FOREST AND FORESTRY OF SIBERIA

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Accepted for Credit: Grade B
Siberia is an old country, but in the same time it is new one. It is still as virgin as centuries ago. Small population, severe climate in northern Siberia, and geographical isolation of it retards development of Siberia. But the country is rich; its various natural resources are enormous, and without doubt Siberia will be a leading country of the world as soon as industries will take a proper place in Siberian life.
Siberia has 5,000,000 square miles of territory; it is nearly twice the size of the United States. Siberia extends for more than 5,000 miles from west to east and about 2,300 miles from south to north. Its land frontier is equal 10,000 miles while the water one is twice that length.

Looking at any map of Siberia, we see that its geographical location isolates it from its neighbors and from the rest of the world. Arctic ice blocks the way from the north and northeast, roadless mountains close it in the southeast and again on the west, and to the south sparsely populated steppes and deserts hinder communication.

Geographically, Siberia is usually divided into four parts: western Siberia - from Ural Mountains to Yenisey River; central Siberia - from Yenisey River to the Lake Baikal; eastern Siberia - from the lake Baikal to the Stanovoy Mountains; and Far East including the rest of territories along the Pacific Coast.

Though the western Siberia is the smallest part of the entire Siberia, it is by far the more important economically, since climatic and soil conditions there are more favorable and it has a large population. Two-third of the western Siberia is a plane, extending from Ural Mountains on the west to the Yenisey River on the east, and from foothills of the Altay Mountains on the south to the Arctic Ocean on the north. As there are no mountains to check the winds from the Arctic Ocean, their icy blasts affect vegetation unfavorably. The northern part of the plane is characterized by frozen swamps through marshes with sparse forest growth which extends along
the Arctic Ocean to the Pacific Ocean, and it is called tundra. The next belt south from tundra is a region of thick primeval forest taiga which occupies the most part of Siberia from the Ural Mountains to the Pacific Coast. The third zone is forested steppe covered with grass and stands of birch; this region is in western part of Siberia south of taiga. And the fourth region of Siberia is treeless steppes which extends in its southwestern corner along the line of the Russian Turkestan.

The central and eastern Siberia is mountainous, with wide expanse of forest, and tundra along the northern coast. The Russian Far East is also mountainous, however it has fertile valleys and is characterized by the presence of hardwoods and closeness of the Pacific Ocean, i.e., to the world's market.

Climate of Siberia is typical continental. In winter time the mercury never rises above 4 degrees of F. below zero, and most of the time it hovers around 58 degrees of F. below zero. The winter lasts eight long months and only remaining four are suitable for the vegetative growth. The summers are warmer than one can expect; the temperature in the sun was registered as high as 87 to 90 degrees of F.; but the ground thaws to a depth of only two feet, below that it is forever frozen. On the way toward north this depth decreases and the vegetation gradually becomes scant and finally disappears and gives up the place for the desert of snow. Contrary to the spread idea of enormous snowfalls in Siberia, there is not much snow; the winter days are shiny throughout the entire its length, and
only in eastern part of Siberia wind prevails during winter months. Precipitation in western, central, and eastern Siberia varies slightly; it is from 12 to 14 inches; only in Far East and Kamchatka it reaches up to 20 and 40 inches. Rainfalls are usually in summer when they are fully utilized for growing period.

Comparing the mean annual temperature of the western, central, and eastern Siberia along the southern line of it, where the population is most dense and where the industrial life is most developed, as in Omsk and Blagoveshchinsk, with that of United States it be found equal to Bismark, N.D. and Duluth, Minn."

As we have found already, Siberia is isolated from the rest of world and, therefore the location of its forests is not favorable in respect to utilization. When one begins to study Siberia's development of lumber industry past or future, the country's vast area and the restriction imposed by great distances must always be kept in mind. There is a point in central Siberia that is 3,000 miles from open tidewater and such a long haul is a heavy handicap to an article so bulky and relatively low priced as wood; therefore the provision of low-cost transportation is one of the most important problem bearing on the commercial development of Siberia's forests, and the existing and projected railroad lines must be linked with the waterways of the country's forest resources if they to be ever exploited commercially.
River driving is the principal transportation in the great Siberian coniferous belt. Siberia has total 81,500 miles of water ways of which 60,000 miles are useful or there are 5.6 miles of streams and only 0.93 miles of railroads for every 386 square miles. However, only one large river, the Amur, flows from west to east into Pacific Ocean; the other three most important rivers Ob, Yenisey, and Lena - cut through the entire breadth of the country from the boundary with China on the south to the Arctic Ocean on the north. While the Arctic Ocean is frozen most of the year, this does not mean that navigation is impossible; as a matter of fact the Arctic Ocean is navigable from both directions - from west via the Kara Sea and from the east via Bering Strait - the first route has been used for centuries. Lately there has been regular sailings and also via Bering Strait to the mouth of the Kolyma River. When the northern sea route is equipped with such customary aids to marines as lighthouses, etc., it will afford low-cost transportation for the exportation of the Siberian raw materials, particularly wood, from the heart of the country to the world's markets. In Siberia the river driving is three times as cheap as the railroad transportation, and forty times as cheap as transport by roads, therefore the loading of logs at the mouth of the rivers in the Arctic Ocean on the large steamers will be the most convenient and cheap method to deliver them on market of Europe, America, China or Australia.
The system of railroads is not developed in Siberia at present time, and the country needs them now; but the railroad construction on large scale will begin only at that time when Siberia will attract capital and commence its industrial life. The most important railroad in Siberia is the Great Trans-Siberian Railway. It connects the center of Russia, Moscow, with the port of Vladivostok on the Pacific Coast, which can be open for navigation by means of icebreakers throughout the entire year. The second commercially important railroad in Siberia is the Eastern Chinese Railway which connects the eastern Siberia with the port of Vladivostok through Manchuria and which is owned by Russia. At last there are many branches from the Trans-Siberian Railway leading to different points, but usually they are short and from standpoint of exploitation of the forest have no significance. I may mention here the Central Siberian Railway, which has been just completed, and which is laid out through the steppe region of western Siberia. The other railway which also has been completed during the last two years is Turkestan Railroad which from the center of western Siberia leads to the heart of Russian Turkestan, and through other system, to the line of India, Afghanistan, Persia, Turkey, and Black Sea.

The total area of the forests of Siberia is roughly some between 786,000,000 and 2,000,000,000 acres. Productive forest land constitutes 57% of the total area - much less than in European Russia, where it is 80%, or in Caucasus,
where it is 63%. This may be explained by the influence of the severe climate in the north and to existence of vast marshes and waste land denuded by fires and not reforested.

Conifers occupy from two-thirds to three-fourths of the forest area and deciduous trees from one-fourth to one-third; one-fourth of the area is under spruce and fir and about one-half under pine, cedar, and larch.

Estimation of the forest area in Siberia varies with various authorities. According to the latest estimation this area is equal 994,000,000 acres, and of productive forest land 565,000,000 acres, or 57% of the total area under forest; this estimation gives us 227,000,000 acres under pine, 135,000,000 acres under fir and spruce, 73,000,000 under cedar and larch, and deciduous trees are occupying 130,000,000 acres.

The forest of Siberia extends practically over all its entire surface, except the tundra in the north and the steppes in the southwest. This forest, known as taiga, does not represent unbroken tracts of timber; it is intersected by innumerable streams, valleys of these streams consist of marshes or meadows with here and there a forest stand.

The most important trees in taiga are coniferous trees as pines, true firs, larches, and spruces. In western Siberia pine (Pinus sylvestris) usually occupies elevated sites; on the slopes pine grows in combination with spruce, larch, cedar (Pinus sibirica), and often birch; the spruce and cedar grow in the lowland. Pinus sylvestris has adapted
itself to the local climatic and soil requirements. Owing to the frozen and rocky subsoil, the top root, which is characteristic of this pine in European Russia, does not develop at all; crown descends lower down the trunk, then even the size of tree is smaller. Some pure pine stands cover area as large as 27,000 acres. Larch (Larix sibirica) seldom forms pure stand, but grows in combination with pine. Forests, consisting largely of spruce (Picea obovata) and cedar (Pinus sibirica) are widely distributed along Irtish and Ob Rivers. In Altay Mountains the rivers' valleys are occupied by birch, (Betula castata) poplar (Populus tremula), and occasionally lime trees; higher up in mountains only coniferous trees can be found. Very good forests were found in the valley of Yenisey River, especially along its middle course. In calcareous clayey soil with thick upper stratum of humus, larch enters into the forest stand in great number. In western Siberia the most typical stands of larch and spruce give about 3,000 cubic feet per acre; pure pine stands yield also the same amount of wood, but in mixed stands with 800 fir trees, 200 cedar trees, 10 larches and 10 birches produce 5,000 cubic feet per acre.

Due to difference in climate, soil and topography taiga can be divided into following types of forest:

1. The mixed spruce and fir forest.
2. The "black taiga" consisting of true fir, spruce and cedar with admixture of pine and birch.
3. The urmany type, that is, mixed coniferous and deciduous stands.

4. The yelany type, where larch predominates.

In the steppes of the western Siberia the isolated forests are scattered all over the total area, though occupying but a small portion of it. In central Siberia, provinces Irkutsk and Yakutsk, the composition of forest is almost the same as in western part of it. However, the larch becomes gradually predominate species, and the yield per acre is slightly smaller than that in western Siberia. Under the present conditions this region is of little importance because this vast area, remote and lacking means of transportation, is almost wholly unexplored. In the eastern Siberia and in the Russian Far East, in addition to the trees commonly found in western part of it, there are growing: Larix daurica, Betula daurica, Abies holophylla, Abies nephrolepis, Betula Ermani, Quercus grosseserata, Phellodendron amurensis - cork tree, Fraxinus manchurica, Tilia amurensis, Tilia manchurica, Demorphantus manchurica - white walnut, Ulmus montana, Ulmus macrocarpa, Acer mono, Acer tangmentosum, and a species of Jugland. Here the northern slopes usually are occupied by larch, while southern ones are under pine. The same is true for the Russian Far East in its northern part where conifers are predominated species covering slopes and valleys; approaching the south, the conifers retreat to the higher elevation, while in the
valleys and on the foothills deciduous trees outnumber the others. In Far East the most important species are cedar (Pinus manchurica), spruce, fir, larch, aspen, oak, elm, lime, and birch. Cedar does not form pure stands; it appears in combination with spruce and deciduous species. It reaches 92 feet in height and 19" in diameter at D.B.H. at the age of 200 years, and of large growth and good quality is one of the most valuable species found in the Far East for export. Spruce, pine, and fir forest with an admixture of deciduous trees attain at 200 or 250 years a volume of 1,000 cubic feet per acre. After fires or cuttings the coniferous stands are replaced here by oak on dry slopes and on wet ones by birch.

Russian Far East is a very interesting country especially region of the Ussuri River which is tributary of the Amur River. It is a country where north meets south. Here pines, firs, cedars, and Arctic birches grow beside walnuts, limes, cork oaks, dimorphous palms, and vines. The reindeer, the brown bear, and the sable live in the same forest with tiger, the boa constrictor, and the red wolf. On the waters of the lakes and on the marshes round Hanka the northern goose, swan, and duck mingle with the Australian black swan, the Indian flamingo, and Chinese heron and Mandarin ducks. A riddle or a joke of Nature? But a legend, this flower of the thought and imagination of the native, says: "When God finished the creation of the world and had put everywhere the allotted trees, bushes,
herbs, animals, birds, and reptiles, only one part of the earth remained bare and without life, the country traversed by the river Ussuri. The Spirit of the River cried in a loud voice: "'Creator, Thou hast given to all lands magnificent gifts and only this country Thou hast not favored. Be gracious and bestow upon it gifts according to Thy wisdom and mercy!"

"God heard the voice of the River Spirit and, taking from everywhere something, plants, animals, birds, reptiles, and precious stones, spread them all in the country of the Ussuri. The land bloomed at once and was full of life and numerous tribes arrived, seeking happiness and riches."

Such is the legend, and the famous naturalist Maack, who visited this country, says in his notes that from the standpoint of natural philosophy he has nothing to say against it. And the Russian explorers have since earliest times called the Ussurian country "The Pearl of the East," and they are right.

As in all other respects, so in forest ownership the "dictatorship of the proletariat" cut deeply into established property rights. All private holdings were confiscated by the law of February 4, 1918 and, in common with all other forest areas, became state property. However, in July of 1923 important concessions were made, and the peasant communities were given out right of 64,500 acres of forest. By this act the government had intention to stipulate proper management of these forests by respective communities.
and save them from stealing by peasants, however the law was ignored and the forests were devastated rapidly without regard to reproduction. Due to this fact the forests of the Russia (and of Siberia as its part) were reorganized again in 1929 and were given over the Chief Council for the State Industry—the authority which is in head of the five-year plan. Thereby the welfare of the forests and forest management, as such, is completely subordinate to the industrial program.

Professor Brutzkus, who before the Russian Revolution was one of the chief executives of the Russian Bureau of Forestry and at present is with a German University, stated at the plenary assembly of the National Forest Council of Germany: "Despite the fact that exploitation without regulation is the fact in Russia today, the area of the forests is so huge that the total growth exceeds the cut as a whole. For all Russia the annual growth is set at 15,350 million cubic feet of which 8,450 million c.f. are in Siberia. The yearly cut, under the five-year plan, is set to be 9,120 million c.f. during 1932 and 1933. The greatest loss in productivity is through peasant-stealing and forest fires. In 1926, the government admitted 34,000,000 acres were so devastated as to be practically impotective. Of course, the five-year plan provides (on paper) for management plans and reforestation, road and rail construction, but it is on paper not in field!"

Strictly speaking the timber industry of Siberia is in its very infancy. That quantity of lumber which Siberia introdu-
ces to the world market is just a fraction and very small fraction of those forest resources which can be converted into the lumber. In Siberia there are 994,000,000 acres of forest of which two-third may be successfully placed for utilization. Just in western Siberia there are alone 465,000,000 acres of the virgin forest, and eastern Siberia, while not so richly endowed, has sufficient timber to supply the world's demand for many generation to come. From the standpoint of possibilities of exploitation this region is in favor able position, being accessible to the consuming markets through the water transportation facilities as Amur River and its numerous tributaries emptying into the Pacific Ocean, as well as through railroads, since the Trans-Siberian Railroad traverses this particular corner of the Russian Far East, which is connected with Japanese and Chinese lines. The potentialities of this region are so great that even under the unfavorable conditions which existed there the lumber industry produced goods before the war to the value of $5,000,000 a year, exporting to Japan, China, and Australia.

A correct system of management of the forests and a good sales organization would reach enormous proportion in the timber output of Siberia. It has been calculated that taking fifty merchantable trees to the acre and allowing to younger to grow one hundred years (which is a term more than sufficient) the quantities of trees which will be cut per annum for the future requirements will not diminish the extent and the productiveness of the forest. Now, if we consider the
the land of Far East, which is in the valley of the Amur River system and covers an area about 2,000,000 square miles and we take only 400,000 square miles as available for timbering, allowing a maximum of forty five trees to the acre, this would give us some 11,520,000,000 trees. The time required for trees to mature as hundred years, 115,000,000 trees could be cut per annum without diminishing, with proper reforestation methods, this single part of Siberian forested land.

Vast forest resources of Siberia had never yet attracted proper attention neither for exploitation nor for the management. This can be seen from the fact that in 1914 the enormous area of State forests was divided into 187 forestry districts, comprising 1,682 forest units and patrolled by 2,084 guards. A forest district is averaged 3,000,000 acres and dacha 400,000 acres. Under these circumstances it is no wonder that so little is known of the composition and quality of Siberian forests. Forest surveying to establish types of stands, species of trees, their growth, quantity and quality of wood, etc., to organize their exploitation on a scientific basis has hardly begun. In 1914 only about one-fifth of all State forest land in Siberia had been surveyed. The total area of organized forests, i.e., surveyed, planned for cutting and reforestation and other economic measures drawn up to secure greatest financial return, is represented from 1 to 10% according to location.
Due to this administration one should not wonder that fires in Siberia are very common and extremely devastated. Nobody is surprised to observe them, much less alarmed. In a few cases, only, the fires are originated through lightning; mostly man is responsible for their appearance. Dry grass and bushes are burned, usually in springs, on meadows where it is considerable opportunity to ensure good grass in summer. Siberian natives are doing the same with taiga to prepare good meadows for wild animals upon hunting of which many of them are entirely dependent. To prepare a field within taiga it is always necessary to destroy a lot of forest and burn most of the trees. In all these cases fire often gets beyond control, becoming very disastrous, the sparse Siberian population being absolutely powerless, and the fires are spreading out hundreds and thousands of miles, are stopped only by natural agencies. Such fires being repeated from year to year, most of the new settlements in taiga are surrounded with burned out forests; this sad picture is to observed over millions of acres.

In order to give some idea of size of Siberian fires and their destructiveness I will take, foe an example, 1915 which, however, is considered in this respect to be the most severe in all history of Siberia. 1915 was especially favorable for fires thanks of absence of rainfalls. Starting during May, they were still increasing during summer, attaining the greatest intensity in August in some places already in July. The most extensive fires were in August, 52%; in
July, 31%, and 17% in June. On average during these three months there were 50 days with fires totaling about two months. The fires, according to Siberian terminology, were of "upper type" when not only grass and brushwood, but also, the trees burned. In many places peat began to burn, and here fire spread over six feet below the surface, without any possibility of being put out. Smoke development was extremely extensive, spreading widely beyond the limits of the fires covering altogether an area 2,600,000 square miles, about equal to the surface of the whole Europe. All of the middle Siberia was enveloped by smoke and very often nothing could be seen at a distance of 14 to 70 feet. It was a great drawback to the regular routine life within the region. Navigation on the rivers Ob, Tobol, Yenisey, and Lena was hardly handicapped, even the steamers were remaining idle for a while. Regular traffic on the railroads was interrupted, too, in some parts of the country, and lights in houses were used during the day time. As a result of this fire 700,000 square miles of the forest cover were burned, and damage was enormous. Indirectly this fire had great influence upon the crop of that year throughout Siberia. Presence of the smoke during the most vegetative period of the summer decreased sunshine for the plant growth. Grass and hay was covered with soot, thus acquiring a smoky smell and bitter taste, and sickness among the cattle resulted from the use of this fodder.
Russian capital is practically nonexistent. The exploitation of the Siberian forests must wait on foreign capital, which will not come until conditions in general justify such investment as safe and profitable. Even under the most favorable conditions it would take years to build transportation facilities and to introduce and develop the various economic institutions and factors needed to make available for export timber in large quantities.