (Rossieny and Kaunas Counties), and very heavily in Vilno (Troki County). The cold spring and summer of 1856 stopped the epidemic, but large areas of the spruce forests had already been devastated.(81) While the nun moth is an occasional threat, the Bark Beetle (or Printer) is an annual danger to the spruce stands and kills large numbers of trees. The success of these two insects was due to the presence of large stands of pure spruce. There was no successful defense against them. Only the swift removal of diseased trees helped, and this was hindered in the state forests. The damaged timber the insects left was sold annually at prices 30%-50% below normal.

(2) Scotch Pine

(a) Most important enemy of this tree is the May Bug, an insect the size of a large acorn. The larvae live in the soil for five years during which period they damage the roots of the young pines. They thrive in large burned or cut-over pine areas. When the cutting system was changed from selective logging to the clearing of strips, danger from the May Bug increased considerably. The only defense was a change in this system. A study of harmful insects was made in Russia, but not in Lithuania.(82)

(b) Pine bark beetles (Myelophilus Peniperda and Minor) were a secondary enemy of pine trees which destroyed already weakened trees. A type of weevil (Hylobius Abietis), hurt pine seedlings by devouring their bark. To combat this pest, the bark was removed from the stumps of cut trees and the cleared areas surrounded by vertical ditches.

j. The most prevalent fungus in the forests was the honey mushroom (Agaricus Melleus). It harms older stands extensively, particularly where the forest is used excessively as pasture. The Rhizomorphus of the fungi infects the tree and spreads between the bark and the wood. The mushroom itself appears in autumn. No defense against this pest was practiced because the use of pasturage was legal and the selective cutting of weakened or diseased trees was not applied. Fungi of the lower orders are very common in Russian and Lithuanian forests, particularly in old, diseased, or damaged trees. Birch and aspen suffer from common white rot and its typical sponge-like growth on their trunks. Aspen grown from sprouts is particularly susceptible to this rot and suffers annual high losses. Types of red rot attack old spruce trees, alders, and old oak trees. In Lithunia, during the period 1918-40, 60% of the oaks 150-200 years old, were infected with rot. There was no plan to combat it at that time.

k. Insect and fungi damage was very extensive.(83) The ratio of timber killed by these pests to growing timber held steady at 1.3 and dead wood sold at a loss of 30%-40% in value.

17. Forest Exploitation (Use)(84)

a. The quantity of wood cut annually is the best yardstick for measuring the intensity of the exploitation of the forests. This figure is available in festmeters per hectare and should be compared with the annual increment in growing timber and the distribution of the forest stands according to their age in order to arrive at a fairly accurate estimate of forest use. Some representative figures follow for European Russia as a whole:

	Festmeters of Wood Cut per Hectare of Forest
1891	0.2
1897	0.3
1903	0.5

b. Russian forestry instructions governing the cutting of timber in unsurveyed forests which were not under working plans, prescribed the following cutting norms:

Forest Density	Quantity (Festmeters) per Hectare
Normal (good) stands	2.8
Moderate stands	2.1
Poor (scattered) stands	1.5

c. By way of comparison, at the same time Western European norms were:

Austria	3.25 festmeters per hectare
Germany	3.30 - 5.10 festmeters per hectare

The result of the conservative Russian policy was that its forests were used too little. The European forests were primarily young and vigorous and the Russian forests over-ripe and susceptible to disease and decay.

d. From 1890-1894, all the forests of European Russia produced 195,000,000 festmeters of wood. Of this quantity, 66.4% was cut from live timber and 33.6% was cut from dead wood. This ratio also held true in 1903.(85) From 1890-1894, the following amounts of wood were used per hectare per year in the various Lithuanian Provinces:

		Average Value
Kovno	1.12 festmeters	1.06 rubles
Vilno	1.68 "	0.33 "
Suvalki	1.12 "	1.41 " (86)

Wood production in Lithuania during two representative years was as follows:

Area	Years	Forest Area in Hectares	Wood Production F.M. From Total Area in F.M.	Wood Production F.M. From 1 Hectare	Net Income Rubles Total	Net Income From 1 Hect. in Rubles	Net Aver. Price 1 F.M. Rubles
Kaunas	1878(87)	191,840	143,850	0.75	123,267	64.25	0.85
	1911(88)	156,860	898,175	6.30*	783,005	500	0.80
Vilno	1878	313,404	188,042	0.60	110,802	35.4	0.59
	1911	283,317	1,268,883	4.70*	1,512,689	590	1.20
Suvalki	1878	334,630	100,390	0.30	60,300	18.0	0.60
	1911	219,447	604,933	2.70*	1,620,784	740.0	2.60

*The heavy cuttings in 1911 point to a concerted drive to cut surplus and over-ripe timber especially in Vilno.

e. From 1866-98, the state forests of the Vilno and Kaunas areas annually produced on an average, 1.10 fest meters of wood per hectare and the Suvalki area two fest meters per hectare.(89) Eighty percent of this quantity was ordinarily prepared for sale, indicating that the supply was more than sufficient to satisfy the demand. The stock available for purchase included the timber earmarked for cutting plus the uncut surplus stock from previous years. In European Russia in 1903, for example, 184,000,000 fest meters of wood were available for sale, of which 100,000,000 was newly designated for cutting and the balance remained uncut from previous years. Forty-two percent of the new stock and 19% of the rest were actually sold.

f. In 1903, Lithuania and Poland used the clear cutting system. The only trees cut selectively were the dead ones. The right to cut these on areas of not less than one square (100 hectares) was sold to agents and merchants. In 1867 and 1878, wood production in European Russia was consumed as follows:

	1867	1878
Peasants on state farms	49%	8%
State requirements	4%	15%
Private interests	47%	77%
	100%	100%(90)

The decrease in the peasants' use of wood is explained by the fact that they were awarded their freedom and lost the right to use the wood of the state forests. In 1878, they had to purchase the wood they used. The 1878 figures are fairly typical and remained about the same until World War I.

g. The 184,000,000 fest meters of wood available for sale in 1903 in European Russia were valued at 49,800,000 rubles (43,000,000 rubles for the 100,000,000 fest meters of freshly designated wood and 6,800,000 for the stock remaining from earlier years). The sale price was set at 60,700,000 rubles (53,200,000 rubles for the fresh stock).(91) The average rise in value (bid over the official price) of the wood at the auctions was 22%. In 1867, it reached 45% and in 1874, 36%. The increase in the bids over the official price is explained by the rising demand, falling production, and rising price.

h. In 1907, the state forests of European Russia produced 56,700,000 fest meters of wood valued at 60,000,000 rubles.(92) In 1913, they produced 88,800,000 fest meters valued at 96,400,000 rubles. Production and forest income steadily increased during the period.

18. Reforestation

a. The first steps toward encouraging natural reforestation were taken in the Polish Kingdom in the 17th Century when grazing in royal hunting forests was restricted in order to stimulate growth in cut-over and burned areas.(93) The first steps were taken in Russia in 1786, with a proposal for clearing strips on the lee sides of the forests not over 40 meters wide, and leaving 20-30 seedlings on each hectare for reforestation purposes.(94) Conditions for natural reforestation in Lithuania and the northern portion of Poland are generally favorable and areas selectively logged reforest quickly.(95) On cleared strips, the natural process was badly retarded. The cleared strip type of logging was introduced in 1840.(96)

b. According to statistics of 1883, during the period from 1862-1882 successful (70% of the primary trees replaced) natural reforestation followed strip logging operations in 25% of the evergreen and 8% of the deciduous forests (a total of 91,576 hectares), located in 242 forest districts in 27 government areas.(97) "Sufficient" reforestation (40-70% of the primary trees replaced) occurred in 11% of the evergreen and 11% of the deciduous forests. "Unsatisfactory" reforestation (10-40% of the primary trees replaced) occurred in 12% of the evergreen and 11% of the deciduous forests. The hardwood deciduous trees reforested only 3% of the primary trees, the soft woods replaced 11%, and no reforestation at all occurred in 8% of the cases. Reforestation of deciduous trees fell into the "unsatisfactory" category as high as 43% of the time. A particularly bad situation existed under the Kingdom of Poland, since annual cutting exceeded the reforestation rate by five times.

c. The initial reforestation period did not exceed 12 years (i.e. within 12 years after an area was cleared it had achieved a sufficient ground cover of new trees mainly of the soft deciduous type).(98) Natural reforestation supplied 93% of the new growth during the period (1862-1882) and cultivated plantings the rest. Total new growth averaged 165 thousand hectares per year during this period. The system of clear strip logging led to large areas of reforestation and vacant areas as well. In 1898, in central and southern Russia and in Poland there were 200 thousand hectares of unreforested land (mainly in the pine forests).

d. In Lithuania, the clear cutting method has been the primary logging operation since 1900, and therefore, reforested areas are largely of the soft deciduous type. The final reforestation of an area with its predominant trees usually began 10 years or more after cutting. The desire of the forestry administration was to achieve a natural reforestation of an area with the same type of trees which had been cut down. The most desired trees were spruce, pine, and oak.

Birch, aspen, alder, and other soft woods were not important until 1922, when they began to be used in the production of veneers. The forestry administration stimulated natural reforestation by leaving 30-50 seedling trees per hectare, prohibiting grazing in the cut-over strips and in parallel zones double the height of the predominant trees in the area. In 1870, the German system was introduced of using the cut-over areas as beds to raise seedlings for 1-3 years.(99) In Germany, the person using cut-over strips as farmland was required to plant the desired trees with his crops. In Lithuania the same system was in use, but the peasants disliked using the rich forest land for crops because of the difficulty in removing stumps and keeping down sprouts. Growing trees from seeds was abandoned on the light, sandy soils because of the danger of wind erosion.

e. The changeover from selective cutting (helpful to natural reforestation) to the cleared strip process resulted in the growth of soft deciduous trees of lesser value in the cleared areas, and delayed by 10 or more years the regrowth of the original and more valuable tree types.(100) Furthermore, large areas did not reforest at all. There is no indication that any artificial reforestation took place in Lithuania prior to 1795. Wealthy land holders did plant large numbers of foreign trees and plants (including entire parks of these) on their estates, but only for decorative purposes. The presence of these plants, however, offers an opportunity to study their adaptability to the Lithuanian climate and the advisability of trying to grow them commercially on a large scale.

f. The Russian forestry administration was interested in protecting the most valuable trees (oak and pine). Where soil conditions were suitable, oak trees were introduced. Soil condition was the main factor affecting tree growth whether in natural or artificial reforestation. The black poplar (Populus Negra) with its characteristic rapid growth, was introduced from eastern Russia, mainly for landscaping purposes around military construction (Alytus, Kaunas, and other areas). Another tree brought into Lithuania was the Sheluga (Salix Acutifolia), a type of willow which grew in the continental climate where the Volga runs into the Caspian. The Sheluga was valuable in preventing wind erosion in the sandy areas along the Baltic Sea and in the Vilno area which has large areas of sandy soil. While conditions were good for the growth of the black poplar and Caspian willow, their seed regeneration was very bad, if not a complete failure.

g. The Italian poplar (Populus Pyramidalis) was introduced for urban landscaping. Land owners brought in valuable fruit trees from foreign lands. Peaches, apricots, grapes, and even palm trees grew in their green houses. Horticulture reached a high level in the last years of Polish control over Lithuania and continued under the Czars. After 1888, when the new conservation laws made wood scarce, prices rose and private forest owners began to experiment with fast growing foreign trees. As a result, private forests in Lithuania contain entire areas of the North American Jack Pine (Pinus Banksiana); the Austrian Black Pine (Pinus Nigra);

The French Maritime Pine (Pinus Maritima); the Polish larch (Larix Polonica); the Siberian larch (Larix Siberica); and the German European larch (Larix Europea). These plantings did not exceed 5-10 hectares each and were in the research stage. Soviet scientists continue to study them and propose to plant some of them widely in Soviet Lithuania.(101) In addition to the above, many shrubs were introduced but only for landscaping purposes.

h. While natural reforestation was most important in the state forests, Russian forestry has an old tradition of artificial reforestation to prevent erosion. Russia has large areas of shifting, sandy soils, eroding gullies, and treeless steppes, and Russian foresters have long used trees to control these areas. The first steps in this program were taken around Astrakhan and the sea of Azov where oak trees were planted. In 1786, private land owners were given financial support to induce reforestation of the steppes. Czar Paul I (1796-1801) established a special "Practical School of Forestry" whose graduates were appointed as silviculturists and assigned to reforestation programs.

i. In 1830, a program was begun to control the shifting sands on the Baltic coast between Palanga (Lithuania) and Ventspils (Vindava) in Latvia. Three thousand rubles were allotted for this purpose. Steps were taken to settle the area and anyone willing to move there received 150 rubles and enough wood to construct the necessary buildings. From 1835-1860, 4,134 hectares of land were reforested although not entirely successfully. In 1870, a new program was initiated to reforest the dunes around Ventspils. The predominant trees planted in this area were the Sheluga (Caspian Willow) and scotch pine.(102)

j. Russian forestry paid the most attention to the reforestation of the southern steppes. Most scientific manpower and financial resources were concentrated in this area. Entire new forest districts of planted trees (primarily oaks) arose in areas such as Veliki-Anadol and Berdyansk. Research developed in the area on the reforestation of arid regions and the work carried on served as a practical school for many famous Russian soil and forestry scientists including Morosov, Dokuchajev, Glinka, and others.

k. In the forests proper, artificial reforestation has really been applied only since the end of the 19th Century. From 1861-1892 natural reforestation was the popular way to replenish a cut-over area. In 1899, artificial planting began to be used.(103) At that time, a certain portion of the money collected from wood sales began to be set aside for reforestation expenses. The forestry authority thereafter used the money for this purpose. In 1890, only 77 thousand hectares of land in European Russia had been cultivated and seeded for artificial reforestation. In 1894, only 72 thousand hectares were under cultivation. From 1890-1893, eight thousand hectares were replanted, which means that 13 thousand hectares had been lost. Of the 72 thousand hectares

in 1894, 42 thousand (evergreen 22 thousand and deciduous 20 thousand) had been planted and 30 thousand (evergreen 13 thousand and deciduous 17 thousand) seeded. From 1894-1898, an additional area of only 24 thousand hectares was planted or seeded but after 1899, the cultivated area grew rapidly as the deposits for this purpose accumulated. From 1899-1905 the following measures were accomplished:

(1) Support of natural reforestation in eight thousand hectares by means of soil cultivation;

(2) Cultivation of trees on 120 thousand hectares of new land;

(3) Budget appropriation for reforestation measures on a total of 218 thousand hectares, including areas where earlier planting and seeding had failed.

1. In 1899, a total of 121 hectares were under cultivation. By 1903, this had risen to 330 thousand hectares. The following budgeted amounts were set aside for reforestation:

Average Annual Budget	100,000-200,000 rubles

Annual Deposits Received from Collections	
1899	60,000 rubles
1900	300,000 "
1901	1,000,000 "
1902	1,700,000 "
1903	2,500,000 "
1904	3,200,000 "
1905	3,900,000 " (104)

As a result of these appropriations, the following land areas were replanted or seeded:

1899	100 hectares
1900	2,000 "
1901	10,000 "
1902	17,000 "
1903	29,000 "
1904	43,000 "
1905	48,000 "

From 1908-1915, 440 thousand hectares were planted or seeded. For this purpose the following sums were expended:

1908	1,062,042 rubles
1909	1,202,739 "
1910	1,404,644 "
1911	1,661,694 "
1912	1,844,043 "
1913	2,419,736 "
1914	2,339,849 "
1915	2,420,000 " (105)

World War I put an end to the increasing reforestation program.

m. Until 1899, the following areas had been artificially reforested in Lithuania:

Kaunas

Kaunas forestry district	140 hectares
Telshe forestry district	122 "

Vilno

Sventsiany forestry district	206 hectares
Troki forestry district	165 "

Suvalki

Gryshkabuda forestry district	60 hectares
TOTAL	693 "

When compared to the Russian total of 707,619 hectares artificially reforested by 1899, it can be seen that the program in Lithuania had been relatively neglected. Natural reforestation was still the most important at this time.

n. While the deposits for reforestation purposes accumulated rapidly the forestry administration was not staffed sufficiently to use them all.(106) In Lithuania, these deposits accumulated as follows:

Vilno	17 rubles per hectare (cut-over)
Kaunas	18 " " " " "
Suvalki	14 " " " " "

(107)

In 1905, deposits made in all European Russia totaled an average of 0.02 rubles per hectare of pure forest land. Excluding the northern forests, the average was 0.07 rubles. For Lithuania these figures were:

Vilno	0.14 rubles per hectare of forest
Kaunas	0.14 " " " " "
Suvalki	0.08 " " " " "

At the same time expenses for reforestation per hectare of forest land in Western Europe averaged 0.45-0.73 rubles.(108) After 1899, the deposits were transferred to the general budget, and appropriations for reforestation increased.(109)

o. In general, the average outlay for the reforestation procedure was as follows:

Cost of planting or seeding	5.5 rubles
Additional expenses (personnel)	9.0 "
Care and supplementary reforestation	1.8 "
Total per hectare	16.3 "

An expenditure of 18 rubles per hectare was not sufficient and if less was spent, the work was badly done. In Vilno, the deposits accruing from one hectare averaged 14 rubles but only five rubles were spent in reforestation (as of 1905) and the effort suffered.(110) The forestry administration left few reforested areas in Lithuania and those which were established were not cared for. By 1918, they had largely disappeared or had been taken over by successive growth.

p. The following techniques were used in artificial reforestation:

(1) Seeding in connection with the primary agricultural crop of the area. This was rarely used;

(2) Collection of evergreen cones for seed (done by peasants for compensation). The cones were dried in seed-making establishments which were usually located in block houses. Each of these ordinarily had two drums covered with wire net. Cones were put in and taken out from an opening on the top. The drums were located high, close to the ceiling and could be rotated. The husking house was heated by a stove range to about 100°F and after the cones dried and opened, the seed fell to the floor and was swept up. The guard was required, as part of its duty, to collect the cones, dry them in their own clay ovens, thrash the open cones, and deliver 1-2 lbs of the seed to the forest master before the spring work began in the forests. The seeds were stored in glass or clay containers until they were used.

(3) The guard had another duty; to collect acorns (50 kg) for seed. The peasants also made these collections to earn money. The acorns were gathered after the first autumnal frosts and stored buried in the earth.

(4) Soil was prepared for planting in the fall by youths who were paid 20-30 kopeks a day. The soil was broken by mattocks, shovels, or plows and the sod removed. The seed was sown in early spring, each individual seed in a cultivated plot, 0.5 meters x 0.5 meters.

(5) Each forestry district maintained its own nursery. When the trees were one to two years old they were planted. Planting and seeding always took place in spring; an unfortunate time, because Lithuanian springs are very short and the peasants were eager to work on their own crops. Frequently, by the time they were willing to do forestry work, it was too late to plant or seed. This accounted for the lack of vitality of many of the young trees, and the problem is still present in Lithuania. Acorns grew best because they were seeded in deep holes probed by sharp sticks. Trespassing on the planted and seeded areas was not allowed, either by cattle or humans, but peasant children frequently invaded these areas in search of berries and hazelnuts which grew in abundance. The planted areas were protected by ditches (to combat weevils) and occasionally by crude stave or lath fences.

q. Each forestry district contained at least one husking house. Production was ordinarily low but sufficient to fulfill the limited needs of the district until artificial reforestation became more important after 1900. From 1908-1915, however, 274 new husking houses were opened in European Russia. Attractive premiums were offered for persons who achieved best results in seed production, planting, and reforestation, and a large step forward was taken in general production and efficiency. Nursery areas were steadily increased. In 1908, there were only 850 hectares in European Russia but in 1914, there were 1,060. In Lithuania, a number of small nurseries were established in the forests.

r. The amount of care extended to growing stands was only incidental until 1898. Thinning and clearing was begun in all state forests of European Russia from 1888-1893, on an annual average of 4,500 hectares, but it should have been done on at least 330 thousand hectares yearly. The area increased sporadically as follows:

1896	17,600 hectares
1897	42,000 "
1898	56,000 "
1899	80,000 "
1900	77,000 "
1901	80,000 "
1902	75,000 "
1903	83,000 "
1904	66,000 "
1905	95,000 "

s. Since there were 127,000,000 hectares of state forest in 1904, this effort was inadequate. Thinning the forests could only be applied in the most valuable areas where demand was highest and supply most inadequate. In such forests, the expenditures for thinning were returned with a profit. Thinning and clearing were applied as follows:

Year	Number of Hectares	Rubles Spent	Taxation Value	Sale Value
1902	75,000	161,000	503,000	891,000
1903	83,000	195,000	556,000	958,000
1904	66,000	191,000	518,000	876,000
1905	95,000	239,000	614,000	877,000

t. The greatest effort in thinning, clearing and nursery development was put forth from 1908-1914, over an area of 820 thousand hectares.(111) There was little loss in clearing the forests because a great deal of it was lost anyway (in Lithuania from 1918-1940, the average loss was 500 thousand fest meters per year).(112) In Lithuania, thinning was carried on in the forests of lesser value and density but not in the more valuable forests. There are no statistics available on the work, but the evidence in the Lithuanian forests indicates that it was very limited.

19. Other Forest Income

a. In addition to their exploitation for wood products, the forests had auxiliary uses as meadowland and farming areas. The meadow and farming areas were allotted to the guard or forestry personnel as part of their compensation, or rented to peasants. The peasants could take forest litter (for fuel), sand and clay; dig holes to store their potatoes over the winter; graze their stack and collect hazelnuts, berries, and mushrooms. All these minor uses provided but little income to the state, but the rental of farm land and mills was more lucrative. In 1903, the forests of European Russia had 21,472 rental areas or facilities with an area of 20,000,000 hectares providing an average annual income of 1,100,000 rubles. Comparative income from one hectare of forest and one hectare used for an auxiliary purpose was as follows:

	Forest Income Per Hectare Rubles	Auxiliary Income Per Hectare Rubles
1866	0.67	0.07
1875	1.20	0.13
1893	0.97	0.18

b. In some areas, forest land produced less income than auxiliary land did. In the Warsaw area in 1893, pure forest land produced an income of 2.20 rubles per hectare per year while auxiliary areas produced 8.10 rubles per year. This was the result of relative over-population. The ratio in the Grodno area at the same time was 1: 2.2 rubles and in Lithuania it was approximately the same [author's estimate]. The income from such minor items as berries, grazing, hunting, and fishing was 30 thousand rubles in 1866; 100 thousand rubles in 1870; 300 thousand rubles in 1880; 500 thousand in 1890; and 1,100,000 in 1903.

20. Prices, Profits and the Sale of Wood

a. The first official price for wood was set in 1799 and was subsequently changed in 1804, 1805, and 1807.(113) An entirely new price system was established in 1810. Prices were determined according to the type of tree, quality of the wood, and distance of the forest from a "floating" river. After 1826, prices were set by the territorial bureaus and generally were not in tune with market prices. After 1838, market prices and transportation and felling expenses were taken into account in the determination of price. In 1883, limited instructions were issued on how to compose a price schedule so that the price schedules of various areas would to some degree correspond.

b. Wood was generally sold "at the stump". The buyer took the responsibility of transporting the tree from the forest. Until 1845, wood was sold at the set price because demand in European Russia was low.

After 1847, demand was high everywhere, including Lithuania, and sales by auction began to increase. After 1860, most sales were by auction and after 1869, other types of sale were rare. Following 1869, the territorial forest bureaus were in charge of all sales from state forests. In 1851, peasants on state property were allowed term payments on their wood purchases and after 1881, they could offer their neighbors' guarantees to secure their purchases. Three types of sale were used throughout European Russia:

(1) Privilege sales - at or below set prices to churches, public schools, etc.

(2) Free sales - for state enterprises (bridges, etc.), or to peasants in disaster areas for reconstruction purposes.

(3) Auctions - regular open auctions in which merchants participated, and closed auctions only for the peasants.

c. In 1903, 57,300,000 fest meters of wood were available for sale. Two thousand, nine hundred fest meters were sold at Privilege Sales for 500 thousand rubles (actual value 1,200,000 rubles). An equal quantity of the same valuation was distributed under the Free Sale arrangement and the balance was sold at auction. In 1901, the practice was begun of holding auctions in the forests for the peasants. In that year, 400 thousand trees worth 531,026 rubles were sold to 37,700 persons (an average of nine trees and 14 rubles per person). The prices paid were 36% below the established price structure. The peasantry (26,729 persons) bought, at sales other than auctions, trees worth 1,581,456 rubles (17% above the set price), an average of 56 rubles per person. The average purchase by value per person in Lithuania was 162 rubles in Vilno and 99 in Kaunas. The figures show purchases above the peasants' budgets, indicating resale to wood merchants. The same situation existed in Lithuania from 1918-40. The best timber purchased at the closed peasant auctions was resold to the merchants. This was an abuse of a system which had been established to help the peasant buy without merchant competition.

d. Purchase prices were as much as 45% higher than the established price schedule from 1867-1874 and 36% higher from 1875-1882. In general, the discrepancy tended to decline. Timber to be offered for sale was figured in value by counting individual trees, or by counting the number of trees in a small plot of a certain size and multiplying this number by the number of such plots to be cut.

On clear cut strips, the Lithuanian system used a plot 20 x 20 meters in size. Deadwood was sold in squares of 110 hectares. The peasant was unable to purchase rights to this large a tract, and as a result the forest income dropped. Smaller units were impossible to service because of the limited size of the forestry administration. Not until the late 1890s were any used, and then only in areas of heavy wood consumption (including Lithuania) where forestry districts were growing smaller.

21. Expenditures

a. Artificial reforestation, care of young forest stands, and particularly the systematic ordering of the forests (working plan system) used up most of the funds budgeted for the forestry program. Other commitments (housing for personnel, improvements in transportation, swamp drainage, bridge repair, etc) were allotted a very small share of the budget. From 1866-1887, in all of European Russia, only the following limited construction and repair was accomplished:

Drainage ditches - 10,000 km
Boundary ditches - 11,000 km
Forest road repairs - 7,430 km
Wooden bridges constructed - 1,391
Boundary sign posts erected - 105,328(114)

Expenditures rose sharply prior to 1910 and remained high until World War I. Huge sums were appropriated to establish new working plans (especially in Asiatic Russia), increase artificial reforestation programs, and to improve the carrying capacity of forest roads and rivers. Funds for the latter purpose grew steadily after 1907.(115) In that year, 65 thousand rubles were appropriated for all of European Russia. In 1908, the sum grew to 190 thousand rubles and by 1915, it reached 950 thousand rubles. Plans for improvements from 1912-16 called for:

(1) Improvement of 44 thousand kilometers of forest road at a cost of 4,200,000 rubles.

(2) Construction of 18 thousand kilometers of new roads (graveled and ditched on both sides) at a cost of 4,300,000 rubles.

(3) Improvement of rivers to make them suitable for timber floating - 2,800,000 rubles.

(4) Construction of new canal locks, ports, etc - 200 thousand rubles. World War I limited the construction which had begun on this program in 1912.

b. The improvements scheduled for 1912-16 were not begun. A special policy for transportation routes near the Prussian border was initiated by the Russian government.(116) It purposely did not care for the roads (except for the strategic highway network) because of the threats of war with Germany. There is no indication of any road improvements in Suvalki, Vilno, or Kovno. Some locks were built on the Zheimiana River and many forest dwellings were constructed. More than 50% of the forest guards and 100% of the forest masters had state owned homes.

22. Income and Expenses

a. At the beginning of the 19th Century the income from state forests was negligible. The forest density was relatively high, the population density was relatively low, and the demand for wood was slight. Income from state forests grew steadily however, as did the expenses of maintaining them:

Date	Income		Expenses
1805	283,930	rubles	99,940
1825	541,456	"	220,000
1831-36 (aver. annual)	598,280	"	?
1837-43 (" ")	898,679	"	?
1847	1,315,687	"	?
1867	4,739,882	"	1,971,985
1868-78 (" ")	8,900,000	"	4,400,000
1886	13,200,000	"	7,200,000
1897	24,000,000	"	6,600,000
1903	63,100,000	"	11,800,000
1907	59,982,000	"	?
1910	74,976,499	"	?
1913	96,350,330	"	?

b. The following conditions were in effect in the Western portion of European Russia, including Lithuania, the Lake Region, and the Baltic Provinces, but excluding Suvalki:

Forests (Total Area in Hectares)	State Forest Area (in Hectares) Per Person	Total Forest Income 1866-77	Total Forest Income 1878-87	% of Increase	Total Forest Income 1888-97	% of Increase	%
7,260,000	0.55	14,500,000 rubles	24,800,000 rubles	71%	41,900,000 rubles	69%	? (117)

In Grodno and Suvalki in 1903, income from a single hectare of forest averaged 6.60 rubles. By way of comparison, income in Prussia averaged 32 marks, Bavaria 44 marks, and Saxony 72 marks (1 ruble = approximately 2 marks).(118)

c. In 1902, the state forest budget for European Russia was set up as follows:

(1) Income

Rentals (farmland, fishing rights, etc)	1,222,321	rubles
Wood Sales	58,000,000	"
Minor Uses (Pasturage, hunting, etc.)	962,300	"
Fines	525,000	"
Other	98,087	"
Total	60,807,708	"

(2) Expenses

Salaries for central administration	626,386	rubles	
Salaries for territorial administration	6,092,877	"	
Forestry colleges and schools	306,057	"	
Forestry projects (working plans, reforestation, etc)	2,942,393	"	(119)
Construction	490,000	"	
Other	1,077,843	"	
Total	11,535,556	"	

The profit from the forests in 1902 was 49,272,152 rubles. By 1913, income and expenses had both increased 50% above 1902.

23. Forestry in the Private Forests

a. About 70% of the forest area in Lithuania was in the hands of private owners (the gentry), so this area was very important in the forest economy. The gentry owned a total of 46,600,000 hectares of forest in European Russia during the period 1881-1887. About 66% of this area was regular forest and the balance was covered by brush and undergrowth. The gentry owned forests in Lithuania (Kaunas, Vilno and Suvalki) at this time totalled 1,785,300 hectares of which 1,357,400 hectares were regular forest and the rest (427,900 hectares) was brush or thinly forested pasture and meadowland.(120) After the liberation of the serfs and the subsequent increase in prices, the need of the gentry for money was such that they cut their forests heavily, particularly in Lithuania and Poland. Since the supply of wood from the state forests was then low, the heavy cutting and other factors such as fire and theft caused grave damage to the private forests. In the Novgorod area, private forests were so devastated that there was little possibility of restoring them.(121) As a result of the damage caused, the Forest Conservation Laws of 1888 were passed, but by this time most private forests were already badly damaged. Good timber could only be found in thinly populated, remote areas far from good transportation. The 1888 laws halted the overcutting, established working plans, and applied the principle of sustained yield. Prices rose sharply as the supply of wood dwindled and this gave an added incentive to the owners to maintain and improve their forests. In 1906, the law applied to over 38,000,000 hectares of forest divided into 67,677 separate forest ranges. Working plans were in use on 12,000,000 hectares (31%) and 27,431 ranges (41%). In most government areas, at least 50% of the private forests were managed under working plans.

b. The state forestry administration advised the private owners and aided them with reforestation by selling seedlings and seed cheaply, and by granting premiums for good results. Every area had private forests which were properly managed. Proper guard systems were established, forest rangers were employed, and cutting rates like those in state forests were applied (oaks 180 years, evergreens 120 years, and softwoods 60-80 years). Some owners set up husking houses (for seed), established nurseries, and employed thinning in their stands. By 1914, about 20 years after the law had been applied in Lithuania, ripe stands began to appear in the private forests of the country which could be sold for good money, but the production of the private forests remained far below that of the state forests.

c. The demand for planting material and seeds became so great that the state forestry service could not meet them. Private forest guards had the same duties and rights as state forest guards. Newly seeded or planted areas were exempted from taxation for 30 years and long, cheap credit was given for new planting materials.

An autonomous institution, Zemstvo, established in 1840 to support the Russian economy, aided very much in the reforestation drive. Its offices existed only in Russian populated areas however, and not in Lithuania or the Polish Kingdom.

24. Management of the Peasant Forests

The forests of the former serfs were supervised from 1802-1873 by a special institution which regulated the life of the peasants. Those forests located in Russia proper got some supervision from Russian forestry officials. In 1873, a special law allotted certain forest areas to the peasants; in European Russia a total of 16,500,000 hectares of former state forest land. The peasants in Lithuania received 84,700 hectares at this time, of which 18,700 hectares were regular forest and the rest (66 thousand hectares) brush and undergrowth to be used for agricultural purposes. These forests were soon exhausted and their timber sold, sometimes very cheaply. By 1888, they were completely devastated. A few, particularly those in areas of shifting sands, were put under supervision for reforestation but most were not affected by the law of 1888.(122)

25. Conclusion

While forestry in Russia proper, especially in Asiatic Russia and the northern portions of European Russia, was extensive, it was comparatively intensive and well organized in Lithuania. Even private forests (excluding peasant forests) were on a proper, if not highly productive, basis after 1888, and were steadily improving. The total production and value of wood steadily increased and a real hope for future progress existed. The Russians left to their successors (the German Army) in Lithuania, some well ordered forest stands, especially in the state forests, with a high percentage of ripe and mature trees.

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F O O T N O T E S

PART II, CHAPTER I, PARAGRAPH B

(1) The name, Province of Lithuania, here applies to the three government areas of Vilno, Kaunas, and Suvalki which were entirely (Kaunas) or partially (Vilno, Suvalki) included in the later Republic of Lithuania (1918-39).

(2) Afanasyev, "Kovenskaya Gubernia", 1861, p 22

(3) "Lietuvos Misky Departmento Metrastis", 1937, p 9 (hereafter LMDM)

(4) Welhorski, W L, "Polska a Litwa", 1947, p 69-101

(5) Surozh, 1908

(6) Ibid, II, p 148

(7) Buchholz, E, "Die Wald u Holzwirtschaft des Ostraumes", 1943, p 66-69

(8) Klimas, "Lietuvos Zemes Valdymas", 1918, p 41

(9) Buchholz, p 71

(10) Nekhoroshev, 1916, "Lesnoyedelo pr' Krivosheine", p 8-12

(11) Surozh, I, 103, Desiatina - were converted into hectares as follows -- 1 Desiatina = 1.1 hectares (actual value 1.09)

(12) State or national forests were administered by the Ministry of Agriculture and State Properties. Crown forests, maintained to support the royal family, were administered by special institution.

(13) Surozh, III/6

(14) "Statistikos Zinios Apie Lietuva iki, 1914", p 85, 96

(15) Surozh, p I/106

(16) Ibid

(17) "Statistikos, Zinios Apie Lietuva iki, 1914"

(18) Assuming that the average production in fest meters per hectare was 3.5 -- author

(19) Afanasyev, 1861, p 391

(20) Surozh, I/115

(21) Ibid, II/12

(22) Ibid, 131-142

(23) There is an unexplained discrepancy between the figures given for Vilno in this table and those given earlier of 43,400 hectares -- author

(24) Surozh, 143-144

(25) Ibid, 1908, I/143

(26) "Statisticheskii atlas Verekha", 1878

(27) author's opinion

(28) Surozh, 1908, p 144

(29) Ibid, p 144-145

(30) "Neudammer Forstliches Lehrbuch", Vol 4, 1955, p 654

(31) "Miskininku Kalendorius", 1940, Augumo Lenteles, p 31

(32) Surozh, 1908, II/148

(33) "Miskininku Kalendorius", 1940

(34) Figures taken from Russian sources -- author

(35) Surozh, II/149

(36) Ibid, II/150

(37) Ibid, II/154

(38) Ustav Lesnoi, 1910, Vol 2, p 817-819

(39) A territory was composed of a varying number of government areas which made up a unified whole of one sort or another. For example, the Lithuanian Province was a special economic unit.

(40) Surozh, 1908, II/17

(41) Nekhorushev, 1916, p 20

(42) Koreiva, "Vilenskaya Gubernia", 1861
Afanasyev, 1861

(43) Surozh, II/165

(44) Surozh, 1908, II/153

(45) Ibid, II/170

(46) Ibid, II/143

(47) Ibidem, II/144

(48) Ibid

(49) Nekhoroshev, "Lesnoie Delo", 1916, 21-22

(50) Ibid, p 15

(51) "Lietuvos Statistika", 1914

(52) Buchholz, 1943, p 72

(53) Nekhoroshev, 1916, p 18
Surozh, II/164

(54) Nekhoroshev, 1916, p 18

(55) Surozh, I/43-57

(56) Nekhoroshev, p 46-47

(57) Koreiva, 1861, p 478

(58) Surozh, II/18, 153, 155

(59) Koreiva, p 478

(60) Surozh, III/6

(61) Ibid, II/153

(62) Ibid, III/93, II/18

(63) Ibid, II/18

(64) Ibid

(65) Ibid, II/20

(66) Ibid, I/21

(67) Ibid, II/23

(68) Ibid, II/155

(69) Ibid, II/158

(70) Ustav Lesnoi, 1910, Vol 2, p 250

(71) Surozh, 1908, II/127

(72) Ustav Lesnoi, II, 597

(73) Surozh, 1908, II/229

(74) Ibid, II/18, 87

(75) Ibid, II/48

(76) Author's opinion as a result of his experiences from 1918-40

(77) Ustav Lesnoi, 1910, I/317-318, 148-153

(78) Nekhoroshev, p 11

(79) Ustav Lesnoi, I/67

(80) Surozh, II/47

(81) Afanasyev, 1861, 254-255

(82) Nekhoroshev, 1916, 47

(83) Afanasyev, p 388

(84) Surozh, II/32

(85) Ibid, II/34

(86) Ibid

(87) "Statisticheskii Lesnoi Atlas", P Verikha and A Materna, 1878

(88) "Lietuvos Z U Statistika Pries Didigi Kara", p 96-97

(89) Surozh, II/34

(90) Ibid

(91) Ibid, II/46

(92) Nekhoroshev, p 43

(93) Ordinatsia Pashch, 1641, Vilno, 1871

(94) Surozh, II/52

(95) Matulionis, "Lietuvos Miskait Podidziogo/Kara", Visa Lietuva, 1922

(96) Surozh, II/52
(97) Ibid

(98) Ibid, II/53

(99) Ustav Lesnoi, I/125

(100) Jankauskas, M., "Maumedziai Lietuvos, TSR", 1954

(101) Ibid

(102) Surozh, II/53-54

(103) Ibid, II/55

(104) Ibid, II/155-156

(105) Nekhoroshev, p 50

(106) Surozh, II/51

(107) Ibid

(108) Ibid, II/64

(109) Nekhoroshev, 48

(110) Surozh, II/65

(111) Nekhoroshev, p 50

(112) Author's estimate
Musy Girios, 1933, p 477

(113) Surozh, II/156

(114) Ibid, II/78

(115) Nekhoroshev, 37-38

(116) Mortensen, 1926, 144

(117) Surozh, II/83

(118) Ibid

(119) Ibid, II/90 - 1,850,000 rubles were spent on state logging operations alone.

(120) Ibid, II/109-110

(121) Ibid

(122) Ibid, II/107