Working Paper

The Forest Resources of Russia by Economic Regions

Dr. Charles A. Backman

WP-95-53
June 1995

IIASA International Institute for Applied Systems Analysis □ A-2361 Laxenburg □ Austria
Telephone: +43 2236 807 □ Fax: +43 2236 71313 □ E-Mail: info@iiasa.ac.at

The Forest Resources of Russia by Economic Regions

Dr. Charles A. Backman

WP-95-53
June 1995

International Institute for Applied Systems Analysis □ A-2361 Laxenburg □ Austria
Telephone: +43 2236 807 □ Fax: +43 2236 71313 □ E-Mail: info@iiasa.ac.at

FOREWORD

Siberia's forest sector is a topic which recently has gained considerable international interest.

IIASA, the Russian Academy of Sciences, and the Russian Federal Forest Service, in agreement with the Russian Ministry of the Environment and natural Resources, signed agreements in 1992 and 1994 to carry out a large-scale study on the Siberian forest sector. The overall objective of the study is to focus on policy options that would encourage sustainable development of the sector. The goals are to assess Siberia's forest resources, forest industries, and infrastructure; to examine the forests' economic, social, and biospheric functions; with these in mind, to identify possible pathways for their sustainable development; and to translate these pathways into policy options for Russian and international agencies.

The first phase of the study concentrated on the generation of extensive and consistent databases of the total forest sector of Siberia and Russia.

The study is now moving into its second phase, which will encompass assessment studies of the greenhouse gas balances, forest resources and forest utilization, biodiversity and landscapes, non-wood products and functions, environmental status, transportation infrastructure, forest industry and markets, and socio-economics. This report, carried out by Dr. Charles Backman, is a contribution to the analysis of the topic of forest industry and markets.

SUMMARY

Russia, accounting for almost one-quarter of the global forest resources, contains 771 million hectares of stocked forest land and 82 billion cubic meters of growing stock. While representing nearly 10 percent of the world's deciduous forest resource, some 50 percent of the coniferous stocked forest land and growing stock are concentrated within her boundaries. When the size of the tropical forest resource is excluded from the deciduous total, Russia accounts for about 20 percent of the remaining non-coniferous stocked forest land and one-third of the concomitant growing stock.

The Russian coniferous resource, accounting for more than 70 percent of the forested land and nearly 80 percent of her volume, contains 552 million hectares of stocked forest land and 64 billion cubic meters of growing stock. The deciduous resource contains 157 million hectares and 16 billion cubic meters, or approximately one-fifth of each of the total Russian stocked area and concomitant growing stock. The balance of 62 million hectares (8 percent) and 1.4 billion cubic meters (2 percent) consists of species which do not contribute a significant share of the aggregated inventory.

The forest resource of Russia is divided into a number of broad categories depending upon the designated sector for utilization. The different sectors are: (1) Forest Sector; (2) Agricultural Sector; and (3) Other Sectors. The Forest Sector category accounts for the majority of the forest resource, representing more than 90 percent of the stocked forest land and growing stock. Agricultural forest accounts for another 5 percent while Other Sectors forest contain only 2 percent of the Russian total.

The forest inventory of Russia is divided into three broad specie associations, of which one association, coniferous, dominates. Coniferous stands account for more than 70 percent of the stocked forest land and almost 80 percent of the growing stock. Deciduous stands account for one-fifth of the forest resource while other species account but for 8 percent of the forested land and 2 percent of the growing stock.

Historically, the forest resource of Russia has also been segregated according to accessibility, based upon the degree to which forests are currently, or expected to become, available within the next twenty years. Exploitable forests account for nearly 60 percent of the stocked forest, or 446 million hectares, and two-thirds of the growing stock, or 55 billion cubic meters. Reserve forests account for the balance of 325 million hectares and 27 billion cubic meters.

The forest resource of Russia is enormous, supporting an AAC estimated to be in the vacinity of 833 million cubic meters. However, slightly more than 30 percent, or 264 million cubic meters, are accounted for in reserve stands, unlikely to provide a sustainable flow of wood products within the course of the next twenty years. The balance, which amounted to 570 million cubic meters, consisted of allowable harvest which is believed supported by the exploitable resource.

The European Russian Region, which excludes West Siberia, East Siberia, and the Far East, accounts for 22 percent of the stocked forest land and 24 percent of the growing stock of Russia, or 166 million hectares and nearly 20 billion cubic meters. While containing one-fifth of Russia's coniferous growing stock and forested land, a more favourable climate and a longer history of human development translates into some two-fifths of the total Russian deciduous forested area and growing stock being sequestered in European Russia. Some 90 percent of the forested resource is believed to be available for exploitation.

While the North Economic region dominated the coniferous forest resource of European Russia, accounting for more than fifty percent of the total, three economic regions contain nearly equal shares of the deciduous resource. These three regions are

the Ural Economic region, the North Economic region, and the Central Economic region.

While accounting for almost 40 percent of the AAC supported by the exploitable forest resource of Russia, European Russia contains less than 10 percent of the AAC which is believed reserved from industrial development. Furthermore, almost 90 percent of the AAC supported by the exploitable resource is thought to be currently available with the present technology and developable sole by the forest sector. The North and Ural Economic regions account for more than one-half of the exploitable and reserve AAC of European Russia.

Asian Russia, consisting of West Siberia, East Siberia, and the Far East, contains almost 80 percent of the forested area but less than three-quarters of the growing stock of Russia. With the exception of West Siberia, coniferous forests dominate the inventory, accounting for four-fifths of the forested land in East Siberia and almost three-quarters in the Far East. If the share of the inventory of the Far East located in lesser important species is eliminated, then the coniferous forests account for almost 90 percent of the stocked area. In West Siberia, coniferous forests only account for two-thirds of the stocked land.

Virtually all of the reserve forest land is located in Asian Russia, primarily in East Siberia and the Far East. In these two regions, reserve forest account for nearly fifty percent and 60 percent respectively of the stocked forest land. In West Siberia, on the other hand, reserve forest account for less than 30 percent of the total stocked forest resource.

While accounting for three-fifths of the AAC supported by the exploitable forest resource, Asian Russia contributes less than one-half of the AAC which is believed currently available for development. West Siberia and the Far East together account for less than one-half of the currently accessible AAC of Asian Russia, while East Siberia contributes some 50 percent of the total.

Acknowledgments

This document builds on the results flowing from the Siberian Forest Study taking place at the International Institute for Applied Systems Analysis (IIASA) in Laxenburg, Austria. The study, under the general direction of Professor Sten Nilsson, includes components examining greenhouse gas balances, biodiversity, landscapes and bioproductivity, non-wood products and functions, environmental status, forest industry and markets, transportational infrastructure, and socio-economics. The present report forms part of the forest industry and market component under the direction of Dr. Charles Backman.

Much of the background research which underlies this paper would not have been possible without the help and patience of a number of people, not least of whom is my wife, Peggy Pantel. Furthermore, without the financial resources provided by Industry Canada for the IIASA study, this document would not have appeared in its present form or at this particular juncture. And finally, IIASA provided the time during, and the environment within, which to complete this report.

TABLE OF CONTENTS

LIST OF MAPS

LIST OF TABLES

The present working paper provides greater insight into the distribution of the forest resource among primary "ownership", specie groupings, and accessibility classes.[5] Following this more in-depth examination, an estimate of the degree to which the resource is physically accessible is derived.[6]

This report is divided into 3 chapters, beginning with chapter **A, Introduction.** Chapter **B, The Russian Forest Resource**, discusses at an aggregated level the forest resources of the Russian Federation. It is through this chapter that many of the concepts employed in the more detailed description following are introduced. In chapter **C**, the **Forest Resources of the Economic Regions of Russia** are reviewed in

Footnotes

[5]The present analysis relies on sources which were published by organizations existing within the governmental structure of the former Soviet Union. These sources provide some detail on, *inter alia*, the distribution of the forest resource according to site and stocking classes (area), distribution of the forest land according to stocked and non-stocked categories (area), distribution of the forested land according to age classes and group of forest (area and volume), distribution of non-forest land among a number of smaller categories (area only), and distribution of the forest resource between mountainous, and non-mountainous classes (area and volume).

While the terminology employed in this report is generally self-evident, "group of forest" requires some explanation. The forest resource of the former Soviet Union is divided into three groups of forests depending on its designated role. Thus, Group I forest provides environmental protection values, while Group II forest is designated for industrial use. However, Group II forest contains sharp restrictions on the exploitation given its proximity to inhabited areas. Group III forest faces the fewest restrictions on exploitation, providing the ability of the land to support forest cover is not compromised. A brief summary of the role which forest groups plays in the inventory of the former Soviet Union is presented in, Backman, Charles A. and Waggener, Thomas R. (1991), Soviet Timber Resources and Utilization: An Interpretation of the 1988 National Inventory, CINTRAFOR Working Paper # 35, Center for International Trade in Forest Products (CINTRAFOR), College of Forest Resources, University of Washington, Seattle, Washington, pp. 17-23.

Within the objective of this report, which was to develop an estimate of the physical accessibility of the forest resource, insufficient information was available to link the indicators presented at the beginning of this footnote with an estimate of the annual volume of solid wood supported by the forest resource. While it is possible to link the allowable annual cut (AAC) figure with actual harvest for 1990 by forest group, lack of historical data complicated an analysis to the Group of forest level of detail. Consequently, this level of detail has been subsumed in the aggregated analysis.

[6]The basis for determining the physical accessibility of the Russian forest resource is patterned after the methodology developed by Backman (1993). The basis for the analysis rested with the degree to which the AAC, advocated by the Russian forest establishment, was utilized during the five year period ending in 1989. Finally, an estimate for the supply of wood fiber from non-forest sector forest is added to yield the estimated annual solid wood AAC currently physically accessible (short term AAC). The difference between the estimated currently accessible AAC and the stated AAC becomes a proxy for the AAC not presently accessible (medium term AAC), but which is expected by the Russian professional establishment to become accessible during the course of the next 20 years. This component is called the potentially accessible AAC.

In addition to the currently accessible AAC and the potentially accessible AAC, there is a third AAC which is linked to the forest resource which is not expected to become accessible during the next twenty years. Whatever the size of this AAC is, however, it should be treated with caution. Part may rest on forest resources which have not been subjected to a serious appraisal, thus exposing them to some unknown degree of net down. Additionally, the share which is linked to the currently and potentially accessible forest resource is subject to the changing values which society places on the use of the forest wealth. Changing valuation could effectively preclude any or all of this portion from ever contributing to the fiber flow sustaining the forest industry.

In order to support the analysis, the forest resource of Russia does not need to be described in its entirety since the starting point for the analysis rests with the AAC figures developed by the Russians themselves, and modified as required. Accordingly, in this assessment, site class and stocking distribution are not discussed because they are implicitly factored into the assessment of the AAC supported by the forest resource. While age class distribution is important, it is implicitly factored into the AAC calculations as well. Linking the description of the forest resource to the AAC through a per hectare contribution provides a rough check against the credibility of the Russian derived figures.

A. INTRODUCTION

Russia, accounting for almost one-quarter of the global forest resources, contains 771 million hectares of stocked forest land and 82 billion cubic meters of growing stock.[1] While representing nearly 10 percent of the world's deciduous forest resource, evident from **Table A.2**, some 50 percent of the coniferous stocked forest land and growing stock are concentrated within her boundaries.[2] When the size of the tropical forest resource is excluded from the deciduous total, Russia accounts for about 20 percent of the remaining non-coniferous stocked forest land and one-third of the concomitant growing stock.[3,4]

The Russian coniferous resource, accounting for more than 70 percent of the forested land and nearly 80 percent of her volume, contains 552 million hectares of stocked forest land and 64 billion cubic meters of growing stock. The deciduous resource contains 157 million hectares and 16 billion cubic meters, or approximately one-fifth of each of the total Russian stocked area and concomitant growing stock. The balance of 62 million hectares (8 percent) and 1.4 billion cubic meters (2 percent) consists of species which do not contribute a significant share of the aggregated inventory.

Footnotes

[1]While accounting for 51 percent of the population and 76 percent of the land mass of the former Soviet Union, Russia dominated her forest resources. More than 95 percent of the USSR's forested area and 94 percent of her growing stock were concentrated within the boundaries of Russia. Other republics which contained some forest resources included the Ukraine and Belorussia, which, individually, accounted for another one percent apiece of the forested area, and two percent and one percent respectively, of the growing stock. Republics other than these each contain less than one percent of the forest resource. **Table A.1** presents selected statistics of the former Soviet Union segregated by Republic.

[2]The information presented in **Table A.2** originates from different years, depending on the geographic aggregation. The oldest inventory data, credited to 1976, are connected with Australia and Oceana, and Asia (excluding the former USSR). North American inventory data (The U.S.A. and Canada) are linked to 1977 while the remainder, except for the former USSR, are as recent as 1980. The numbers presented for the former Soviet Union are effective as of 1983. The different effective dates of the inventory data do not compromise the underlying message that Russia is the guardian of a large share of the global forest resources.

[3]The global growing stock supported on the deciduous stocked forest land amounts to 240 billion cubic meters. Of this amount, 80 percent, or 192 billion cubic meters, has been credited to tropical forests. Total forest land stocked with deciduous forests amounts to some 1.9 billion hectares. (*Lesnaya Entsiklopediya, Tom 2* [Forest Encyclopedia, Volume 2], p. 63) The tropical forest resource has been estimated to occupy more than 600 million hectares in South and Central America, 300 million in South-East Asia and Australia (excluding Oceana), and 200 million in Africa. (*Lesnaya Entsiklopediya, Tom 2* [Forest Encyclopedia, Volume 2], p. 470) Included with the 1.9 billion hectares of deciduous forested land appears to be the share of the Soviet forest resource which was stocked by stands dominated by non-principal species. Consequently, when determining the aggregated total global deciduous stocked forest land, the residual total of 800 million hectares, derived by subtracting estimated tropical forest resource from the 1.9 billion hectares, should be lowered. For the purposes of this discussion, it has been assumed that all of the forest resource classified as "other species" within Russian data sources was previously considered deciduous. In the 1988 inventory of the then Soviet forest resources, "other species" amounted to 65 million hectares and 1.4 billion cubic meters. (*Statisticheskiy Sbornik lesnoy fond sssr {po uchetu na 1 yanvarya 1988 goda} Tom I* [Statistical Handbook - The Forest Fund of the USSR {as of January 1, 1988} Volume I], p. 9)

Accordingly, of the 735 million hectares of non-tropical deciduous forest land and 46 billion cubic meters of growing stock, the 157 million hectares and 16 billion cubic meters contributed by the Russian Federation account for slightly more than 20 percent of the forested area, and one-third of the supported growing stock.

[4]Some 3 billion cubic meters of coniferous growing stock on an indeterminate area of forested land have been included in tropical forested land. (*Lesnaya Entsiklopediya, Tom 2* [Forest Encyclopedia, Volume 2], p. 63) These numbers pale in comparison to the size of the coniferous resource located in North America, Russia and Europe, however. Ignoring these numbers when discussing the global coniferous resource sequestered in Russia does not materially affect her share.

detail. From the third chapter, an understanding of the distribution of the Russian resources throughout the country is obtained, including an estimate of the AAC supported by it.

B. THE RUSSIAN FOREST RESOURCE

The forest resources of Russia are discussed focusing on the indicators describing their "ownership", "specie" distribution, and accessibility.[7,8,9] The potential of the forest resource to support an AAC is then reviewed.

B.1 THE RUSSIAN FOREST RESOURCE ACCORDING TO OWNERSHIP

The forest resource of Russia, which in total amounts to 771 million hectares of stocked forest land and 82 billion cubic meters of growing stock, is divided into a number of broad categories depending upon the designated sector for utilization.[10,11]

Footnotes

[7]Under the former regime, the forest resource was divided, *inter alia*, among different ministries, organizations, and/or other administrative bodies. These categories not only provide some clue about the end use to which the resources were dedicated, but also the successor organizations which should be approached concerning availability of timber.

[8]Soviet data sources provide two levels of detail describing the inventory according to the major specie association within stands. At a broad level of aggregation, forest inventory is divided into four categories, namely (1) coniferous; (2) hardwood deciduous; (3) softwood deciduous; and (4) other species.

While the coniferous category requires no further comment, the others cannot be so easily dealt with. The division within the deciduous category is based upon the density of the wood, with species such as oak and beech classified as hardwood deciduous species. Birch, alder, and aspen would qualify as softwood deciduous species. The fourth category, "Other Species", is a derived one, based on the difference between the total forest resource and the sum of values for each of the first three categories, identified at the beginning of this footnote. Since the category of other species is a derived value, a small residual remaining after subtracting considerable larger numbers inherent in either of, or a combination of, the coniferous and the two deciduous categories, care must be exercised when interpreting the values ascribed to the "other species" category of the Russian forest resource.

At the second level of detail, the coniferous and deciduous stands are segregated into the major specie stand associations. The coniferous resource is divided into 6 categories consisting of: (1) pine; (2) spruce; (3) true fir; (4) larch; (5) Korean pine; and (6) other coniferous. The hardwood deciduous resource is divided into three components which are: (1) oak; (2) beech; and (3) other hardwood deciduous. Softwood deciduous stands are divided into four categories consisting of: (1) birch; (2) aspen; (3) alder; and (4) other softwood deciduous.

The data presented in the two volume handbook, identified below, which describes the stocked forest land inventory includes sufficient information to split the inventory into the coniferous component, the two deciduous components, and the component of other species not expressly identified, for most of the land aggregations. However, information dissecting the inventory into the finer divisions describing the size of the forest resource in each of the stand associations belonging to the four specie groups relies on an aggregation of land which excludes agricultural forest resources and forest resources allocated to non-forest sector organizations. Additionally, the data at the stand association level are not available based on accessibility, thus masking the influence of accessibility on the distribution of the specie dependent inventory.

While this report amalgamates the two deciduous groups together under the title of deciduous, a more detailed description of the two sub-groups is presented in, Backman, Charles A. and Waggener, Thomas R. (1991), Soviet Timber Resources and Utilization: An Interpretation of the 1988 National Inventory, CINTRAFOR Working Paper # 35, Center for International Trade in Forest Products (CINTRAFOR), College of Forest Resources, University of Washington, Seattle, Washington, 296 pp.

[9]Forest inventory of Russia is divided into two classes of accessibility, called exploitable and reserve. The reserve category includes not only inventory which is beyond the reach of projected transportational development twenty years hence, but forest which have uses which effectively preclude industrial development by the forest sector. "Industrial development" in this context refers to the production and use of roundwood.

[10]Data describing the distribution of forest resources within the boundaries of the former Soviet Union are available effective January 1, 1988. This information is located in a two volume statistical source, called *Statisticheskiy Sbornik lesnoy fond sssr {po uchetu na 1 yanvarya 1988 goda} Tom I , II* [Statistical Handbook - The Forest Fund of the USSR {as of January 1, 1988} Volumes I and II], which were published in

Footnotes *continued on next page*

The different sectors are: (1) Forest Sector; (2) Agricultural Sector; and (3) Other Sectors. The Forest Sector category accounts for the majority of the forest resource, representing more than 90 percent of the stocked forest land and growing stock. Agricultural forest accounts for another 5 percent while Other Sectors forest contain only 2 percent of the Russian total. **Table B.1** shows the forest resource of Russia segregated into these three broad categories.

B.1.1 Forest Sector

The Forest Sector resource, which accounts for more than 90 percent of the Russian inventory, amounts to 714 million hectares of stocked forest land and 75 billion cubic meters of growing stock. It is divided into three categories. Two categories, "Forest Set Aside for Long-Term Uses", and "Forest Assigned to Short and Medium Term Needs", were managed by the former State Committee for Forests (*Goskomles*).[12,13,14] While "Forest Set Aside for Long-Term Uses" do not necessarily contain timber suitable for industrial uses, to varying degrees, the remainder does and has supported industrial harvesting. The third category, "Forest Assigned to the Former Ministry of the Timber Industry", accounts for a small share of the forest resource, amounting to slightly more than one percent of the stocked forest land and growing stock.[15] The largest share of the forest resource is contained in the category of the forests managed by *Goskomles*, and now its successor organization, for short and medium-term needs. This category amounted to nearly 95 percent of stocked forest land and growing stock. Forests managed by *Goskomles*, and now its successor organization, for long-term uses, while accounting for 5 percent of the stocked area, only contain some 3 percent of the growing stock.

Footnotes *continued*

1990 and 1991. While it is difficult to determine the ownership of forest resources under the economic, social, and political systems existing in Russia at this juncture, some indication can be obtained by examining the distribution of the forest inventory contained in the forest fund among the different agencies of the former regime. Additionally, in the absence of alternatives, these two source books provide a base from which to develop an understanding of the forest resource of Russia, its characteristics, and its distribution.

[11]Holowacz (1985) claims that even though utilization for the forest resource in non forest sector forests was vested with either the agricultural or non-forest sector organizations, responsibility for management rested with the then *Goskomles*. See: Holowacz, J., Forests of the USSR, *The Forestry Chronicle,* October, 1985, pp. 366-373

[12]*Goskomles* is the shortened form for *Gosudarstvenniy komitet po lesu.* The successor organization of *Goskomles* is called the Russian Federal Forest Service (*Federalnaya sluzhba lesnogo khozyaystva*).

[13]The inventory data does not expressly identify a category of land belonging to *Goskomles* as "Forests Assigned to Short and Medium Term Needs". Rather, this category is derived as the difference of the total resource allocated to the forestry sector less that share designated for long-term uses. The term, "Forests Assigned to Short and Medium Term Needs", was arbitrarily chosen to separate the resource under the control of *Goskomles* which was not designated for long-term uses. In tables describing the forest resource segregated by ownership, the term, "Forests Assigned to Short and Medium Term Needs", has been shortened to, "Other Forest Economy".

[14]The term, *Goskomles*, will be used to signify the old regime and the successor organization, the Russian Federal Forest Service. The inventory data underlying the report dates from before the dissolution of the USSR. Since the resource described by the data is not believed to have been affected by the changed political environment, and it appears that one organ, *Goskomles*, has been replaced by another, *Federalnaya sluzhba lesnogo khozyaystva* in so far as the resource within Russia is concerned, exchanging the Federal Forest Service for *Goskomles* does not materially affect the analysis.

[15]The former Ministry of the Forest Industry was a competing and complimentary organization with *Goskomles* up until the demise of the USSR. While the former Ministry has ceased to exist, many of the assets are in the process of being privatized. While it is not clear the fate of the forest land which was designated for its use, some opportunity to secure the basic resource through acquisition of the physical assets of the producing enterprises may exist.

B.1.1.1 *Goskomles* Short and Medium Term Forests

Accounting for more than 750 million hectares of forest land, nearly 90 percent are considered stocked. Coniferous forest occupies the largest share of the forested land, representing almost 490 million hectares, or 75 percent of the nearly 655 million stocked hectares. Deciduous forests account for another 120 million hectares, or nearly one fifth of the stocked land. The balance, amounting to more than 47 million hectares (7 percent of the forested land), supports forests dominated by minor species with limited commercial significance.[16] Total growing stock, corresponding to the area of stocked forest land, amounts to 69 billion cubic meters. Coniferous forest accounts for 56 billion cubic meters (81 percent), deciduous stands for 12 billion cubic meters (17 percent), and other species for one billion cubic meters (one percent). The average stocking per hectare, then, amounts to 115 cubic meters per hectare in coniferous stands, about 105 cubic meters per hectare in deciduous stands, and only some 20 cubic meters per hectare in stands where the non-principal species dominate.

On an aggregated basis, mature and overmature stands account for slightly more than one half of the stocked forest land. Examining each of the two major species groups separately reveals some differences. Coniferous forest, which in total amounts to 489 million hectares, contain 270 million hectares of mature and overmature forested land, or 55 percent of the coniferous total. Deciduous forests, on the other hand, while accounting for 118 million hectares of stocked forest land, contain only 42 million hectares of mature and overmature forests, or approximately one-third of the deciduous forested area.[17] Mature and overmature coniferous stands support 36 billion cubic meters of growing stock, indicating a stocking per hectare of 135 cubic meters. Deciduous mature and overmature stands contain some 6 billion cubic meters, yielding stocking per hectare of slightly more than 140 cubic meters. By comparison, stocking in the immature stands varies from some 90 cubic meters per hectare in the coniferous forest to 75 cubic meters in the deciduous forest.

B.1.1.2 Resources Assigned to the Former Ministry of Forest Industry

The component of the forest land which is considered part of the former forest industrial ministerial system is not large, amounting to 23 million hectares, 22 million hectares of which are stocked.[18] Three-quarters of the stocked forest land, or 17 million hectares, are covered by coniferous forest. The balance, amounting to some 5 million hectares of stocked land, consists of deciduous stands. Forested land dominated by the non-principal species is conspicuous by its absence. Growing stock supported by the forested land amounts to 3 billion cubic meters, of which 80 percent, or nearly 2.5 billion cubic meters, is contributed by coniferous forest. Deciduous stands account

Footnotes

[16]In the context of this report, commercial significance is considered to convey importance for the timber industry. While the forest resource provides significant other products, such as berries, nuts, recreational values, for example, these should be considered in the context of the total forest resource, rather than as values dependent on a specific tree specie or specific stand type.

[17]Data presented in the inventory statistical handbooks at this level of aggregation do not provide sufficient detail to determine the share of the forest resource dominated by other species which is mature and overmature. Sufficient data is available for the aggregation which includes both the Forest Service resource designated for short and medium term needs and the forest resource which was allocated to the former USSR Ministry of the Forest Industry.

[18]The share of the forest land which is considered stocked amounts to 94 percent, higher than the 87 percent evident in the Forest Service lands set aside for short and medium term uses. Of the forest sector lands, the lowest share of forest land which is stocked is located in those forest service lands allocated for long-term uses, amounting to 76 percent.

for the remaining 553 million cubic meters of growing stock. The average stocking per hectare amounts to more than 135 cubic meters per hectare, with that in coniferous stands surpassing 140 cubic meters. Stocking in deciduous stands amounts to some 115 cubic meters per hectare.

Growing stock on mature and overmature coniferous stands amounts to 1.4 billion cubic meters standing on 7 million hectares, or nearly 60 percent and 40 percent of the coniferous totals of forested land and growing stock. Mature and overmature coniferous forest support a stocking of nearly 200 cubic meters per hectare. Stocking in the immature stands, on the other hand, amounts to almost 100 cubic meters. Mature and overmature deciduous stands support 260 million cubic meters of growing stock on 1.3 million hectares, providing a stocking per hectare of nearly 200 cubic meters as well. Stocking in the immature stands, however, is somewhat less than the coniferous stands, amounting to only 85 cubic meters per hectare.

B.1.1.3 *Goskomles* Forests Set Aside for Long-Term Uses

Lands which have been allocated to long-term uses amount to more than 100 million hectares, of which one-half is considered capable of sustaining forests. Only three-quarters of this forest land, or 37 million hectares, are thought to be stocked. Unlike the other categories of use, coniferous forests account for slightly more than 50 percent of the forested land. While deciduous forests account for some 10 percent, the remainder, representing almost one-third of the forested land, is stocked with stands dominated by the non-principal species. While growing stock supported by the forested area amounts to slightly more than 2 billion cubic meters, stocking per hectare is very modest, varying from some 80 cubic meters in deciduous and coniferous stands to 35 cubic meters in stands dominated by the non-principal species.

The mature and overmature component of the coniferous resource accounts for 70 percent of the forested land, or 14 million hectares, and almost 80 percent of the growing stock, or 1.2 billion cubic meters. In deciduous stands, the mature and overmature share of the forested land amounts to 75 percent, or approximately 3 million hectares, while the share of growing stock reaches 80 percent, or slightly more than 245 million cubic meters. Stocking per hectare in coniferous and deciduous stands amounts to approximately 85 cubic meters, while immature stands support stocking of some 55 cubic meters per hectare.

B.1.2 Agricultural Sector

Agricultural forest, amounting to 5 percent of the land contained in the Russian inventory, accounts for 5 percent of the forest land. However, unlike other ownerships, all of the land located in agriculture forest is considered forest land, with virtually all of the forest land thought to be stocked with either coniferous or deciduous stands.[19] The growing stock supported by the 43 million hectares of forested land (5 percent of the Russian forested land) amounts to some 5 billion cubic meters (5 percent of the Russian growing stock).

The agricultural forest resource is concentrated in deciduous stands which account for 60 percent of the stocked forest area (26 million hectares) and slightly more than one-half of the growing stock (2.6 billion cubic meters) reserved for the agricultural sector.

Footnotes

[19]The degree to which the forest land of the agricultural sector is stocked is the highest of all aggregations discussed in this report, amounting to 96 percent.

Coniferous forest, containing 2.4 billion cubic meters of growing stock on 17 million hectares of stocked land, account for the remaining resource dedicated for agricultural uses. The resulting stocking per hectare amounts to nearly 155 cubic meters in coniferous forest and almost 200 cubic meters in deciduous forest.

Considering the "ownership" of the resource, it is not surprising to see that more than 80 percent of the coniferous and deciduous forested areas are concentrated in immature stands.[20] Of the 2.4 billion cubic meters of coniferous growing stock, about one-half billion cubic meters are considered mature and overmature, indicating a stocking per hectare of almost 190 cubic meters. Immature coniferous stands support a stocking of some 150 cubic meters. Almost 600 million cubic meters of deciduous growing stock are believed to be mature and overmature, suggesting a stocking of more than 150 cubic meters per hectare. Immature stands support stocking of slightly more than 90 cubic meters per hectare.

B.1.3 Other Sectors

Historically, forest resources have been allocated to organizations other than agricultural or strictly forestry concerns. These organizations have included the Ministry of the Interior, Ministry of Defense, and Ministry of Transportation, for example. Compared to the forest sector "ownership", however, these forests play a minor role, accounting for only two percent of the stocked forest land and growing stock located in the forest fund.

Supporting more than 17 million hectares of forest land, almost 16 million hectares are considered stocked.[21] Two-thirds of the stocked forest land, or 10 million hectares, support stands in which coniferous species dominate, while one-quarter, or 4 million hectares, support those in which deciduous species are a major factor. The balance, amounting to one and one half million hectares, support stands of the periphery species. Containing two billion cubic meters of growing stock, almost three-quarters of the volume consist of those dominated by coniferous species. The stocking in the coniferous stands amounts to almost 145 cubic meters per hectare. Stocking in the deciduous stands, derived by dividing the 468 million cubic meters of growing stock by the 4 million hectares of stocked land, is slightly less, reaching almost 110 cubic meters per hectare. The stocking in stands represented by the non-principled species amounts to almost 35 cubic meters per hectare.

The mature and overmature component of the forested land amounts to two-fifths in coniferous forest and one-third in deciduous forest. Supporting 600 million cubic meters and almost 200 million cubic meters on 3.7 million and 1.4 million hectares, stocking in mature and overmature coniferous stands approaches 160 cubic meters per hectare, while that in deciduous stands amounts to some 140 cubic meters per hectare. In comparison, stocking in immature stands amounts to 135 cubic meters in the coniferous forest and 95 cubic meters in deciduous forest.

Footnotes

[20] It follows that agricultural forests would have been subjected to a long term of developmental pressures given the use to which they have been dedicated. Consequently, what would have been mature and overmature forest at one time, would have long been converted to either agricultural land or to land supporting immature stands of forest.

[21] The degree to which the forest land dedicated to other sectors is stocked amounts to 92 percent, more than is the case with the Forest Service land dedicated for short and medium terms needs, but less than the agricultural forest and the forest sector land allocated to the former USSR Ministry of the Forest Industry.

B.2 SPECIE DISTRIBUTION

The forest inventory of Russia is divided into three broad specie associations, of which one association, coniferous, dominates. Coniferous stands account for more than 70 percent of the stocked forest land and almost 80 percent of the growing stock. Deciduous stands account for one-fifth of the forest resource while other species account but for 8 percent of the forested land and 2 percent of the growing stock. Although information is scanty concerning the constituent species contained in the category of "other species", more detailed information is available for the coniferous and deciduous components.[22,23] **Table B.2** presents data describing the forest resources of Russia segregated into specie associations.

B.2.1 Coniferous Association

More than one-half of the coniferous forested area consists of stands in which larch forms the major component. Pine stands represent slightly more than one-fifth of the coniferous stocked forest land. Spruce and true fir stands account for almost twenty percent, with the remainder dominated by five needle pine species.[24] While accounting for nearly one half of the stocked coniferous land, larch stands make-up only 40 percent of the coniferous growing stock. Pine stands account for almost one-quarter of the growing stock while spruce and fir stands represent slightly more than 20 percent. Five needle pine stands, while representing 7.5 percent of the stocked forest land, contain almost 12.5 percent of the growing stock.

On an aggregated basis, "Korean pine" stands contain the highest stocking per hectare, amounting to almost 185 cubic meters. True fir and spruce stands follow next with a stocking per hectare of nearly 165 cubic meters and slightly more than 135 cubic meters respectively. Stocking in pine stands amounts to nearly 115 cubic meters while stocking in larch stands trails all the others with a stocking of slightly more than 90 cubic meters per hectare.

B.2.2 Deciduous Association

Deciduous stands account for 20 percent of the forest inventory, which by a large extent, are dominated by birch. Birch stands account for two-thirds of the deciduous forested area and three-fifths of their growing stock, providing stocking of more than

Footnotes

[22]The distribution of the inventory data among the specie associations is presented in percentage terms because of the different amalgamations of the forest resource data employed to describe different characteristics of the inventory within the two volume statistical handbook referenced at the beginning of this chapter. Thus, one set of numbers provides an indication of the total coniferous resource without revealing its distribution among the different stand types. Another set of numbers describes the coniferous inventory segregated by stand type, but does not include all of the "ownerships", or the share of the forest resource located in the periphery species group. Presenting both percentage and the actual numbers underlying the percentages would be confusing, and not add significantly to the understanding of the Russian forest resource.

[23]Information is scanty concerning the distribution of the forest resource among the different associations at the specie level of detail for aggregates of land other than that included in with the forest sector. Additionally, distribution of the forest resource, located in the category of "other species", among the constituent specie associations, is not readily available at an economic region level of detail. Consequently, the discussion focusing on the resource segregated to the specie association level is presented for deciduous stands and coniferous stands. Accordingly, the distribution of the resource located in other species into component species is not presented.

[24]The five needle pine species have been variously called Korean Pine or Cedar in the literature. In no way does this tree resemble the Western Red Cedar species of Canada or the United States.

90 cubic meters per hectare. Aspen and oak account for the next two largest shares, representing almost 15 percent and slightly greater than 5 percent of the forested area, and one-fifth and one-fifteenth of the growing stock respectively. Aspen stands support much higher stocking than birch stands, containing nearly 150 cubic meters per hectare while oak support stands of some 110 cubic meters per hectare.

B.3 ACCESSIBILITY

Historically, the forest resource of Russia has also been segregated according to accessibility, based upon the degree to which forests are currently, or expected to become, available within the next twenty years.[25] Shown in **Table B.3**, which provides a distribution of the forest resource of Russia segregated by accessibility classes, exploitable forests account for nearly 60 percent of the stocked forest, or 446 million hectares, and two-thirds of the growing stock, or 55 billion cubic meters. Reserve forests account for the balance of 325 million hectares and 27 billion cubic meters.

B.3.1 Exploitable

Exploitable forest, which amounts to 446 million hectares, or 58 percent of the total stocked forest land, and 55 billion cubic meters of growing stock, or 67 percent of the total inventory volume, consists of those within the responsibility of forest sector organizations, agricultural forest, and forest allocated to "Other Sectors". The last two are included to account for their perceived greater accessibility.[26] The inferred stocking per hectare approaches 125 cubic meters per hectare.

Both agricultural forest and forest allocated to Other Sectors play a minor role in the size of forest resource considered to be exploitable. The largest share, accounting for more than 85 percent of the stocked forest land and concomitant growing stock, lies within the boundaries of the successor organs to *Goskomles* . Agricultural forest encompasses almost 10 percent, while forest allocated to other sectors represents approximately 5 percent of the exploitable resource.

B.3.1.1 Forest Sector

Exploitable forest sector forest amounts to 388 million hectares and 48 billion cubic meters of growing stock, or seven-eighths of the exploitable stocked forest land and growing stock. Coniferous stands account for three-quarters of the forest sector forested area (292 million hectares), while the balance (97 million hectares) consists almost exclusively of deciduous stands. Coniferous stands support 37 billion cubic meters of growing stock, almost 80 percent of the forest sector total of 48 billion,

Footnotes

[25]Forests may in fact be accessible at the present time, but may not be available for forest industry because of uses which preclude a significant degree of development.

[26]Soviet data sources routinely provide an indication of the accessibility of a certain sub-set of the forest resource which includes the forest resource under control of successor organizations to *Goskomles* (but excluding those forests allocated to long-term uses), plus the forest resource which had been under the control of the former Ministry of the Forest Industry. To this resulting figure, agricultural forests should be added since by definition it would seem reasonable that forest linked to the food sector would be located in proximity to inhabited area and a concomitant transportation network. In this study, it was further assumed that forest resource assigned to the "other sectors" would also be exploitable at the present time. While this assumption is a debatable point, the uncertainty introduced to the analysis does not materially affect the outcome. Other sector forest accounts for only two percent of Russian totals, approximately one-third that contained in agricultural forest.

providing an average stocking per hectare of more than 125 cubic meters. Deciduous stands, accounting for virtually all of the remaining volume, support stocking of nearly 110 cubic meters per hectare. The insignificant growing stock located in stands dominated by periphery species translates into a stocking of only 50 cubic meters per hectare.

The mature and overmature components of the forest sector exploitable resource account for one-half of the coniferous forested area (151 million hectares) and 60 percent of the coniferous growing stock (24 billion cubic meters). The statistics describing the coniferous mature and overmature inventory translate into a stocking per hectare of slightly more than 155 cubic meters. Deciduous mature and overmature stands, supporting 5.5 billion cubic meters on 32 million hectares, 52 percent and 33 percent of the deciduous stocked forest land and growing stock, indicate stocking of 170 cubic meters per hectare. The share of the mature and overmature component in stands dominated by periphery species amounts to almost 65 percent of their volume (one million cubic meters) and slightly more than 70 percent of the area (19 thousand hectares). Stocking in mature and overmature component of the other specie stands, then, is almost 45 cubic meters per hectare. The corresponding stocking in the immature components amounts to more than 95 cubic meters per hectare in the coniferous stands and almost 80 cubic meters per hectare in the deciduous stands. In other specie stands, the immature component supports stocking slightly greater than 65 cubic meters per hectare.[27]

B.3.1.2 Agricultural Sector

Agricultural forest have been described in section **B.1.2.**

B.3.1.3 Other Sectors

Forest resource designated for use by the other sectors has been described in section **B.1.3.**

B.3.2 Reserve

Reserve forests, amounting to 325 million hectares of stocked forest land and 27 billion cubic meters of growing stock, account for two-fifths of the total stocked area and one-thirds of the total growing stock of Russia. Stocking per hectare amounts to almost 85 cubic meters, not unexpectedly, less that the stocking in the exploitable stands. Reserve forests consist of traditional forest sector forest lands assigned for short and medium term uses but currently unavailable for development, plus the Forest Service forest resource which has been set aside for long-term uses. Forest sector forest designated for short and medium term use account for the majority of the reserve resource, or some 90 percent of the stocked area and growing stock.

Footnotes

[27]More detailed data is available for the component of the inventory that includes *Goskomles* forest, less that set aside for long-term uses, plus forest allocated to the former Ministry of the Forest Industry. From this data set it is possible to develop an understanding of the distribution of other specie inventory according to mature and immature categories. However, while detail concerning the resource dominated by the periphery species is possible, it is not provided at the economic region level of detail. The component of the AAC provided by this resource is not identified or referred to in the literature, and consequently appears to be not material. However, to provide a feeling for the extent to which this resource is present in each of the economic regions, it is mentioned in passing, and presented at a greater detail for the forest resource aggregated to the Russia level.

B.3.2.1 Forest Sector for Short and Medium Term Uses

Reserve forests in this category account for 288 million hectares and nearly 25 billion cubic meters of growing stock. Coniferous stands, occupying 214 million hectares and 22 billion cubic meters, account for three-quarters of the forest sector reserve forested area and seven-eighths of its growing stock. Deciduous stands, which amount to 26 million hectares and some two billion cubic meters of growing stock, account for 9 percent of the stocked forest land and 10 percent of the growing stock belonging to the *Goskomles* short to medium term resource. Stands populated with other species, accounting for slightly more than 15 percent of the stocked forest land, contain less than 5 percent of the growing stock. Stocking in coniferous forest amounts to 100 cubic meters per hectare while deciduous forest supports almost 90 cubic meters per hectare. Stocking in forests comprised of other species amount to slightly less than 20 cubic meters per hectare.

The mature and overmature component of the resource accounts for more than one-half of the area (149 million hectares) and five-eighths of the growing stock (15 billion cubic meters). While the mature and overmature component of the coniferous stands accounts for three-fifths (126 million hectares) and two-thirds of the growing stock (14 billion cubic meters) of the coniferous total, the shares in the deciduous stands are much less, amounting to almost 45 percent with respect to stocked forest land (11 million hectares) and one-half (1.2 billion cubic meters) with respect to the growing stock. Other specie stands account for the balance of 12 million hectares of stocked land but only 184 million cubic meters of growing stock. Stocking per hectare amounts to more than 110 cubic meters in coniferous mature and overmature stands and almost 105 cubic meters in deciduous stands. Not unsurprisingly, stocking in the mature and overmature stands dominated by the periphery species amounts to only 15 cubic meters per hectare. Corresponding stocking in the immature stands amounts to almost 85 cubic meters in coniferous stands. slightly more than 75 cubic meters in deciduous stands, and 20 cubic meters in the other specie stands.

B.3.2.2 *Goskomles* Forest Allocated to Long-term Uses

The characteristics of forest resources dedicated to long-term uses have been described in section **B.1.1.3**.

B.4 The Russian Allowable Annual Cut

The forest resource of Russia is enormous, supporting an AAC estimated to be in the vacinity of 833 million cubic meters.[28,29,30] However, evident from **Table B.5**,

Footnotes

[28]The ability of the forest resource to support a flow of wood raw material can be measured through the AAC. In this analysis, both the forest resource data and the AAC figures linked to it have been obtained from publicly available sources. No attempt has been made to derive an AAC directly from the underlying forest resource. Rather, the AAC data presented in the sources are compared back to the forest resource data to test for reasonableness. Difficulties in selecting both a country and the appropriate forest resource statistic within that country for comparison with the Russian experience resulted in a very crude approach. The AAC figures linked to the forest sector exploitable lands for 1988 were divided by the comparable stocked forest land to develop an inferred contribution per hectare. Providing the resulting figures appeared consistent with inferred growth rates evident from alternate sources, the AAC figures were accepted as providing an indication of fiber potential

In the USSR, FAO shows growth rates as approximately 1.1 cubic meters per hectare for coniferous stands and about 1.2 cubic meters per hectare for deciduous stands (Runyon, K.L., Canada's Timber Supply: Current Status and Outlook, Information Report E-X-45, Ottawa: Forestry Canada, p. 15). These averages, however,

Footnotes *continued on next page*

slightly more than 30 percent, or 264 million cubic meters, are accounted for in reserve stands, unlikely to provide a sustainable flow of wood products within the course of the next twenty years.[31,32] The balance, which amounted to 570 million cubic meters, consisted of allowable harvest which is believed supported by the exploitable resource.

Footnotes *continued*

undoubtedly include all forest regardless of accessibility. Consequently, when developing an estimate of annual growth based on the AAC, one would expect the resulting figures to be somewhat higher, and show regional diversity to account for the range in site and stocking classes and different management intensities. In fact, as is evident from **Table B.4**, regional diversities do exist. Not only are regional diversities present, but there is a distinct difference between the AAC supported by the non-Forest Sector resource and that supported by the Forest Sector resource. The sharply lower figures visible for the non-Forest Sector can be linked to the protective nature of the forest resource, consisting almost exclusively of what are believed to be Group I and Group II forests. Based on the above discussion and comments appended to the section describing each economic region, it is not possible to disregard the AAC figures presented in the Russian literature as an approximation of the underlying potential of the forest resource.

[29]The AAC figures presented in this section specifically exclude that which is supported by the lowest two site classes of the former Soviet Union inventory, referred to as site class V^a and V^b in the literature. While the size of the AAC in Russia supported by the lower class forest resource is not clear, based on the near total concentration of the low site class land in Russia, amounting to virtually 100 percent of the total for the USSR (94.7 million hectares in the former Soviet Union of which 94.3 million hectares are located in Russia), the estimated 104 million cubic meters of USSR AAC would be located almost completely in Russia. For more detail concerning site classes of the USSR, refer to Backman, Charles A. and Waggener, Thomas R. (1991), Soviet Timber Resources and Utilization: An Interpretation of the 1988 National Inventory, CINTRAFOR Working Paper # 35, Center for International Trade in Forest Products (CINTRAFOR), College of Forest Resources, University of Washington, Seattle, Washington, 296 pp.

[30]The estimated AAC contributed by the low site lands is based on fugitive data presented in Lesnaya Entsiklopediya, Tom II, pp. 403 and 405. The total annual growth credited to forests belonging to *Goskomles* amounted to 931 million cubic meters. Subtracting the 634 million cubic meters in the exploitable forest and the 193 million cubic meters in the reserve stands leaves an estimated 104 million cubic meters of AAC which could be credited to low site lands. While the annual growth of 931 million cubic meters does not necessarily translate into an AAC of corresponding size, it was assumed that the difference between the annual growth of 931 million cubic meters and the AAC figures of 827 million cubic meters is as good a first estimate as is demanded by the report. In fact, comparing the inferred AAC per hectare of low site land (1.1 cubic meters) with the inferred AAC in exploitable forest (1.6 cubic meters) and the reserve forests (0.9 cubic meters), seen in **Table B.4**, would suggest that the estimated AAC contributed by low site lands may be overstated.

[31]The AAC in the reserve stands in the late 1970s amounted to an estimated 201 million cubic meters (Vorob'ev, G.I. *et alia*, Ekonomicheskaya geografiya lesnikh resursov SSSR, p. 58). Another AAC in the reserve stands is presented, apparently for sometime in the first part of the 1980s, amounting to 193 million cubic meters (Lesnaya Entsiklopediya, Tom II, p. 405). The difference between these two figures introduces some uncertainty when determining the size of the additions to the reserve category estimated to have occurred following the revision of the AAC levels for 1991. The difference of 7 million cubic meters between the two values for the reserve stands cannot be attributed to the decline in AAC (in the forest sector lands) either between 1975 and 1980 (**Table B.6** shows AAC levels, available only for the USSR as a whole for 1975 and 1980, changing by less than 2 million cubic meters), or even from 1980 until 1985 (during which the AAC for the USSR barely moved). Following the revision of the AAC downwards in 1991, the difference between the 1990 AAC and the modified AAC of 1991 has been added to the reserve AAC previously identified. Utilization of the 1990 AAC, which is lower than the 1985 AAC for Russia by some 15 million cubic meters, as the base from which to add to the reserve category, could understate the reserve by at least 15 million cubic meters. However, when the two estimates for the AAC represented by the reserve stands are considered, and the non-contribution of this volume to the current or potentially accessible AAC, the uncertainty is not considered to material affect the analysis.

[32]AACs in Russia have been decreasing in recent years, having fallen from 619 million cubic meters in 1980 to nearly 600 million cubic meters in 1990 (**Table B.7**). By 1991, the AAC had fallen further to approximately 540 million cubic meters due to, *inter alia*, the exclusion of Korean pine stands from the total. The decline would have been to 555 million cubic meters if cedar component were to be added back to the total. Future declines can be expected as the ability of the Russian forests to sustain harvest and accommodate the different uses is recognized, particularly in the Siberian and the Far Eastern regions of the country.

B.4.1 The Exploitable Allowable Annual Cut

The AAC contributed by the exploitable forest resource amounts to an estimated 570 million cubic meters. The forest sector resource dominates the total, accounting for 95 percent of the 570 million cubic meters, or 540 million cubic meters of AAC. The AAC provided by the non-forest sector stands amounts to 30 million cubic meters.

B.4.1.1 The Forest Sector Allowable Annual Cut

Three-fifths of the exploitable AAC of nearly 540 million cubic meters consists of coniferous species, amounting to almost 325 million cubic meters.[33,34] The principal species association within the coniferous AAC is spruce-true fir stand association, which accounted for 40 percent of the coniferous total. Pine and larch stands make up most of the remainder, representing 32 percent and 28 percent of the total respectively. Deciduous stands contribute the remaining 210 million cubic meters of AAC. The largest share of the deciduous total is concentrated in birch forests which represent nearly three-fifths of the volume.

While it is important to develop an understanding of the total flow of wood fiber potentially available, under current conditions, it is more appropriate to examine the extent to which the current and potentially accessible AAC can divided into that which is currently accessible and that which is potentially accessible.[35,36]

Footnotes

[33]The coniferous AAC in 1991 amounted to 325 million cubic meters, a decline of 55 million cubic meters from levels evident in 1990. Almost one-third of the decline was contributed by the removal of Korean Pine stands. The balance, amounting to almost 40 million cubic meters, was contributed by the remaining stand associations of pine, spruce-true fir, and larch.

[34]An estimate of the level of AAC supported by one hectare of exploitable forest can be made for 1991 providing it is assumed that the exploitable land base evident in 1988 has not materially changed. While AAC for 1991 are available, it is not clear the source for the decline in current and potential AAC from levels experienced as late as 1990. The source could be connected with a transfer of land from the exploitable category to the reserve category, or could be linked to a transfer of land from one forest group to another, thus introducing more onerous conditions under which harvest can occur.

For the purposes of developing an estimate of the AAC supported by one hectare of forested land, it was assumed that the land base has been reduced. The basis for this assumption is the ban on harvest in Korean pine stands. If there is a ban on harvest, then it follows that the stands have been removed from the exploitable land base supporting the AAC. Consequently, when developing an estimate of fiber supported by one hectare, it was decided to link exploitable stocked forest land available for 1988 with the AAC available in 1988 from Isaev (1991). Any changes in the AAC since then are assumed to be brought on by a sufficient change in the land base such that the average does not alter. The AAC per hectare in coniferous stands amounted to 1.3 cubic meters, while that in deciduous stands amounted to 2.3 cubic meters.

[35]While harvest levels have fallen off since the late 1980s due to the uncertain economic, social, and political conditions existing in Russia, an estimate of the physical availability of solid wood can be made by assuming that harvest levels under the planned system approximated a medium-term balance. With this assumption, the level of harvest in the late 1980s is a proxy for what is currently physically available. The average harvest then is compared to the AAC to ensure than there has not been any serious over cutting. The difference between the estimated currently accessible AAC and the AAC provided by the Russian establishment becomes an estimate for the potentially available AAC during the next 20 year period.

However, it is not the total harvest, combining the deciduous and coniferous components together, which yields a realistic result. In the past, the forest sector of the former USSR preferred to harvest from the coniferous stands, even if it meant by passing the deciduous resource made accessible as a by-product of developing the coniferous resource. Consequently, the methodology must first be applied to the coniferous components of the principal harvest and AAC. The share of the deciduous AAC which is believed currently accessible is based on the ratio developed in the coniferous resource.

Footnotes *continued on next page*

B.4.1.1.1 The Currently Accessible Allowable Annual Cut

After the methodology defined by Backman (1993), the presently accessible AAC amounts to an estimated 340 million cubic meters, three-fifths of which (196 million cubic meters) flow from coniferous stands. The major share is provided by spruce/true forest stands, which amounted to nearly one half of the total. Pine stands account for slightly more than one-third of the coniferous total with the balance made-up by fiber from larch stands. The deciduous component, amounting to 40 percent of the total presently accessible AAC, contains 144 million cubic meters. The major contributions consist of birch stands and aspen stands. Minor contributions flow from the oak and beech stands.

B.4.1.1.2 The Potentially Accessible Allowable Annual Cut

The potentially available AAC amounts to 200 million cubic meters, two-thirds of which are contributed from coniferous stands.[37] The contribution from larch stands accounts for slightly more than one-half of the potentially available. The balance in the coniferous component is made up of by nearly equal shares from the pine and spruce stands.[38]

The deciduous component, which amounts to 70 million cubic meters, derives nearly two-thirds of its total from birch stands. While fiber potential from oak and beech stands do contribute, the majority of the remainder flows from aspen stands.

B.4.1.2 The Non-Forest Sector Allowable Annual Cut

The AAC represented by this forest resource has been estimated to be 30 million cubic meters, of which 10 million cubic meters, or one-third, flows from coniferous stands. The balance, amounting to some 20 million cubic meters, consisted of contributions from deciduous stands. The coniferous component is dominated by contributions from the pine and spruce stands. Larch accounts for slightly more than 7 percent of the total.

Footnotes *continued*

The following methodology was employed. The ratio of average coniferous harvest (less an estimate of the cedar component) for the period 1985-89 was reduced by the ratio of AAC less cedar in 1991 divided by AAC less cedar in 1990. The resulting adjusted average harvest was compared to the 1991 AAC to derive the ratios to be applied to the deciduous component of the AAC.

[36]Backman (1993) provided such a break down, using the methodology described in the preceding footnote. He showed that the AAC for Russia which is currently accessible amounted to 395 million cubic meters, of which 238 million cubic meters flowed from coniferous stands and 158 million cubic meters from deciduous stands. However, the level of accessibility was based not only on the level of harvest during the period from 1986 until 1988, but included an allowance for perceived surplus capacity and an allowance for stands which were currently physically accessible, but could not be harvested because of technological constraints. This report adopts a more conservative approach, assuming that the level of harvest chosen to represent an average accessibility utilization could not be exceeded in the short to medium term. Consequently, the inferred capacity does not need to be adjusted upwards to account for surplus capacity existing during the period 1985 and 1989. Additionally, the rapid increase in harvest experienced between 1985 and 1988 may be a short term phenomenon, not connected with increasing capital capacities. In fact, the currently accessible AAC may have been over harvested. Thus, a proxy for capacity was derived based on the average between 1985 and 1989, a five year period which was thought to provide a better estimate which accounted for annual variations brought on by unexpected developments in weather, demand, and so on.

[37]The potential AAC is a derive result based on the Russian estimate of AAC in the current and potentially accessible resource less the estimated currently accessible component.

[38]The larch component is higher in the potentially accessible AAC due to the historic preference for spruce/true fir and pine, the physical location of the larch stands (generally in the lesser developed regions of the country) and the difficulties imposed by the characteristics of larch on utilization (Barr, Brenton and Kathleen Braden, The Disappearing Russian Forest, p. 196).

Birch stands provide the major source of the deciduous component, amounting to slightly more than one-half of the total volume. It is believed that aspen accounts for most of the remainder, with minor contributions from oak and beech stands.

B.4.2 The Reserve Allowable Annual Cut

The reserve AAC amounts to an estimated 264 million cubic meters, 234 million cubic meters of which consist of contributions from coniferous forest. Deciduous stands provide the balance of 30 million cubic meters.[39] Distribution of the reserve AAC among the stand components is not available.

Footnotes

[39]During the late 1970s, the AAC contributed by the then reserve stands amounted to 201 million cubic meters, of which 178 million consisted of fiber flow from coniferous stands. Following the revision of the AACs in 1991, the reserve AAC was adjusted upwards to account for the shift of 63 million cubic meters between the AAC of 1990 and the revised AAC of 1991. The shift caused an increase of 56 million cubic meters in the coniferous component and a 7 million cubic meter increase in the deciduous component.

C. THE FOREST RESOURCES OF THE ECONOMIC REGIONS OF RUSSIA

Evident from Chapter 2, the forest resources of Russia are enormous. As large as Russia is, however, so too is the diversity when examining the forest resources among the eleven economic regions.[40] This chapter provides a more detailed treatise of the forest resources of Russia, taking a closer examination of the distribution of forest resources among the economic regions. **Table C.1** shows the distribution of the major forest resource indicators segregated according to the economic regions.

C.1 NORTHERN ECONOMIC REGION

Evident from **Map A**, the North Economic Region is located in the extreme reaches of European Russia. Containing 76 million hectares of stocked forest land and 7.6 billion cubic meters of growing stock, it accounts for some 10 percent of the forest resources of Russia. Of the 8 separate regions of European Russia, this economic region accounts for the greatest share, representing nearly fifty percent of the stocked forest land and about 40 percent of the growing stock. Almost 60 percent of the coniferous stocked forest land and nearly one-half of the growing stock of European Russia are concentrated in this region. The degree to which the Northern Economic Region dominates the forest resources of European Russia is amply evident in **Table C.1**.

C.1.1 The Forest Resource According to Ownership

Following the pattern established when examining the aggregated forest resources of Russia, the forest resources of the Northern Economic region have been divided into three broad categories: (1) Forest Sector; (2) Agricultural Sector; and (3) Other Sectors. The Forest Sector category accounted for the majority of the forest resources, representing some 90 percent of the stocked forest land and growing stock. Agricultural forests accounted for another 7 percent while Other Sector forests represented only 2 percent of the total. **Table C.2** shows the forest resources of the Northern Economic region segregated into these broad use categories.

C.1.1.1 Forest Sector

While *Goskomles* forests allocated for medium term uses still dominate the 69 million hectares of forested land and nearly 7 billion cubic meters of growing stock of this economic region, the forest resource designated for the former Ministry of the Forest Industry amounts to slightly more than 10 percent of the forested land and 10 percent of the growing stock. The share of the forest sector resources allocated to long-term uses amounts to some 5 percent of the stocked area and growing stock. *Goskomles* forests designated for medium term utilization accounted for three-quarters of the forest sector resource.

Footnotes

[40]Russia has historically been divided into eleven economic regions plus Kaliningrad *oblast'*. Kaliningrad *oblast'*, shown on **Map A** of the main text, is nestled between Lithuania and Poland, and is geographically isolated from the rest of Russia. Historically, Kaliningrad has not been included with any one of the eleven economic regions of Russia, but has been incorporated into a larger region called the West (The three Baltic republics, Belorussia, and the Kaliningrad *oblast'*). Kaliningrad, accounting for only 267 thousand hectares of stocked forest land and 39 million cubic meters of growing stock, is dwarfed by the other regions in Russia, and accordingly is not included in the analysis.

C.1.1.1.1 Goskomles Short and Medium Term Forests

Accounting for nearly 58 million hectares of forest land, more than 95 percent are considered stocked. Coniferous forests occupies the largest share of the forested land, representing four-fifths of the 56 million stocked hectares. Deciduous species accounts for another 11 million hectares while the balance, amounting to only one thousand hectares, supports forests of minor species. Total growing stock, corresponding to the area of stocked forest land, amounts to more than 5.5 billion cubic meters. Coniferous forests amounts to 85 percent of the aggregated regional total with the balance being comprised of deciduous species. Other species are conspicuous by their absence. The average stocking per hectare, accordingly, amounts to almost 110 cubic meters per hectare in coniferous stands, and more than 75 cubic meters per hectare in deciduous stands. What forest resource located in other species shows stocking of less than 15 cubic meters per hectare.

While on an aggregated basis, mature and overmature stands account for almost 60 percent of the stocked forest land, deciduous forests, while accounting for 11 million hectares of stocked forest land, contain only 3 million hectares of mature and overmature forests, or approximately 30 percent of the deciduous forested area. Coniferous forests, on the other hand, which in total amounted to some 44 million hectares, contain nearly 28 million hectares of mature and overmature forested land, or 64 percent of the coniferous total. Mature and overmature coniferous stands support 3.7 billion cubic meters of growing stock, indicating a stocking per hectare of 130 cubic meters per hectare. Deciduous mature and overmature stands, on the other hand contain some 434 million cubic meters, thus yielding stocking per hectare of 135 cubic meters. In comparison, stocking in the immature stands varies from almost 70 cubic meters per hectare in the coniferous stands to slightly more than 50 cubic meters in the deciduous stands.

C.1.1.1.2 Resources Assigned to the Former Ministry of Forest Industry

The component of the forest resources, which is part of the former forest industrial ministerial system, while not large, still amounts to nearly 12 percent of the forested land (nearly 9 million hectares) and 10 percent of the growing stock (786 million cubic meters). Some 90 percent of the stocked forest land and growing stock are covered with coniferous forests, with the balance consisting of deciduous stands. Forested land occupied by the non-principle species are conspicuous by their absence. The average stocking per hectare amounts to almost 90 cubic meters per hectare, with stocking in coniferous stands amounting to slightly more than 90 cubic meters per hectare, while stocking in deciduous stands to almost 80 cubic meters per hectare.

Growing stock on mature and overmature coniferous stands amounts to almost 370 million cubic meters standing on nearly 3 million hectares, or nearly 50 percent and 35 percent of the totals of stocked forest land and growing stock respectively. Mature and overmature stands support a stocking of slightly more than 135 cubic meters per hectare. Stocking in the immature stands, on the other hand, amounts to slightly less than one-half of the average in the mature and overmature stands. Mature and overmature deciduous stands supports some 33 million cubic meters of growing stock on 207 thousand hectares, providing a stocking per hectare greater than 160 cubic meters. Stocking in the immature deciduous stands amounts to 55 cubic meters per hectare.

C.1.1.1.3 Goskomles Forests Set Aside for Long-Term Uses

Lands which have been allocated to Long-Term Uses amount to more than 10 million hectares, of which less than 50 percent are considered capable of sustaining forests. Nearly all of this forest land, or 5 million hectares, is stocked. Coniferous forests account for slightly more than 80 percent of the forested land, with deciduous stands

accounting for the remainder. Stocked forest land under other species are absent. While growing stock supported by the forested area amounts to almost 300 million cubic meters, stocking per hectare is very modest, varying from some 70 cubic meters in coniferous stands to slightly more than 35 cubic meters in the deciduous stands.

The mature and overmature components of the coniferous resource account for almost 90 percent of the forested land and growing stock. In deciduous stands, the mature and overmature share of the forested land amounted to 70 percent while the share of growing stock reached almost 80 percent. Stocking per hectare in coniferous mature and immature stands amounted to between 75 and 80 cubic meters while in deciduous mature and immature stands, stocking amounted to between some 25 cubic meters and 40 cubic meters.

C.1.1.2 Agricultural Sector

Unlike other ownerships, all of the land located in agriculture control is considered forest land, amounting to 5 million hectares. Virtually all of the forest land is stocked with either coniferous or deciduous species. The growing stock supported by the forested land amounted to 678 million cubic meters.

The forest resources of the agriculture interests are concentrated in coniferous species which account for more than 60 percent of the stocked forest area and slightly more than 70 percent of the growing stock. The resulting stocking per hectare reveals almost 155 cubic meters in coniferous forests and almost 110 cubic meters in deciduous stands.

Considering the "ownership" of the resource, it is not surprising to see that more than 80 percent of the coniferous and 60 percent of the deciduous forested areas are concentrated in immature stands. Of the 481 million cubic meters of coniferous growing stock, about 100 million cubic meters growing on some 500 million hectares are considered mature and overmature, indicating a stocking per hectare of almost 175 cubic meters. Immature coniferous stands support a stocking of about 150 cubic meters. Almost 86 million cubic meters of deciduous growing stock are believed to be mature and overmature, suggesting a stocking of more than 185 cubic meters per hectare on the 450 million hectares of deciduous mature and overmature land. Immature stands support stocking of slightly more than 80 cubic meters per hectare.

C.1.1.3 Other Sectors

Supporting 2 million hectares of forest land, nearly all are considered stocked. More than 80 percent of the stocked forest land supports coniferous species with the balance consisting of deciduous stands. Containing 215 million cubic meters of growing stock, almost 90 percent consist of coniferous stands, the stocking in which amounting to almost 125 cubic meters per hectare. Stocking in the deciduous stands is somewhat less, reaching almost 65 cubic meters per hectare.

The mature and overmature component of the coniferous forested land amounts to two-fifths of the coniferous total while the mature and overmature component in deciduous stands amounts to one-third of the deciduous total. Supporting 91 million cubic meters and 12 million cubic meters respectively, stocking in mature and overmature coniferous stands amounts to 140 cubic meters per hectare and some 110 cubic meters per hectare in deciduous stands. In comparison, stocking in immature stands amounted to almost 115 cubic meters and nearly 45 cubic meters respectively.

C.1.2 Species Distribution

The forest inventory of the Northern Economic region is dominated by coniferous stands which account for 80 percent of the stocked forest land and 85 percent of the

growing stock. Deciduous stands account for one-fifth of the forest forested area and 15 percent of the growing stock. Only marginal amounts of the forest resource are located in the category of other species. **Table B.2** presents data describing the forest resources segregated by species associations.

C.1.2.1 Coniferous Association

The coniferous resource consists almost entirely of stands predominated by pine species and spruce stands. Spruce accounts for three-fifths of the forested area and two-thirds of the growing stock with the balance almost entirely consisting of pine stands. Minor amounts of true fir, larch and cedar round out the coniferous resource. On an aggregated basis, spruce species contain the highest stocking per hectare, amounting to almost 115 cubic meters, while stocking in pine stands amount to 85 cubic meters per hectare. Stocking in the true fir, larch, and cedar stands vary between some 105 and 125 cubic meters per hectare.

C.1.2.2 Deciduous Association

Deciduous stands, accounting for the remaining 20 percent of the forest inventory, are dominated by birch stands. Birch accounts for 90 percent of the forested area and four-fifths of the growing stock. Aspen stands account for virtually all of the remainder. Species such as oak and beech appear to be non-existent. Birch stands support a lower stocking per hectare than most other deciduous stands, amounting to slightly more than 65 cubic meters per hectare. Aspen stands support much higher stocking, containing nearly 140 cubic meters per hectare.

C.1.3 Accessibility

Table C.3 provides a distribution of the forest resources of the Northern Economic region segregated by accessibility classes. Exploitable forests, which amount to 67 million hectares and 7 billion cubic meters of growing stock, account for almost 90 percent of the area and almost 95 percent of the growing stock of the total in the economic region. Reserve forests, amounting to 9 million hectares and 560 million cubic meters of inventory, make up the remainder.

C.1.3.1 Exploitable

Both agricultural forests and forests allocated to "Other Sectors" play a minor role in the size of forest resource considered to be exploitable, amounting to 7 percent and 3 percent of the exploitable forested area of 67 million hectares. The largest share, accounting for 90 percent of the stocked forest land, lies within the boundaries of responsibility of the successor organs to *Goskomles* . A similar situation exists as far as growing stock is concerned for which agricultural and other sectors account for 10 percent and 3 percent of the region exploitable total of 7 billion cubic meters. Slightly more than 85 percent of the growing stock are located within the domain of the successor organizations to *Goskomles.*

C.1.3.1.1 Forest Sector Short and Medium Term Forests

The exploitable area of 60 million hectares supports nearly 6 billion cubic meters of growing stock. While coniferous species account for four-fifths of the forested area, the balance consists solely of deciduous stands. Forested stands supporting species other than the principal ones are conspicuous by their absence. Stocking per hectare surpasses 105 cubic meters per hectare in coniferous stands and approaches 80 cubic meters in the deciduous stands. What little forested area under other species does not contribute in meaningful way to industrial potential.

Mature and overmature forests, located on 32 million hectares, account for one-half of the forested area and 70 percent of the growing stock (4.4 billion cubic meters). While the mature and overmature component of coniferous forests amounts to almost 60 percent of the area and three-quarters of the growing stock, the share of deciduous stands amounts to only one-quarter of the stocked forest land and one-half of the growing stock. Stocking in mature and overmature stands amounts to 135 cubic meters in coniferous stands and some 165 cubic meters in deciduous stands. In comparison, immature coniferous forests support stocking of more than 65 cubic meters while that in deciduous stands amounts to slightly more than 50 cubic meters per hectare.

C.1.3.1.2 Agricultural Sector

Agricultural forests have been reviewed in section **C.1.1.2**.

C.1.3.1.3 Other Sectors

Other sector forests have been reviewed section **C.1.1.3**.

C.1.3.2 Reserve

Reserve forests amount to 9 million hectares and 560 million cubic meters of growing stock, or 12 percent and 7 percent respectively of the total forest resource. More than one-half of the stocked forest area and growing stock is located in forests set aside for long-term uses. The balance, amounting to slightly more than 45 percent of both stocked forest land and growing stock, is contained in medium term *Goskomles* forests.

C.1.3.2.1 Forest Sector Short and Medium Term Forests

Reserve forests account for 4 million hectares and nearly 263 million cubic meters of growing stock, representing 47 percent of the reserve stocked forest land and growing stock. Coniferous stands, occupying 3 million hectares and 218 million cubic meters, account for slightly less than 75 percent of the stocked forest land and almost 85 percent of the growing stock. Stocking of almost 65 cubic meters per hectare are located in reserve forests with a range from 70 cubic meters in coniferous forests to slightly more than 42 cubic meters in deciduous forests.

C.1.3.2.2 Goskomles Long Term Forests

Goskomles long-term forests have been reviewed in section **C.1.1.1.3**.

C.1.4 THE NORTH ALLOWABLE ANNUAL CUT

The AAC supported by the forest resources of the Northern region amounts to 94 million cubic meters, of which 81 million cubic meters, or more than 85 percent, are considered to be currently or potentially accessible from the exploitable resource (**Table B.5**). The AAC contributed by the reserve stands amounts to 13 million cubic meters, up considerably from the levels of the late 1970s which approached 5 million cubic meters per year.

C.1.4.1 The Exploitable Allowable Annual Cut

The exploitable AAC amounting to 81 million cubic meters, is dominated by the contribution from the forest sector lands, which amounts for more than 95 percent. The AAC contributed by the forest sector resource amounts to 77 million cubic meters. The remainder, amounting to almost 3.5 million cubic meter, flows from the non-forest sector lands.

C.1.4.1.1 The Forest Sector Allowable Annual Cut

The exploitable AAC, amounting to 77 million cubic meters, is dominated by the coniferous resource, which accounted for slightly more than 70 percent of the volume, or 56 million cubic meters.[41] Deciduous species accounted for the remaining 21 million cubic meters. However, not all of the forest sector AAC can be considered to be current accessible with the given level of technology and infrastructural development. The currently accessible AAC in the Northern economic region amounts to 70 million cubic meters, or more than 90 percent of the forest sector total. The potentially accessible AAC, then, amounts to 7 million cubic meters per annum.

C.1.4.1.1.1 The Currently Accessible Allowable Annual Cut

The currently accessible AAC, amounting to 70 million cubic meters, is dominated by the coniferous species which account for more than 70 percent of the total. The principal source of the coniferous volume, amounting to 50 million cubic meters, consists of spruce and true fir stands, which account for some two-thirds of the coniferous total. The balance consists virtually of volume flowing from pine stands. The deciduous component, amounting to 19 million cubic meters, is comprised mainly of softwood deciduous species, the principal one being birch.

C.1.4.1.1.2 The Potentially Accessible Allowable Annual Cut

The potentially accessible AAC amounts to 7 million cubic meters, almost three-quarters of which consists of coniferous species. The major stand association in the coniferous component is pine which represents almost 55 percent of the total. While spruce/true fir stands make up most of the remainder, a small volume is available from larch stands which amounts to one percent. The deciduous component, amounting to 2 million cubic meters, contains the same distribution among the species associations as for the currently accessible variety. Two-thirds of the potential deciduous AAC consists of birch stands with the balance consisting of aspen.

C.1.4.1.2 The Non-Forest Sector Allowable Annual Cut

The AAC supported by the non-forest sector forest resource amounts to an estimated 3.4 million cubic meters, of which three-fifths are believed to consist of coniferous species.[42] More than 70 percent of the coniferous component of the AAC is contributed by the spruce/true fir stands with the balance originating from the pine stands. Birch stands contribute the largest share of the deciduous AAC, amounting to nearly 60 percent of the deciduous total with, it is believed, aspen providing the remainder.

Footnotes

[41]The current and potential AAC per hectare for the coniferous stands amounts to 1.3 cubic meters and 1.8 cubic meters in the deciduous stands (**Table B.4**). These figures do not appear to be unreasonable thereby suggesting that the exploitable AAC from the forest sector lands cannot be discarded as inadequate.

[42]The AAC per hectare supported by the non-Forest Sector stocked forest land amounts to 0.5 cubic meters in coniferous stands and 0.6 cubic meters in deciduous stands. These figures are surprisingly consistent throughout the European part of Russia. While the figures are less than those contained in the Forest Sector lands, the differences are believed linked to the sectors to which the lands are dedicated. Agricultural lands would not perform solely timber producing roles, but could be expected to provide other benefits which would be linked to the integrity of the forest itself. A lower AAC per unit area would follow from this assumption.

C.1.4.2 The Reserve Allowable Annual Cut

In addition to both the current and potentially available fiber, the reserve forests of the Northern Economic region are believed to support an AAC of some 13 million cubic meters. Virtually all of this volume is believed to be contributed by coniferous stands. The AAC supported by the reserve component of the forest resource has more than doubled since the late 1970s suggesting that further modification of the AAC may be possible.[43,44]

C.2 NORTH-WEST ECONOMIC REGION

The North-West Economic Region, shown on **Map A** of the main text, accounts for one percent of the forested area (10 million hectares) and 2 percent of the growing stock (1.6 billion cubic meters) of Russia. Of the 8 separate regions of European Russia, this economic region is fifth in size. Coniferous stands account for one-half of the forested area and slightly more of the growing stock with the balance provided by the deciduous resource. **Table C.1** shows for selected indicators, the distribution of the forest resource among the different economic regions of Russia.

C.2.1 The Forest Resource According to Ownership

The forest resources of the North-West Economic region (10 million hectares and 1.6 billion cubic meters) have been divided into three broad categories: (1) Forest Sector; (2) Agricultural Sector; and (3) Other Sectors. The Forest Sector category accounts for some three-fifths of the total stocked forest land and growing stock. Agricultural forests account for another 35 percent and almost one-third respectively. Other Sector forests contain the balance. **Table C.4** shows the forest resources of the North-West Economic region segregated into these broad use categories.

C.2.1.1 Forest Sector

Forest assigned to Long-term uses account for an insignificant share of the forested area (11 thousand hectares) and growing stock (one million cubic meters). The forest resources assigned to *Goskomles* for medium term uses, and to the former Ministry of the Forest Industry, amount to more than 99 percent of the total forest sector stocked forest land (6 million hectares) and growing stock (one billion cubic meters). The resource designated for use by the former Forest Industry accounts for a significant share amounting to two-fifths of the forest sector stocked forest land and growing stock, or 2.5 million hectares and 421 million cubic meters.

Footnotes

[43]The AAC in the North Economic region in 1990 amounted to 86 million cubic meters, down slightly from the 89 million cubic meters evident in 1980. In 1991, however, the AAC amounted to 77 million cubic meters, a decline of 10 percent on the 1990 levels. While it is unclear the motives underlying the reduction, it does appear that the ability of what had been considered to be exploitable forest resource is being re-examined. The trend in the AAC supported by the exploitable resource of the North Economic region is shown in **Table B.7**.

[44]The AAC per hectare supported by the reserve resource amounts to 1.3 cubic meters in coniferous stands and 0.4 cubic meters in the deciduous resource. While the low value in the deciduous component of the reserve forest would suggest that the area may be of low site and or stocking class, the near equal values between exploitable forest sector land and reserve forest sector land could indicate that factors restricting its use are linked to accessibility and or environmental factors limiting exploitation.

C.2.1.1.1 Goskomles Short to Medium Term Forests

Accounting for 3.8 million hectares of forest land, nearly all of the *Goskomles* forest land is considered stocked. Coniferous forests occupy the largest share of the forested land, accounting for 60 percent of the stocked hectares. Deciduous stands account for the remainder. The share of the forest resource allocated to other species is virtually non-existent. Total growing stock, corresponding to the area of stocked forest land, amounts to 605 million cubic meters. Coniferous forests account for 70 percent with the balance consisting of deciduous forest. Other species are conspicuous by their absence. The average stocking per hectare, accordingly, is almost 165 cubic meters per hectare in coniferous stands, and more than 170 cubic meters per hectare in deciduous stands. What forest resource there is located in other species shows stocking of only 30 cubic meters per hectare.

Mature and overmature stands account for approximately one-fifth of the stocked forest land. The mature and overmature component of coniferous forests, amounting to nearly 341 thousand hectares, represent 16 percent of the coniferous total. Deciduous mature and overmature forests, on the other hand, while accounting for 464 thousand hectares, represent one-third of the deciduous forested area. Mature and overmature coniferous stands support 84 million cubic meters of growing stock, indicating a stocking per hectare of 245 cubic meters. Deciduous mature and overmature stands, on the other hand contain some 108 million cubic meters, yielding stocking per hectare of almost 235 cubic meters. In comparison, stocking in the immature stands varies from 150 cubic meters per hectare in the coniferous stands to slightly more than 140 cubic meters in the deciduous stands.

C.2.1.1.2 Resources Assigned to the Former Ministry of Forest Industry

The component of the forest resources which were part of the forest industrial ministerial system, amounting to two-fifths of the forest sector forest land, account for nearly 2.7 million hectares. Almost 2.5 million of these hectares are stocked. Nearly 65 percent of the stocked forest land are covered by coniferous forests. The balance consist of stands in which deciduous species dominate. Forested land occupied by the non-principal species are conspicuous by their absence. Growing stock supported by the forested land amount to some 421 million cubic meters, of which 64 percent consist of coniferous species. The average stocking per hectare surpasses 165 cubic meters, with stocking in coniferous stands amounting to this figure, and while stocking in deciduous stands approaches nearly 170 cubic meters.

Growing stock in mature and overmature coniferous stands amounts to 122 million cubic meters standing on nearly 486 thousand hectares, or almost 45 percent and 30 percent of the coniferous totals respectively. Mature and overmature coniferous stands support a stocking of more than 250 cubic meters per hectare, while stocking in the immature stands amounts to slightly more than one-half of the mature and overmature stand.

Mature and overmature deciduous stands support some 68 million cubic meters of growing stock on 282 thousand hectares, providing a stocking per hectare of nearly 240 cubic meters. Stocking in the immature stands amounts to slightly more than 140 cubic meters per hectare.

C.2.1.1.3 Goskomles Forests Set Aside for Long-Term Uses

Lands which have been allocated to long-term uses amount to only 58 thousand hectares, of which slightly less than one-fifth are considered capable of sustaining forests. Nearly all of this forest land, or 11 thousand hectares, is stocked. Coniferous forests account for slightly more than 70 percent of the forested land, with deciduous representing the remainder. Stocked forest land under other species are absent.

Growing stock supported by the forested area amounts to almost one million cubic meters, with stocking per hectare modest, varying from some 115 cubic meters in coniferous stands to almost 120 cubic meters in the deciduous stands.

The mature and overmature components of the coniferous resource account for 9 percent of the forested land and 12 percent of the growing stock. In deciduous stands, the mature and overmature share of the forested land amounts to 15 percent while the share of growing stock reached almost 25 percent. Stocking per hectare in coniferous mature stands approaches 160 cubic meters and is 200 cubic meters in deciduous mature stands. Immature coniferous stands have stocking of some 110 cubic meters per hectare while those in deciduous stands contain stocking of almost 105 cubic meters.

C.2.1.2 Agricultural Sector

The forest land component amounts to nearly 4 million hectares, virtually all of which is considered stocked with either coniferous or deciduous forests. The growing stock supported by the forested land amounts to 514 million cubic meters.

The agricultural forest resources are concentrated in deciduous stands which account for almost 70 percent of the stocked forest area and slightly more than 60 percent of the growing stock. The resulting stocking per hectare shows almost 170 cubic meters in coniferous forests and more than 125 cubic meters in deciduous stands.

Almost 90 percent of the coniferous and deciduous forested areas are concentrated in immature stands. Of the 198 million cubic meters of coniferous growing stock, 32 million cubic meters are considered mature and overmature, indicating a stocking per hectare of more than 220 cubic meters. Immature coniferous stands support a stocking of about 160 cubic meters. Almost 57 million cubic meters of deciduous growing stock growing on 285 thousand hectares are believed to be mature and overmature, suggesting a stocking of more than 200 cubic meters per hectare. Immature stands support stocking of slightly more than 115 cubic meters per hectare.

C.2.1.3 Other Sectors

Supporting 586 thousand hectares of forest land, all save 20 thousand hectares are considered stocked. More than 60 percent of the stocked forest land supports coniferous stands with the balance containing deciduous stands. Supporting 83 million cubic meters of growing stock, almost two-thirds are contributed by stands in which coniferous species dominate. The stocking in coniferous stands amount to more than 150 cubic meters per hectare, while that in deciduous stands is somewhat less, being almost 140 cubic meters per hectare.

The mature and overmature component of the forested land amounts to 10 percent in coniferous forests and almost one-fifth in deciduous stands. Supporting 8 million cubic meters in each specie group respectively, stocking in mature and overmature coniferous stands amount to more than 215 cubic meters per hectare and more than 200 cubic meters per hectare in deciduous stands. Stocking in immature stands amounts to 145 cubic meters in coniferous stands and more than 125 cubic meters in deciduous stands.

C.2.2 Species Distribution

Coniferous stands account for three-fifths of the stocked forest land and growing stock in the North-West Economic region. Deciduous stands contain the remainder. Only marginal amounts of the forest resource are located in the category of other species. **Table B.2** presents data describing the forest resources segregated by specie associations.

C.2.2.1 Coniferous Association

The coniferous resource consists almost entirely of stands predominated by pine species and spruce species. Pine accounts for three-fifths of the coniferous forested area and 55 percent of the growing stock with most of the balance made up of spruce stands. Larch stands are present, although the degree to which they contribute to the forest resources of this economic region is not significant.

On an aggregated basis, spruce stands contain the highest stocking per hectare, amounting to almost 185 cubic meters. Stocking in pine stands amounts approaches 155 cubic meters per hectare. Stocking per hectare in those larch stands which are present amounts to 65 cubic meters.

C.2.2.2 Deciduous Association

Deciduous stands account for almost 40 percent of the forest inventory, which, by a large extent, is dominated by the birch and aspen stands. Together, these two stands associations account for virtually all of the stocked deciduous forest land and growing stock. Minor amounts of alder and trace amounts of oak stands are present, although both are dwarfed by the birch and aspen components.

Birch stands support a lower stocking per hectare than most other deciduous stands, amounting to slightly more than 160 cubic meters per hectare. Aspen stands contain much higher stocking amounting to nearly 215 cubic meters per hectare. Alder stands support stocking per hectare of nearly 145 cubic meters.

C.2.3 Accessibility

Table C.5 provides a distribution of the forest resources of the North-West Economic region segregated by accessibility classes. Exploitable forests account for more than 95 percent of the stocked forest land and growing stock of 10 million hectares of stocked forest land and 1.6 billion cubic meters of growing stock. Reserve stands contain only 454 thousand hectares and 80 million cubic meters of growing stock.

C.2.3.1 Exploitable

Forests allocated to Other sectors play a minor role in the size of forest resource considered to be exploitable, amounting to only 566 thousand hectares of stocked land and 83 million cubic meters of growing stock, or some 5 percent of the exploitable totals. The largest share, accounting for about 60 percent of the stocked forest land and concomitant growing stock, lies within the boundaries of the successor organs to *Goskomles*. These forests contain 5.7 million hectares of stocked land and 945 million cubic meters of growing stock. The remainder is accounted for by the agricultural forests.

C.2.3.1.1 Forest Sector Forests for Short and Medium Term Needs

The exploitable resource supports 945 million cubic meters of growing stock on 5.7 million hectares. Coniferous forest account for three-fifths of the forested area and growing stock, or 569 million cubic meters and 3.5 million hectares of stocked land. The balance is made-up solely of deciduous stands. Forested stands supporting species other than the principal ones are conspicuous by their absence. Stocking per hectare amounts to nearly 165 cubic meters per hectare in coniferous stands and 170 cubic meters in the deciduous stands. What little forested area under other species does not contribute in meaningful way to industrial potential.

The mature and overmature component, accounting for one-quarter of the aggregated forested area, amounts to slightly more than one-fifth of the coniferous forested land

and almost one-third of the deciduous stands. Stocking in the mature and overmature components amounts to nearly 250 cubic meters in coniferous stands and more than 235 cubic meters in deciduous stands.

The immature coniferous stands, accounting for almost 80 percent of the coniferous area and two-thirds of the growing stock, support stocking of nearly 140 cubic meters per hectare. The corresponding numbers in the deciduous stands are some two-thirds of the area and more than 55 percent of the volume, indicating a stocking of almost 140 cubic meters per hectare.

C.2.3.1.2 Agricultural Sector

Agricultural forests have been discussed in section **C.2.1.2.**

C.2.3.1.3 Other Ministries

The forest resource sequestered with other ministries and organizations has been reviewed in section **C.2.1.3.**

C.2.3.2 Reserve

Reserve forests amount to 454 thousand hectares and 80 million cubic meters of growing stock, or some 5 percent of the total forest resource. Marginal amounts of the reserve forests are located in forests set aside for long-term uses.

C.2.3.2.1 Forest Sector Short to Medium Term Forests

Reserve forests in this category account for 443 thousand hectares and nearly 79 million cubic meters of growing stock. Coniferous species, occupying 309 thousand hectares, representing 70 percent of the total aggregated forests. Stocking of 180 cubic meters per hectare are located in reserve forests which range from some 180 cubic meters in coniferous forests and slightly greater than 170 cubic meters in deciduous stands.

C.2.3.2.2 Goskomles Long Term Forests Reserved from Use

Long-term forests have been discussed in a section **C.2.1.1.3.**

C.2.4 THE NORTH-WEST ALLOWABLE ANNUAL CUT

Shown in **Table B.5**, the total AAC supported by the forest resource amounts to 17 million cubic meters, of which all are considered to be either currently or potentially accessible at the present time. Contributions by reserve forest are conspicuous by their absence.[45]

Footnotes

[45]Prior to 1982, the Northwest and the North Economic regions were combined into one region called, the Northwest Economic region. It is the Northwest region, dating from before 1982, which was credited with an AAC of 4.5 million cubic meters supported by the reserve forest of the time. For the purposes of this report, it has been assumed that the reserve forest, located in what is now considered to be the Northwest region, does not contain Reserve forest area of sufficiently high site to contribute to the AAC.

C.2.4.1 The Exploitable Allowable Annual Cut

The exploitable AAC, accounting for all of the AAC in this economic region, is dominated by the forest sector component, which contributes some 14.5 million cubic meters of the 17 million total exploitable AAC. Non-forest sector forest contributes the balance of some 2.5 million cubic meters per annum.

C.2.4.1.1 The Forest Sector Allowable Annual Cut

More than 70 percent of the forest sector AAC of 14.5 million cubic meters is considered to be currently accessible. The balance, amounting to 4 million cubic meters, is thought to become accessible with infrastructural development and the introduction of technology to permit safe harvesting of the harvesting site.[46]

C.2.4.1.1.1 The Currently Accessible Allowable Annual Cut

Nearly 45 percent of the currently accessible AAC of 10.6 million cubic meters consists of coniferous species, amounting to 4.7 million cubic meters. The principal species association within the coniferous AAC is spruce-true fir stand association, which accounted for 3.2 million cubic meters, or almost two-thirds of the coniferous total. Pine makes up most of the remainder. Deciduous species account for 55 percent of the AAC, or 6 million cubic meters. The largest share is concentrated in birch forests which represent more than three-fifths of the deciduous total. The balance consists primarily of aspen stands.

C.2.4.1.1.2 The Potentially Accessible Allowable Annual Cut

The potential fiber flow, which depends on infrastructural development or the introduction of new technology in the harvesting process, contributes 4 million cubic meters. The coniferous component, amounting to 1.7 million cubic meters, consists of nearly equal shares from pine stands and spruce/true fir stands. More than 55 present of this total, or greater than 2 million cubic meters, is contributed by deciduous stands, the major specie association being birch.

C.2.4.1.2 The Non-Forest Sector Allowable Annual Cut

The non-forest sector resource supports an AAC estimated to be 2.6 million cubic meters, 70 percent of which flowed from deciduous forests.[47] Birch stands contribute the major component of the volume, comprising 45 percent of the deciduous total. The coniferous component, which amounts to almost 800 thousand cubic meters, comes mainly from spruce associations (two-thirds) and pine associations (one-third).

C.2.4.2 The Reserve Allowable Annual Cut

Reserve AAC does not appear to be located in the North-West economic region.

Footnotes

[46]The average AAC in the current and potentially accessible resource amounts to 1.9 cubic meters per hectare in coniferous stands and 3.7 cubic meters in deciduous stands (**Table B.4**). Located south of the North Economic region, it is not surprising to see higher per hectare values evident for the Northwest Economic region.

[47]The AAC per hectare supported by the non-Forest Sector lands amounts to 0.5 cubic meters in coniferous stands and 0.7 cubic meters in deciduous stands. Slightly more than those evident for the North Economic

Footnotes *continued on next page*

C.3 CENTRAL ECONOMIC REGION

The Central Economic Region, located south of the Northwest and North Economic regions (**Map A**), accounts for only 3 percent of the forested area and 4 percent of the growing stock of Russia, or 20 million hectares of stocked forest land and 3 billion cubic meters of growing stock. Of the 8 separate regions of European Russia, this economic region is third in size after the Northern and Ural Economic Regions. Unlike the Northern Economic region, however, coniferous species account for less than 50 percent of the forested area and growing stock, evident from **Table C.1**.

C.3.1 The Forest Resource According to Ownership

The Forest Sector category accounted for almost 65 percent of the stocked forest land and slightly more than two-thirds of the growing stock. Agricultural forests accounted for another 30 percent and more than 25 percent respectively. Other Sector forests represented only 5 percent of the forested land and growing stock. **Table C.6** shows the forest resources of the Central Economic region segregated into these broad use categories.

C.3.1.1 Forest Sector

Forest assigned to longer-term uses, and those assigned to the former Forest Industry Ministry do not account for a significant share of the forested area or growing stock. The forest resources located in the boundaries of the former *Goskomles* amount to more than 99 percent of the stocked forest land and growing stock.

C.3.1.1.1 Goskomles Short to Medium Term Forests

Accounting for some 13 million hectares of forest land, more than 95 percent is stocked with either coniferous or deciduous forests. Deciduous stocked forests occupy equal shares of the forest resource. Coniferous forests account for 6 million hectares of stocked land while deciduous stands account for a slightly larger area. The share of the forest resource allocated to other species is virtually non-existent. Total growing stock, corresponding to the area of stocked forest land, amounts to 2 billion cubic meters, of which coniferous forests account for one-half of the total. The balance consist of deciduous forests. Other species are conspicuous by their absence.

The average stocking per hectare, accordingly, amounts to almost 165 cubic meters per hectare in coniferous stands, and 160 cubic meters per hectare in deciduous stands. What forest resource located in the minor species shows stocking of only 20 cubic meters per hectare.

On an aggregated basis, mature and overmature stands account for approximately 15 percent of the stocked forest land. Coniferous forests, which in total amounts to some 6 million hectares, contain more than 780 thousand hectares of mature and overmature forested land, or 12 percent of the coniferous total. Deciduous forests, on the other hand, while accounting for 6 million hectares of stocked forest land, contain only one million hectares of mature and overmature forests, or approximately 17 percent of the deciduous forested area. Mature and overmature coniferous stands support 195 million cubic meters of growing stock, indicating a stocking per hectare of nearly 250 cubic

Footnotes *continued*

region, these figures appear to be consistent with expectations of a higher site class in the Northwest region than in the North region.

meters. Deciduous mature and overmature stands, on the other hand, containing some 248 million cubic meters, have stocking per hectare of nearly 230 cubic meters. Stocking in the immature stands varies from more than 150 cubic meters per hectare in the coniferous stands to some 145 cubic meters in the deciduous stands.

C.3.1.1.2 Resources Assigned to the Former Ministry of Forest Industry

The component of the forest resources which is part of the forest industrial ministerial system is not a significant factor when examining the forest resources of the Central Economic region. The 59 thousand hectares support only 11 million cubic meters of growing stock, providing a stocking per hectare of more than 190 cubic meters. Only 45 percent of the forested area and slightly more than two-fifths of the growing stock were located in coniferous forests. The balance of 32 thousand hectares and 7 million cubic meters consist of deciduous stands. The average stocking per hectare in coniferous stands amounted to 180 cubic meters, while stocking in deciduous stands to slightly more than 200 cubic meters per hectare.

Growing stock on mature and overmature coniferous stands amounts to 2 million cubic meters standing on nearly 5 thousand hectares, supporting a stocking of slightly more than 300 cubic meters per hectare. Stocking in the immature stands, on the other hand, amounted to only 150 cubic meters per hectare. Mature and overmature deciduous stands support some 3 million cubic meters of growing stock on 11 thousand hectares, providing a stocking per hectare of nearly 300 cubic meters. Stocking in the immature stands is somewhat less standing at 155 cubic meters per hectare.

C.3.1.1.3 Goskomles Forests Set Aside for Long-Term Uses

Lands, which have been allocated to Long-Term Uses, amount to only 211 thousand hectares, of which 40 percent are considered capable of sustaining forests. Nearly all of this forest land, or 81 thousand hectares, are stocked with 9 million cubic meters of growing stock. Coniferous forests account for slightly more than 40 percent of the forest resource with deciduous forests accounting for the remainder. Stocked forest land under other species are absent. Stocking per hectare is very modest, varying from some 105 cubic meters in coniferous stands to 110 cubic meters in the deciduous stands.

The mature and overmature components of the coniferous resource account for some 15 percent of the forested land and one-quarter of the growing stock. In deciduous stands, the mature and overmature share of the forested land amount similar shares of the forested area and growing stock. Stocking per hectare in coniferous mature and overmature stands amount to almost 175 cubic meters while in the deciduous stands amounting to slightly more than 170 cubic meters. Stocking in the immature stands ranged from 95 cubic meters per hectare in coniferous stands to nearly 100 cubic meters in the deciduous stands.

C.3.1.2 Agricultural Sector

Unlike with other ownerships, all of the land located in agriculture control is considered forest land, amounting to 6.6 million hectares. Virtually all of the forest land is considered stocked with either coniferous or deciduous species. The growing stock supported by the forested land amounted to 813 million cubic meters. The forest resource supports stocking of 125 cubic meters per hectare.

The largest share of the agricultural forest resources lies with deciduous stands, which account for two-thirds of the stocked forest area and slightly less than 60 percent of the growing stock. The resulting stocking per hectare amounts to 160 cubic meters in coniferous forests and almost 110 cubic meters in deciduous forests.

More than 95 percent of the 2 million hectares of coniferous areas and 90 percent of the 4 million hectares of deciduous forested areas are concentrated in immature stands. Of the 346 million cubic meters of coniferous growing stock, about 20 million cubic meters are considered mature and overmature, indicating a stocking per hectare of almost 235 cubic meters. Immature coniferous stands support a stocking of almost 160 cubic meters. Almost 70 million cubic meters of deciduous growing stock are believed to be mature and overmature, suggesting a stocking of 190 cubic meters per hectare. Immature stands support stocking of slightly more than 100 cubic meters per hectare.

C.3.1.3 Other Sectors

Supporting one million hectares of forest land, nearly all are considered stocked either coniferous stands (50 percent) or deciduous stands (50 percent). Supporting 149 million cubic meters of growing stock, almost 55 percent consist of coniferous stands, the stocking of which amounted to 165 cubic meters per hectare. Stocking in the deciduous stands is somewhat less, being slightly more than 140 cubic meters per hectare.

Mature and overmature component of the forested land amounts to almost 10 percent in coniferous forests and nearly 15 percent in deciduous forests. Supporting 10 million cubic meters and 15 million cubic meters respectively, stocking in mature and overmature coniferous stands amounted to slightly more than 270 cubic meters per hectare and 235 cubic meters per hectare in deciduous stands. In comparison, stocking in immature stands amounted to more than 155 cubic meters in coniferous stands and more than 125 cubic meters in deciduous stands.

C.3.2 Species Distribution

The forest inventory of the Central Economic region is divided into three broad species aggregations, of which coniferous and deciduous stands each occupy one-half of the stocked area and one-half of the growing stock. Only marginal amounts of the forest resource are located in the category of other species. **Table B.2** presents data describing the forest resources segregated by species.

C.3.2.1 Coniferous Association

The coniferous resource consists almost entirely of stands predominated by pine species and spruce species, with pine accounting for nearly 60 percent of the stocked area and growing stock. Spruce accounts for virtually all of the remainder, although minor amounts of larch are represented.

On an aggregated basis, pine stands contain the highest stocking per hectare, amounting to almost 170 cubic meters. Stocking in spruce stands amount to almost 160 cubic meters per hectare. Stocking in the larch stands amount to only 120 cubic meters per hectare.

C.3.2.2 Deciduous Association

By a large extent, the deciduous resource is dominated by the birch species, accounting for 70 percent of the deciduous forested area and growing stock. While aspen accounts for some 20 percent of the forested area and nearly one-quarter of the growing stock, other miscellaneous species still make up five percent of the resource. Minor amounts of oak appear to be present.

Birch stands support a lower stocking per hectare than most other deciduous stands, amounting to slightly more than 155 cubic meters per hectare. Aspen stands support much higher stocking containing nearly 180 cubic meters per hectare. Stocking in the oak stands varies between 140 and 160 cubic meters per hectare.

C.3.3 Accessibility

Table C.7 shows that the exploitable forest resource, amounting to 18 million hectares and 2.7 billion cubic meters of growing stock, account for some 90 percent of the forest resources of the Central Economic region. Reserve forests amount to 2 million hectares and 352 million cubic meters.

C.3.3.1 Exploitable

Exploitable forests consist of those within the responsibility of the Forest Sector excluding those allocated to long-term uses, agricultural forests and forest allocated to Other Sectors. While forests designated to Other sectors play a minor role, accounting for 5 percent of forest resource considered to be exploitable, agricultural forests account for 35 percent of the exploitable stocked forest land and 30 percent of the growing stock. The largest share, accounting for three-fifths of the stocked forest land and nearly two-thirds of the growing stock, lies within the boundaries of the responsibility of the Forest Sector.

C.3.3.1.1 Forest Sector Forests for Short and Medium Term Needs

The exploitable area, amounting to 11 million hectares, supports nearly 1.7 billion cubic meters of growing stock. Coniferous stands account for one-half of area and growing stock, with the balance consisting of the deciduous stands. Forested stands supporting species other than the principal ones are conspicuous by their absence. Stocking in the coniferous stands and in the deciduous stands amounts to nearly 160 cubic meters per hectare.

Mature and overmature component of the coniferous and the deciduous forests account for some 15 percent of the forested area, and about one-quarter of the growing stock. Stocking per hectare in deciduous stands amounts to nearly 230 cubic meters per hectare and almost 250 cubic meters in coniferous stands. Immature stocking, of course is less, amounting to between 140 and 145 cubic meters per hectare.

C.3.3.1.2 Agricultural Sector

Agricultural forests have been discussed in section **C.3.1.2**.

C.3.3.1.3 Other Sector

The forest resource sequestered with other ministries have been examined in section **C.3.1.3**.

C.3.3.2 Reserve

Reserve forests amount to 2 million hectares and 352 million cubic meters of growing stock, or 9 percent and 12 percent respectively of the total forest resource. Nearly all of the stocked forest area and growing stock is located in *Goskomles* forests set aside for short to medium term uses.

C.3.3.2.1 Forest Sector Forests for Short and Medium Term Needs

Virtually all of the reserve forest is contributed by *Goskomles*, which accounts for more than 95 percent of the stocked forest land and growing stock. While accounting for one-half of the stocked forest land, coniferous forests contain nearly 55 percent of the growing stock. The resulting stocking per hectare amounts to more than 200 cubic meters per hectare. Deciduous forests, correspondingly, have a stocking per hectare of almost 175 cubic meters.

C.3.3.2.2 Goskomles Forests Allocated for Long-term Term Uses

This resource has been reviewed in section **C.3.1.1.3.**

C.3.4 THE CENTRAL ALLOWABLE ANNUAL CUT

The forest resources of the Central Economic region support an AAC estimated to be almost 32 million cubic meters (**Table B.5**). The component contributed by the reserve forests is not significant, leaving virtually the whole amount in the exploitable category.

C.3.4.1 The Exploitable Allowable Annual Cut

The exploitable AAC in the currently and potentially accessible forest amounts to slightly more than 31 million cubic meters. The share contributed by the non-forest sector resource accounts for 4.6 million cubic meters, or nearly 15 percent of the total. The balance, amounting to almost 27 million cubic meters, represents the remaining exploitable AAC contributed from the forest sector resource.

C.3.4.1.1 The Forest Sector Allowable Annual Cut

Almost 90 percent of the forest sector AAC is located in stands which are believed to be currently accessible following infrastructural development normally encounter during the harvesting phase.[48] The currently accessible AAC amounts to 24 million cubic meters. The balance of 3 million cubic meters is believed located in the forest resource which is potentially accessible following introduction of modern technology or infrastructural development.

C.3.4.1.1.1 The Currently Accessible Allowable Annual Cut

The forests of the Central Economic region support a currently accessible AAC estimated to be 24 million cubic meters. Deciduous stands account for two-thirds of the currently accessible total, with the principal source consisting of birch stands. The balance primarily flows from aspen stands. The coniferous component, amounting to almost 9 million cubic meters, flows mainly from spruce/true fir stands, accounting for almost three-fifths of the coniferous total. Pine stands comprise the remainder.

C.3.4.1.1.2 The Potentially Accessible Allowable Annual Cut

The potentially accessible AAC amounts to 3 million cubic meters, two-thirds of which flow from deciduous stands. Birch contributes the largest share of the deciduous component, amounting to nearly 50 percent of the total. In the coniferous component, spruce/true fir stands contribute three-fifths of the total with pine stands making up the remainder.

Footnotes

[48]The AAC per hectare supported by the exploitable Forest Sector resource amounts to 1.8 cubic meters in coniferous stands and 3.2 cubic meters in the deciduous stands. The coniferous component is expectedly consistent with the coniferous component in the Northwest region. While the deciduous component is less, it is still greater than 3 cubic meters per hectare. While it is not clear the reasons for the difference, it may be linked to site class, stocking, or a greater share of the forest resource lying in lands for which more onerous restrictions governing harvest are located. However, it is not sufficiently different to reject the AAC figure linked to the forest sector resource.

C.3.4.1.2 The Non-Forest Sector Allowable Annual Cut

The AAC supported by the non-forest sector resource amounts to an estimated 4.6 million cubic meters, almost 70 percent of which consist of deciduous stands.[49] Of the 3.2 million cubic meters flowing from deciduous forest, one-half, or 1.6 million cubic meters, comes from birch stands. Except for minor amounts contributed by the oak resource, the balance flows from what are believed to be aspen stands. The coniferous component, which amounts to 1.4 million cubic meters, is dominated by contributions from the spruce/true fir stand associations, which account for 814 thousand cubic meters. The balance comes from the pine stands.

C.3.4.2 The Reserve Allowable Annual Cut

Reserve AAC appears to be absent from this economic region.[50]

C.4 VOLGO-VYATSKIY ECONOMIC REGION

The Volgo-Vyatskiy Economic Region, located to the south of the North Economic region and east of the Central region (**Map A**), accounts for only 2 percent of the forested area and of the growing stock of Russia, or 13 million hectares and nearly 2 billion cubic meters. Of the 8 separate regions of European Russia, this economic region is fourth in size after the North, Central, and Ural Economic Regions. Coniferous species account for slightly than 50 percent of the forested area and almost 60 percent of the growing stock. **Table C.1** shows for selected forest indicators the distribution among the different economic regions of Russia.

C.4.1 The Forest Resource According to Ownership

The Forest Sector category accounted for almost 80 percent of the stocked forest land and of the growing stock. Agricultural forests accounted for nearly all of the remainder. Other Sector forests represented only 3 percent of the totals. **Table C.8** shows the forest resources of the Volgo-Vyatskiy Economic Region segregated into these broad use categories.

C.4.1.1 Forest Sector

Forest assigned to longer-term uses and the Former Ministry of the Forest Industry do not account for a significant share of the forested area or growing stock. The forest resources located under the responsibility of the former *Goskomles* amount to more than 99 percent of the stocked forest land and growing stock.

C.4.1.1.1 Goskomles Short to Medium Term Forests

Accounting for some 11 million hectares of forest land, 95 percent are considered stocked. Coniferous forests occupy the largest share of the forested land, representing more than 50 percent of the 10.5 million stocked hectares. Deciduous stands account for another 5.1 million hectares. The share of the forest resource allocated to other

Footnotes

[49]The AAC per hectare supported by the non-Forest Sector resource amounts to 0.5 cubic meters in coniferous stands and 0.7 cubic meters in deciduous stands, not overly different from that experienced in the Northwest economic region.

[50]While the Central Economic region contains reserve forest, it is not believed to be of sufficiently high site to contribute to an AAC.

species is virtually non-existent. Total growing stock, corresponding to the area of stocked forest land, amounts to 1.4 billion cubic meters. Coniferous forests amounted to 55 percent of the aggregated regional total with the balance being comprised of deciduous species. Other species are conspicuous by their absence. The average stocking per hectare, accordingly, amounts to almost 140 cubic meters in coniferous stands, and almost 130 cubic meters in deciduous stands. What forest resource located in other species shows stocking of only some 25 cubic meters per hectare.

On an aggregated basis, mature and overmature stands account for one-quarter of the stocked forest land and one-fifth of the growing stock. Coniferous forests, which in total amounted to some 5.3 million hectares, contain nearly 1.2 million hectares of mature and overmature forested land, or 23 percent of the coniferous total. Deciduous forests, on the other hand, while accounting for 5 million hectares of stocked forest land, contain only 900 thousand hectares of mature and overmature forests, or approximately one-third of the deciduous forested area. Mature and overmature coniferous stands support 263 million cubic meters of growing stock, indicating a stocking per hectare of 220 cubic meters per hectare. Deciduous mature and overmature stands, on the other hand contain some 215 million cubic meters, show a stocking per hectare of almost 235 cubic meters per hectare. Stocking in the immature stands varies from almost 120 cubic meters per hectare in the coniferous stands to nearly 105 cubic meters in the deciduous stands.

C.4.1.1.2 Resources Assigned to the Former Ministry of Forest Industry

Forests assigned to the former ministry of the forest industry do not exist in Volgo-Vyratskiy Economic Region.

C.4.1.1.3 Goskomles Forests Set Aside for Long-Term Uses

Lands which have been allocated to Long-Term Uses amount to only 109 thousand hectares, of which 37 thousand hectares are considered capable of, and are, sustaining stocked forests. The stocked forest land supports only 3 million cubic meters of inventory, indicating stocking of almost 90 cubic meters per hectare.

Coniferous forest accounts for about one-half of the forested area and 55 percent of the growing stock. Stocking in the coniferous stands amounts to more than 100 cubic meters while that in the deciduous stands amounts to slightly more than 75 cubic meters. The mature and overmature component in coniferous stands accounts for almost one-quarter of the coniferous stocked forest land and 10 percent of the deciduous stocked land. Corresponding numbers for growing stock are 35 percent and almost 25 percent respectively. The indicated stocking per hectare in the mature and overmature coniferous stands approaches 160 cubic meters while that in the deciduous stands is almost 180 cubic meters. Immature stocking is less, amounting to slightly more than 85 cubic meters per hectare in the coniferous stands and almost 65 cubic meters in the deciduous stands.

C.4.1.2 Agricultural Sector

Agriculture forest land, all of which is considered stocked, amounts to 2.5 million hectares. The growing stock supported by the forested land amounted to 326 million cubic meters.

The largest share of the forest resources of the agriculture interests are located in coniferous species which account for almost 55 percent of the stocked forest area and almost 65 percent of the growing stock. Stocking in coniferous stands amount to slightly more than 155 cubic meters per hectare, while that in the deciduous stands surpasses 105 cubic meters in deciduous stands.

Some 90 percent of the coniferous and the deciduous forested areas are concentrated in immature stands. Of the 208 million cubic meters of coniferous growing stock, about 33 million cubic meters on 156 thousand hectares are considered mature and overmature, indicating a stocking per hectare of almost 215 cubic meters. Immature coniferous stands support a stocking of about 150 cubic meters. Almost 18 million cubic meters of deciduous growing stock on 100 thousand hectares are believed to be mature and overmature, suggesting a stocking of more than 180 cubic meters per hectare. Immature stands support stocking of 100 cubic meters per hectare.

C.4.1.3 Other Sectors

Nearly all of the 427 thousand hectares of Forest Land are considered stocked with coniferous (228 thousand) and deciduous (181 thousand) stands. Supporting 57 million cubic meters of growing stock, almost 60 percent consist of coniferous species. The stocking amounts to almost 150 cubic meters per hectare. Stocking in the deciduous stands is somewhat less, being slightly more than 125 cubic meters per hectare.

Mature and overmature component of the forested land is less than 20 percent in coniferous forests and 15 percent in deciduous species. Supporting 7 million cubic meters and 9 million cubic meters respectively, stocking in mature and overmature coniferous stands amounted to 160 cubic meters per hectare and some 335 cubic meters per hectare in deciduous stands. Stocking in immature stands amounted to slightly more than 145 cubic meters and 90 cubic meters respectively.

C.4.2 Species Distribution

The forest inventory of the Volgo-Vyatskiy Economic region is divided into three broad species aggregations. Coniferous accounts for slightly more than one-half of the forested land and growing stock. Deciduous species account for virtually all of the remainder. Only marginal amounts of the forest resource are located in the category of other species. **Table B.2** presents data describing the forest resources segregated by species.

C.4.2.1 Coniferous Association

The coniferous resource consists almost entirely of stands predominated by pine species and spruce species. Spruce accounts for two-fifths of the coniferous forested area and growing stock with the balance made up of pine species. Minor amounts of true fir and larch stands exist, but do not amount to a significant area or volume. On an aggregated basis, spruce species contain the highest stocking per hectare, amounting to almost 155 cubic meters. Stocking in pine stands amounts to almost 135 cubic meters per hectare. What fir stands exist have a higher stocking, amounting to almost 205 cubic meters per hectare. Larch stands demonstrate the lowest stocking per hectare of the coniferous stands, amounting to almost 95 cubic meters.

C.4.2.2 Deciduous Association

Deciduous stands, accounting for some 50 percent of the forested area and 45 percent of the growing stock, are dominated by the birch species. Birch stands account for some 70 percent of the forested area and the growing stock. Aspen accounts for another 20 percent with minor species making up the remainder. Small amounts of oak and alder are present, but do not account for a significant share of the regional resource. Birch stands support a lower stocking per hectare than most other deciduous stands, amounting to slightly more than 120 cubic meters per hectare. Aspen stands contain much higher stocking amounting to more than 150 cubic meters per hectare. Stocking in the trace amounts of oak stands amount to between 130 and 140 cubic meters per hectare.

C.4.3 Accessibility

Table C.9 provides a distribution of the forest resources of the Volgo-Vyatskiy Economic region segregated by accessibility classes. Exploitable forests, amounting to 12 million hectares and almost 1.7 billion cubic meters, account for almost 95 percent of the total forest resources of the region. Reserve forests contain 844 thousand hectares and 128 million cubic meters.

C.4.3.1 Exploitable

The largest share of the exploitable forest resource, accounting for three-quarters of the stocked forest land and concomitant growing stock, lies within the boundaries of the successor organs to *Goskomles* . Agriculture forests contain one-fifth of the exploitable resource with the balance, amounting to three percent, located within other sectors.

C.4.3.1.1 Forest Sector Short and Medium Term Forests

The exploitable area supports nearly 1.3 billion cubic meters of growing stock on 9.6 million stocked hectares. Coniferous species account for one-half of the forested area and 55 percent of the growing stock, providing a stocking per hectare of nearly 140 cubic meters. Deciduous stands, accounting for virtually all of the remainder, support stocking of 125 cubic meters per hectare. Forested stands supporting species other than the principal ones are only marginally present.

Mature and overmature forests account for almost 25 percent of the coniferous stands and almost one-fifth of the deciduous stands. Stocking in mature and overmature stands amounts to almost 220 cubic meters in coniferous stands and more than 230 cubic meters in deciduous stands. Corresponding stocking in the immature coniferous components amounts to 115 cubic meters per hectare and almost 105 cubic meters in the deciduous stands.

C.4.3.1.2 Agricultural Sector

Agricultural forests have been reviewed in section **C.4.1.2.**

C.4.3.1.3 Other Sectors

The forest resource sequestered with other ministries and organizations has been examined in section **C.4.1.3.**

C.4.3.2 Reserve

Reserve forests amount to only 844 thousand hectares and 128 million cubic meters of growing stock, or some 6 percent of the total forest resource. Virtually all of the stocked forest area and growing stock is located in medium term forests belonging to *Goskomles.*

C.4.3.2.1 Forest Sector Short and Medium Term Forests

Reserve forests, accounting for 807 thousand hectares and nearly 124 million cubic meters of growing stock accounted for virtually all of the forest resource classified as reserve. Coniferous species, occupying 431 thousand hectares, account for slightly more than one-half of the total aggregated forests. Stocking of almost 155 cubic meters per hectare are located in reserve forests with a range from almost 160 cubic meters in coniferous forests and 150 cubic meters in deciduous species.

C.4.3.2.2 Goskomles Forest for Long-term Uses

Long-term use forests are discussed in section **C.4.1.1.3**.

C.4.4 THE VOLGO-VYATSKIY ALLOWABLE ANNUAL CUT

The AAC contributed by the forest resources of the Volgo-Vyatskiy economic region amounts to 24 million cubic meters. Virtually all of the AAC is located in the currently and potentially accessible forest. An insignificant volume is located in the reserve forests.

C.4.4.1 The Exploitable Allowable Annual Cut

The annual allowable cut (AAC) flowing from the currently and potentially accessible forest resource amounts to 24 million cubic meters, of which all but 1.7 million cubic meters is contributed by the forest sector (**Table B.5**). Non-forest sector forest accounts for the unaccounted 1.7 million cubic meters.

C.4.4.1.1 The Forest Sector Allowable Annual Cut

The forest sector AAC, amounting to 22.5 million cubic meters, is not all currently accessible with present harvesting technology and existing infrastructure. At the present time, the currently accessible AAC is thought to approach 21 million cubic meters, with the balance of 1.7 million cubic meters contributed by the potentially accessible component.[51]

C.4.4.1.1.1 The Currently Accessible Allowable Annual Cut

More than one-third of the currently accessible AAC of 20.8 million cubic meters flows from coniferous stands, amounting about 8 million cubic meters. The principal species association from which the coniferous AAC originates is spruce-true fir, accounting for 4.6 million cubic meters or almost 60 percent of the 8 million cubic meters. Pine stands make-up the remainder. Deciduous stands contribute 13 million cubic meters, the largest specie group being birch. The balance consists mainly of aspen species.

C.4.4.1.1.2 The Potentially Accessible Allowable Annual Cut

The potential AAC, amounting to 1.7 million cubic meters, consists mainly of deciduous stands which represent some 60 percent of the total. Fiber from birch stands dominates the deciduous component, accounting for three-fifths of the total, while spruce/true fir accounts for 80 percent of the coniferous total, or 502 thousand cubic meters. Pine accounts for the remainder within the coniferous component of the AAC.

Footnotes

[51]The AAC in the currently and potentially accessible stands amounts to 1.9 cubic meters in coniferous stands and 3.3 cubic meters in deciduous stands. These figures are consistent with those of economic regions in close proximity with the Volgo-Vyatskiy region.

C.4.4.1.2 The Non-Forest Sector Allowable Annual Cut

The AAC flowing from this resource is expected to amount to 1.7 million cubic meters, of which coniferous species will contribute slightly more than one-half.[52] Spruce stands account for three-fifths of the coniferous total with pine representing the remainder. The deciduous component is dominated by birch stands which account for 60 percent of the deciduous total. The balance consists primarily of aspen stands.

C.4.4.2 The Reserve Allowable Annual Cut

The AAC allocated to the reserve stands is not significant, amounting to an estimated 129 thousand cubic meters.[53]

C.5 Black Earth Economic Region

The Black Earth Economic Region, located immediately south of the Central Economic region (**Map A**), is not a major source of the forest resources of Russia, accounting for only 0.2 percent of the stocked forest land and growing stock, or 1.5 million hectares and 183 million cubic meters of growing stock. Of the 8 economic regions of European Russia, this economic region accounts for the smallest share of the forest resources. Coniferous species account for only 28 percent of the forested area and 34 percent of the growing stock. With the exception of one percent of the forest resources situated in other species, the balance consists of deciduous species. **Table C.1** which shows for selected forest indicators, the distribution among the different economic regions of Russia.

C.5.1 The Forest Resource According to Ownership

The Forest Sector ownership accounts for 80 percent of the stocked forest land and 83 percent of the growing stock. Agricultural forests accounted for another 14 percent and 8 percent respectively, while Other Sector forests represented only 6 percent and 9 percent of the total. **Table C.10** shows the forest resources of the Black Earth Economic region segregated into these broad ownership.

C.5.1.1 Forest Sector

Forests assigned to the Former Forest Industry Ministry are not present while those assigned to Long-term uses do not account for a significant share of the forested area or growing stock. The forest resources located in the boundaries of the former *Goskomles* amount to more than 99 percent of the stocked forest land and growing stock.

C.5.1.1.1 Goskomles Forests for the Short to Medium Term

Accounting for some 1.2 million hectares of forest land, almost 95 percent were considered stocked. Deciduous forests occupy the largest share of the forested land,

Footnotes

[52]The AAC per hectare for the non-Forest Sector lands amounts to 0.6 cubic meters per hectare in coniferous stands and 0.6 cubic meters per hectare in deciduous stands. These figures are consistent with the figures of the non-forest sector resource located in surrounding economic regions.

[53]The reserve AAC of 129 thousand cubic meters, not evident in the data dating from the 1970s, appears to be supported by a forest of 844 thousand hectares. The inferred per hectare AAC amounts to almost 0.2 cubic meters. Such a low figure would suggest that the reserve forests cannot be considered to be a reliable source of unallocated fiber available for future consumption.

representing almost 70 percent of the 1.2 million stocked hectares. Coniferous species account for the remaining 30 percent. The share of the forest resource allocated to other species is virtually non-existent. Total growing stock, corresponding to the area of stocked forest land, amounts to 152 million cubic meters. Coniferous forests amounted to one-third of the aggregated regional total with the balance being comprised of deciduous species. The contribution by other species is insignificant. The average stocking per hectare, accordingly, amounts to almost 155 cubic meters per hectare in coniferous stands, and about 120 cubic meters per hectare in deciduous stands.

On an aggregated basis, mature and overmature stands account for approximately 5 percent of the stocked forest land and 10 percent of the growing stock. Coniferous forests, which in total amounted to some 340 thousand hectares, contain only 12 thousand hectares of mature and overmature forested land, or 4 percent of the coniferous total. Deciduous forests, on the other hand, while accounting for 818 thousand hectares of stocked forest land, contain 57 thousand hectares of mature and overmature forests, or approximately 7 percent of the deciduous forested area. Mature and overmature coniferous stands support 3 million cubic meters of growing stock, indicating a stocking per hectare of 280 cubic meters per hectare. Deciduous mature and overmature stands, on the other hand contain some 11 million cubic meters, thus yielding stocking per hectare of about 200 cubic meters per hectare. Stocking in the immature stands, on the other hand, varies from nearly 150 cubic meters per hectare in the coniferous stands to about 115 cubic meters in the deciduous stands.

C.5.1.1.2 Resources Assigned to the Former Ministry of Forest Industry

Forest resources under the ownership of the former forest industry do not exist in the Black Earth Economic region.

C.5.1.1.3 Goskomles Forests Set Aside for Long-Term Uses

Lands which have been allocated to Long-Term Uses amount to only 7 thousand hectares, of which 70 percent are considered capable of sustaining forests. Coniferous forests do not account for any of the forested land. Stocked forest land under other species are absent. Deciduous forests account for all of the forested resource. While growing stock supported by the forested area amounts to one million cubic meters, stocking per hectare is very modest, varying from some 125 cubic meters in coniferous stands to some 140 cubic meters in the deciduous species.

The mature and overmature components of the coniferous resource account for 4 percent of the forested land and a negligible amount of the growing stock. In deciduous stands, the mature and overmature share of the forested land amounted to 7 percent while the share of growing stock reached almost 15 percent. In deciduous mature stands, stocking amounted to 200 cubic meters per hectare and some 95 cubic meters in immature stands.

C.5.1.2 Agricultural Sector

All of the land located under agriculture control is considered forest land, amounting to 211 thousand hectares. Deciduous stands account for three-quarters of the stocked land with the balance made up of coniferous stands. The growing stock supported by the forested land amounted to 14 million cubic meters, of which coniferous stands contributed 4 million cubic meters, or nearly 30 percent of the total. Deciduous stands, accounting for 10 million cubic meters, support stocking of nearly 60 cubic meters while that in coniferous species accounts for nearly 90 cubic meters.

All of the coniferous and almost 95 percent of the deciduous forested areas are concentrated in immature stands. Nearly one million cubic meters of deciduous growing stock are believed to be mature and overmature, suggesting a stocking of some

105 cubic meters per hectare. Deciduous immature stands support stocking of 55 cubic meters per hectare, while those in the coniferous stands amounts to nearly 90 cubic meters per hectare.

C.5.1.3 Other Sectors

Supporting 92 thousand hectares of forest land, nearly 87 thousand are considered stocked, of which 30 percent support coniferous stands. The balance, consisting of 61 thousand hectares, contain deciduous stands. Other species are not widely distributed. Supporting 17 million cubic meters of growing stock, less than one-third consist of coniferous species, the stocking of which amounted to almost 220 cubic meters per hectare. Stocking in the deciduous stands is somewhat less, being some 180 cubic meters per hectare.

Mature and overmature component of the forested land is larger, amounting to about 2 percent in coniferous forests and 20 percent in deciduous species. Supporting minor volumes in coniferous stands and 4 million cubic meters in deciduous stands, stocking in the coniferous mature and overmature amounted to 300 cubic meters per hectare and about 230 cubic meters per hectare in deciduous stands. Stocking in immature stands amounted to 215 cubic meters in coniferous stands and more than 65 cubic meters in deciduous stands.

C.5.2 Species Distribution

The forest inventory of the Black Earth Economic region is divided into three broad species aggregations, of which one aggregation, deciduous, dominates, accounting for 70 percent of the stocked forest land and 65 percent of the growing stock. Coniferous species account for the balance. Only marginal amounts of the forest resource are located in the category of other species. **Table B.2** presents data describing the forest resources segregated by species.

C.5.2.1 Coniferous Association

The coniferous resource consists almost entirely of stands predominated by pine species. Spruce stands and some larch stands make up less than one percent of the forest resource. On an aggregated basis, pine stands contain the stocking per hectare amounting to almost 155 cubic meters. Stocking in spruce stands and larch stands that do exist show 55 cubic meters per hectare and 100 cubic meters per hectare respectively.

C.5.2.2 Deciduous Association

Deciduous species account for 70 percent of the forested resource and two thirds of the growing stock. Slightly more than two-thirds of the forested area and one-half of the growing stock consists of oak species Birch and aspen account for the remainder in roughly equal proportions. Oak stands support a stocking per hectare which varies from 110 cubic meters to almost 150 cubic meters per hectare. Aspen stands contain stocking of nearly 130 cubic meters per hectare, while birch stands support stocking of almost 110 cubic meters per hectare.

C.5.3 Accessibility

Table C.11 provides a distribution of the forest resources of the Black Earth Economic region segregated by accessibility classes. Exploitable forests, amounting to 1.2 million hectares and 147 million cubic meters, account for four-fifths of the total forested land and growing stock. Reserve forests amount to 283 thousand hectares of stocked forest land and 36 million cubic meters of growing stock.

C.5.3.1 Exploitable

Forest sector forests allocated for medium term uses plus industry forests account for three-quarters of the exploitable stocked land and four-fifths of the growing stock. Agricultural forests account for nearly 20 percent of the stocked land but only 8 percent of the growing stock. Other sector forests account or 7 percent of the stocked forest land and 11 percent of the growing stock.

C.5.3.1.1 Forest Sector Forests for Short and Medium Term Needs

Stocked forest land, considered to be exploitable, amounts to almost 900 thousand hectares. The exploitable area supports nearly 117 million cubic meters of growing stock. Coniferous stands account for almost 30 percent of the forested area and nearly 35 percent of the growing stock with the balance made-up of deciduous stands. Stocking per hectare amounts to nearly 150 cubic meters per hectare in coniferous stands and 125 in the deciduous stands. What little forested area under other species does not contribute in meaningful way to industrial potential. Stocking amounts to 52 cubic meters

Mature and overmature component in the coniferous stands accounts for less than 5 percent of the stocked land and 10 percent of the growing stock, providing stocking per hectare of almost 280 cubic meters. The mature and overmature component in deciduous forests accounts for a higher share than in coniferous stands, amounting to 7 percent of the area and 12 percent of the growing stock. Stocking per hectare in the mature and overmature deciduous stands amounts to 200 cubic meters.

C.5.3.1.2 Agricultural Sector

Agricultural forests have been discussed in section **C.5.1.2.**

C.5.3.1.3 Other Sectors

The forest resource have been discussed earlier in section **C.5.1.3.**

C.5.3.2 Reserve

Reserve forests amount to 283 thousand hectares and 36 million cubic meters of growing stock, or one-fifth of the total forest resource. Virtually all of the reserve forest resource is under the control of *Goskomles.*

C.5.3.2.1 Forest Sector Short to Medium Term Forests

Reserve forests account for 278 thousand hectares and 35 million cubic meters of growing stock, account for virtually all of the reserve forest land. Coniferous species, occupying 70 thousand hectares with 12 million cubic meters, account for 25 percent of the Reserve forested land and 34 percent of the growing stock. Stocking of 126 cubic meters per hectare are located in reserve forests with a range from 170 cubic meters in coniferous forests to almost 25 cubic meters in other species.

C.5.3.2.2 Goskomles Forests for Long-Term Use

Lands which have been allocated to Long-Term Uses have been discussed before in section **C.5.1.1.3.**

C.5.4 THE BLACK EARTH ALLOWABLE ANNUAL CUT

The total AAC in the Black Earth Economic region amounts to almost 1.5 million cubic meters. Almost 85 percent, or an estimated 254 thousand cubic meters, are believed to

be located in reserve stands. The balance of 1.2 million cubic meters is contributed by both the forest sector and non-forest sector forest resource which is thought to be exploitable (**Table B.5**)

C.5.4.1 The Exploitable Allowable Annual Cut

The exploitable AAC of 1.2 million cubic meters consists of nearly 1.1 million cubic meters located in forest sector forests. An estimated 152 thousand cubic meters in the non-forest sector stands.

C.5.4.1.1 The Forest Sector Allowable Annual Cut

The forest sector AAC is virtually all located in the currently accessible AAC, available with the present level of harvesting technology and infrastructural development. A potentially accessible AAC is not present.[54]

C.5.4.1.1.1 The Currently Accessible Allowable Annual Cut

The forests of the Black Earth Economic region supports an AAC estimated to be in the vacinity of 1.1 million cubic meters. Nearly four-fifths of the AAC flows from deciduous stands, the principal species association of which is oak. The coniferous component, amounting to 240 thousand cubic meters, consists entirely of fiber emanating from pine stands.

C.5.4.1.1.2 The Potentially Accessible Allowable Annual Cut

There does not appear to be any potentially accessible fiber available in the Black Earth economic region.

C.5.4.1.2 The Non-Forest Sector Allowable Annual Cut

The non-forest sector resource supports an AAC estimated to be 152 thousand cubic meters.[55] Deciduous species contribute nearly four-fifths of the total (119 thousand cubic meters), the principal stand contributor being oak (47 thousand cubic meters). The coniferous share amounts to one-fifth, or 32 thousand cubic meters, the principal stand component being pine.

Footnotes

[54]The per hectare AAC supported by the exploitable forest sector resource amounts to 0.9 cubic meters in coniferous stands and 1.8 cubic meters in deciduous stands. While these numbers seem low compared to the surrounding regions (except for the North Caucuses), the lower figures may be linked to lower site and/or a poorer or over utilized resource.

Since the fiber available from the Forest Sector resource accounts for only one-half of the fiber potential in the short term, it is possible that the forest resource has been over utilized in the past. While detailed knowledge about the forest resources of the Black Earth region is lacking, under these circumstances, it is possible that the derived figures are reflective of the existing stand conditions, rather than being an indication of uncertainty in the actual AAC figure employed to reflect the physical fiber supply. Thus, the AAC figures cannot be rejected.

[55]The AAC per hectare supported by the non-forest sector resource amounts to 0.4 cubic meters in coniferous stands and 0.5 cubic meters per hectare in the deciduous stands. These numbers do not appear to vary considerably from the values evident in the surrounding economic regions.

C.5.4.2 The Reserve Allowable Annual Cut

In addition to the accessible fiber supply, some 250 thousand cubic meters of AAC are believed to be contributed by the reserve stands.[56]

C.6 POVOLZHSKIY ECONOMIC REGION

The Povolzhskiy Economic Region, identified on **Map A** as Volgo Littoral, accounts for only one percent of the forested area and growing stock of Russia, or 4.8 million hectares of stocked forest land and 573 million cubic meters of growing stock. Of the 8 separate regions of European Russia, this economic region is sixth in size, exceeding only the North Caucuses and Black Earth Economic Regions. Coniferous species account for one-quarter of the forested area and 30 percent of the growing stock. Deciduous species account for nearly all of the remainder with other species accounting for some one percent of the growing stock and forested area. **Table C.1** shows for selected forest indicators, the distribution among the different economic regions of Russia.

C.6.1 The Forest Resource According to Ownership

The Forest Sector category accounts for 84 percent of the stocked forest land and 90 percent of the growing stock. Agricultural forests accounted for another 11 percent and 5 percent respectively, while Other Sector forests represented only 6 percent and 5 percent of the total. **Table C.12** shows the forest resources of the Povolzhskiy Economic region segregated into these broad use categories.

C.6.1.1 Forest Sector

Forest assigned to Long-term uses do not account for a significant share of the forested area or growing stock, while the forest resource under the control of the former ministry of forest industry is absent. The forest resources located in the boundaries of the former *Goskomles* amount to more than 99 percent of the stocked forest land and growing stock.

C.6.1.1.1 Goskomles Short to Medium Term Forests

Accounting for some 4.4 million hectares of forest land, more than 90 percent are considered stocked. Deciduous forests occupy the largest share of the forested land, representing almost three-quarters of the 4 million stocked hectares. Coniferous species account for another one million hectares. The share of the forest resource allocated to other species is not significant. Total growing stock, corresponding to the area of stocked forest land, amounts to 515 million cubic meters. Coniferous forests amount to 30 percent of the aggregated regional total with the balance consisting of deciduous stands. Other species account for an insignificant share of the forest resource. The average stocking per hectare, accordingly, amounts to more than 160 cubic meters per hectare in coniferous stands, and about 120 cubic meters per hectare in deciduous

Footnotes

[56]The 250 thousand cubic meters of reserve AAC is supported by 283 thousand hectares of stocked forest land, suggesting an inferred per hectare contribution of 0.9 cubic meters. The higher value evident from the reserve stands could suggest that the forest resource, while having sufficiently high site to contribute to the AAC, suffers from characteristics which are limiting development either from an environmental viewpoint, or an access viewpoint.

stands. What forest resource located in other species shows stocking of only 17 cubic meters per hectare.

On an aggregated basis, mature and overmature stands account for approximately 15 percent of the stocked forest land. The share is less in the coniferous forests for which mature and overmature component amounted for 7 percent of the coniferous total. Mature and overmature coniferous stands support 22 million cubic meters of growing stock, indicating a stocking per hectare of more than 320 cubic meters. In deciduous forests, the mature and overmature component accounts for approximately 15 percent of the deciduous forested area. Deciduous mature and overmature stands contain some 81 million cubic meters, yielding stocking per hectare of more than 175 cubic meters per hectare. Stocking in the immature stands varies from 150 cubic meters per hectare in the coniferous stands to some 110 cubic meters in the deciduous stands.

C.6.1.1.2 Resources Assigned to the Former Ministry of Forest Industry

The share of the forest resources which were part of the forest industrial ministerial system is non-existent in Povolzhskiy Economic region.

C.6.1.1.3 Goskomles Forests Set Aside for Long-Term Uses

Lands which have been allocated to Long-Term Uses amount to only 11 thousand hectares, of which 3 thousand are considered capable of sustaining forests. Nearly all of this forest land is stocked. Coniferous forests account for one-third of the forested land with deciduous forests accounting for the remainder. Stocked forest land under other species is absent. While growing stock supported by the forested area amounts to less than one million cubic meters, stocking per hectare is very modest, varying from some almost 215 cubic meters in coniferous stands to 90 cubic meters in the deciduous species.

The mature and overmature components of the coniferous resource account for almost 15 percent of the forested land and the growing stock. In deciduous stands, virtually all of the resource is classified as immature. Stocking per hectare in coniferous mature stands amounted to 300 cubic meters while in the immature stands, it reached 200 cubic meters. In deciduous immature stands, stocking amounted to 95 cubic meters per hectare.

C.6.1.2 Agricultural Sector

Agricultural forests, accounting for 11 percent of the stocked forest land and 5 percent of the growing stock, contain 549 thousand hectares of stocked forest land and 29 million cubic meters of growing stock. All of the forest land is considered stocked with either coniferous or deciduous stands.

The forest resources are concentrated in deciduous stands which account for more than 70 percent of the stocked forest area and growing stock. The resulting stocking per hectare amounts to almost 55 cubic meters in coniferous forests and slightly more than 50 cubic meters in deciduous species.

All of the coniferous and seven-eighths of the deciduous forested areas are concentrated in immature stands. Almost 4 million cubic meters of deciduous growing stock are believed to be mature and overmature, suggesting a stocking of 75 cubic meters per hectare. Immature coniferous and deciduous stands support stocking of almost 50 cubic meters per hectare.

C.6.1.3 Other Sectors

Supporting 250 thousand hectares of forest land, almost 95 percent are considered stocked. Nearly one-fifth of the stocked forest land supports coniferous species with most of the balance consisting of deciduous stands. Other species comprise just one percent of the forested area. Supporting 29 million cubic meters of growing stock, almost one-quarter consist of coniferous species, the stocking of which amounts to almost 170 cubic meters per hectare. Stocking in the deciduous stands is somewhat less, amounting to more than 115 cubic meters per hectare.

Mature and overmature component of the forested land amounts to some 15 percent in coniferous forests and one-fifth in deciduous species. Supporting 2 million cubic meters and 7 million cubic meters respectively, stocking in mature and overmature coniferous stands amounts to almost 315 cubic meters per hectare and almost 170 cubic meters per hectare in deciduous stands. In comparison, stocking in immature stands amounted to more than 145 cubic meters and 100 cubic meters respectively.

C.6.2 Species Distribution

The coniferous component of the forest inventory of the Povolzhskiy Economic region accounts for one-quarter of the stocked forest land and 30 percent of the growing stock. Deciduous species account for most of the balance. Only marginal amounts of the forest resource are located in the category of other species. **Table B.2** presents data describing the forest resources segregated by species.

C.6.2.1 Coniferous Association

The coniferous resource consists almost entirely of stands predominated by pine species. Spruce accounts for only 2 percent of the forest resource. Minor amounts of true fir and larch are also present. On an aggregated basis, true fir stands have a stocking per hectare amounting to nearly 200 cubic meters per hectare. Pine stands, accounting for the majority of the coniferous resource, show stocking of more than 165 cubic meters. Stocking in spruce stands amounts to more than 75 cubic meters per hectare, while in larch stands, stocking is 85 cubic meters per hectare.

C.6.2.2 Deciduous Association

Deciduous species account for three-quarters of the stocked forest land and 70 percent of the growing stock. By a large extent, the deciduous resource is dominated by oak, aspen, and birch in descending order of size. Birch stands support a lower stocking per hectare than most other deciduous stands, amounting to 130 cubic meters per hectare. Aspen stands contain slightly higher stocking amounting to nearly 135 cubic meters per hectare. Oak stands vary between 85 and some 110 cubic meters per hectare.

C.6.3 Accessibility

Table C.13 provides a distribution of the forest resources of the Povolzhskiy Economic region segregated by accessibility classes. Exploitable forests, amounting to 3.6 million hectares and 412 million cubic meters, or three-quarters of the total stocked forest land and slightly more than 70 percent of the growing stock. Reserve forests, amount to 1.2 million hectares supporting 161 million cubic meters of growing stock.

C.6.3.1 Exploitable

The largest share of exploitable forests, accounting for almost 80 percent of the stocked forest land and slightly more than 85 percent growing stock, lies within the boundaries of the responsibility of the successor organs to *Goskomles* . Agricultural forests

account for 15 percent of the exploitable stocked land and 7 percent of the growing stock, while other ownerships account for the remainder.

C.6.3.1.1 Forest Sector Forests for Short to Medium Term Needs

Stocked forest land amounting to 2.8 million hectares, supports nearly 354 million cubic meters of growing stock. Coniferous stands account for one-quarter of the forested area and almost one-third of the growing stock. Forested stands supporting species other than the principal ones play a minor role. Stocking per hectare amounts to nearly 155 cubic meters per hectare in coniferous stands and 115 in the deciduous stands. What little forested area under other species does not contribute in meaningful way to industrial potential, having stock of almost 25 cubic meters per hectare.

While mature and overmature deciduous forests account for slightly greater than 15 percent of the forested area, only 7 percent of the coniferous stands are located in this age class. The mature and overmature component of the growing stock in coniferous forests amounts to almost 15 percent and more than one-quarter in the deciduous stands. Accordingly, stocking in mature and overmature stands amounts to almost 315 cubic meters in coniferous stands and some 115 cubic meters in deciduous stands.

C.6.3.1.2 Agricultural Sector

Agricultural forests have been discussed in a section **C.6.1.2.**

C.6.3.1.3 Other Sectors

The forest resource sequestered with other ministries have been discussed in a section **C.6.1.3.**

C.6.3.2 Reserve

Reserve forests amount to 1.2 million hectares and 161 million cubic meters of growing stock, or 25 percent and nearly 30 percent respectively of the total forest resource. Virtually all of the stocked forest area and growing stock is located in forests belonging to *Goskomles.*

C.6.3.2.1 Goskomles Short to Medium Term Forests

Reserve forests account for 1.2 million hectares and nearly 161 million cubic meters of growing stock. Coniferous species, occupying 227 thousand hectares and 42 million cubic meters of growing stock. Stocking in coniferous forest amount to almost 185 cubic meters per hectare. Deciduous species, accounting for three-quarters of the forested land and growing stock, contain stocking of almost 135 cubic meters per hectare. Lesser important species, accounting for 5 percent of the stocked and one percent of the growing stock, show stocking of only 33 cubic meters per hectare.

C.6.3.2.2 Goskomles Sector Long-Term Forests

Lands which have been allocated to Long-Term Uses have been discussed in section **C.6.1.1.3.**

C.6.4 The Povolzhskiy Allowable Annual Cut

The total AAC provided by the forest resource of the Povolzhskiy economic region amounts to approximately 7 million cubic meters. Virtually all of the AAC is located in the currently accessible forest stands (**Table B.5**).

C.6.4.1 The Exploitable Allowable Annual Cut

The 7 million cubic meters of AAC flowing from the exploitable forest resource is dominated by the share from the forest sector lands, which account for 95 percent of the total, or 6.8 million cubic meters. The non-forest sector resource contributes nearly 400 thousand cubic meters to the total.

C.6.4.1.1 The Forest Sector Allowable Annual Cut

Virtually all of the forest sector AAC is considered to be currently accessible at the present time.[57]

C.6.4.1.1.1 The Currently Accessible Allowable Annual Cut

The forests of the Povolzhskiy Economic region support an AAC estimated to be 7 million cubic meters, concentrated in forest sector forests which are considered currently accessible. Nearly seven-eighths of the AAC is supported by deciduous stands, amounting to nearly 6 million cubic meters. The principal species association within the deciduous AAC is oak and birch which can support 1.5 million and one million cubic meters respectively. Aspen stands are also a major contributor to the deciduous fiber supply. The coniferous component, amounting to almost one million cubic meters, is nearly completely derived from pine stands.

C.6.4.1.1.2 The Potentially Accessible Allowable Annual Cut

There does not appear to be any potentially accessible fiber in the Povolzhskiy region.

C.6.4.1.2 The Non-Forest Sector Allowable Annual Cut

The non-forest sector AAC amounts to an estimated 400 thousand cubic meters, three-quarters of which are contributed from deciduous stands.[58] The deciduous component (296 thousand cubic meters) depends on aspen, oak and birch stands, which collectively account for virtually all of the deciduous volume. The coniferous component of almost 100 thousand cubic meters flows almost completely from pine stands with trace amounts originating from spruce/true fir forest.

C.6.4.2 The Reserve Allowable Annual Cut

There does not appear to be reserve AAC available in the Povolzhskiy economic region.[59]

Footnotes

[57]The AAC in the currently accessible category supports an estimated per hectare value of 1.3 cubic meters in coniferous stands and 2.5 cubic meters in deciduous stands. These figures, while lower than regions to the north in terms of deciduous stands, are similar to figures in the Ural region. It is difficult to explain the low figure evident in the coniferous stands. However, it may be linked to the over utilization of the coniferous resource rather than underlying uncertainty in the AAC from the forest sector lands. Greater utilization pressures in the past without a concomitant increase in forest management could have lead to a degradation of the coniferous resource.

[58]The per hectare AAC supported by the non-Forest Sector resource amounts to 0.5 cubic meters in coniferous stands and 0.5 cubic meters in deciduous stands. These figures are consistent with the figures evident for other economic regions in the area.

[59]While reserve forest is present in the Povolzhskiy Economic region, it is believed to be of sufficiently low site that it does not contribute to the AAC, or suffers from physical characteristics which effectively prohibit exploitation by the forest sector.

C.7 NORTH CAUCUSUS ECONOMIC REGION

The North Caucusus Economic Region, located south of both the Black Earth and Povolzhskiy (Volgo Littoral) regions (**Map A**), accounts for less than one percent of the forested area and growing stock of Russia. Of the 8 separate regions of European Russia, this economic region is the next to smallest in terms of size of the forest resource. Coniferous species in this economic region account for some 10 percent of the stocked forest area and 15 percent of the growing stock indicating the role which the deciduous resource plays in the forest sector of this region. While coniferous species are of minor importance, the share of the forest resource allocated to other species is almost 5 percent of the forested area and 3 percent of the growing stock. **Table C.1** shows for selected forest indicators the distribution among the different economic regions of Russia.

C.7.1 The Forest Resource According to Ownership

The Forest Sector category accounts for only four-fifths of the stocked forest land and almost 90 percent of the growing stock. Agricultural forests account for another 10 percent and 4 percent respectively, while Other Sector forests represent only 8 percent and 7 percent of the total. **Table C.14** shows the forest resources of the North Caucusus Economic region segregated into these broad use categories.

C.7.1.1 Forest Sector

Forest assigned to Long-term uses and the Former Forest Industry do not account for a significant share of the forested area or growing stock. The forest resources located in the boundaries of the former *Goskomles* amount to 98 percent of the stocked forest land and growing stock.

C.7.1.1.1 Goskomles Short to Medium Term Forests

Accounting for 3 million hectares of forest land, more than 95 percent are considered stocked. Deciduous forests occupy the largest share of the forested land, representing almost 85 percent of the 2.9 million stocked hectares. Coniferous species account for another 331 thousand hectares. The share of the forest resource allocated to other species amounts to almost 5 percent. Total growing stock, corresponding to the area of stocked forest land, amounts to 494 million cubic meters. Coniferous forests amount to nearly 15 percent of the aggregated regional total with the balance consisting mainly of deciduous species. Other species account for only 3 percent of the volume. The average stocking per hectare, accordingly, amounts to more than 215 cubic meters per hectare in coniferous stands, and more than 155 cubic meters per hectare in deciduous stands. What forest resource located in other species shows stocking of more than 125 cubic meters per hectare.

On an aggregated basis, mature and overmature stands account for approximately 30 percent of the stocked forest land. Coniferous forests, which in total amount to some 331 thousand hectares, contain nearly 75 thousand hectares of mature and overmature forested land, or more than one-fifth of the coniferous total. Deciduous forests account for almost 2.5 million hectares of stocked forest land, of which 714 thousand hectares are classified as mature and overmature forests, or almost 30 percent of the deciduous forested area.

Mature and overmature coniferous stands support 36 million cubic meters of growing stock, indicating a stocking per hectare of more than 490 cubic meters. Deciduous mature and overmature stands contain some 162 million cubic meters, yielding stocking per hectare of more than 225 cubic meters. Stocking in the immature stands varies from 140 cubic meters per hectare in the coniferous stands to 125 cubic meters in the deciduous stands.

C.7.1.1.2 Resources Assigned to the Former Ministry of Forest Industry

The component of the forest resources which were part of the forest industrial ministerial system is not large, amounting to only 68 thousand hectares of stocked forest land and 18 million cubic meters. More than 20 percent of the stocked forest land are covered by coniferous forests. Except for minor amounts covered with other species, the balance, amounting to three-quarters of forested area, consists of deciduous species. Growing stock supported by the forested land amounted to some 18 million cubic meters, of which 40 percent are coniferous stands. The average stocking per hectare amounts to more than 255 cubic meters per hectare, with stocking in coniferous stands amounting to more than 465 cubic meters per hectare Stocking in deciduous stands exceeded 200 cubic meters per hectare.

Growing stock on mature and overmature coniferous stands amounts to 6 million cubic meters standing on nearly 11 thousand hectares, or nearly 40 percent of the totals respectively. Mature and overmature stands support a stocking of nearly 540 cubic meters per hectare. Stocking in the immature stands, on the other hand, amounted to slightly less than 250 cubic meters per hectare.

Mature and overmature deciduous stands supported some 7 million cubic meters of growing stock on 28 thousand hectares, providing a stocking per hectare of more than 260 cubic meters. Stocking in the immature stands is somewhat less than the coniferous stands at 125 cubic meters per hectare however.

C.7.1.1.3 Goskomles Forests Set Aside for Long-Term Uses

Lands which have been allocated to Long-Term Uses amount to only 24 thousand hectares, of which two-thirds are considered capable of sustaining forests. Nearly all of this forest land is stocked. Coniferous forests account for an insignificant portion, amounting to just one percent of the forested land. Except for some three percent, deciduous forests account for the remainder. While growing stock supported by the forested area amounts to almost 3 million cubic meters, stocking per hectare is close to that contained in deciduous forests, amounting to almost 170 cubic meters in deciduous stands and 100 cubic meters in coniferous stands.

The mature and overmature components of the deciduous resource account for all of the mature and overmature forested land and growing stock in this "ownership" category. In deciduous stands, the mature and overmature component of the forested land amounts to nearly one-fifth of the deciduous total. Stocking per hectare in coniferous immature stands amounts to 100 cubic meters while in deciduous mature and immature stands, stocking amounts to almost 170 cubic meters.

C.7.1.2 Agricultural Sector

All of the land located in agriculture control is considered forest land, amounting to 410 thousand hectares. Virtually all of the forest land is stocked with either coniferous or deciduous stands. The growing stock supported by the forested land amounts to 25 million cubic meters.

The forest resources of the agriculture interests are concentrated in deciduous species which account for virtually 100 percent of the stocked forest area and the growing stock. The resulting stocking per hectare amounts to nearly 70 cubic meters.

Almost 10 percent of the deciduous forested areas are concentrated in mature stands. Some 24 million cubic meters of deciduous growing stock are believed to be mature and overmature, suggesting a stocking of more than 135 cubic meters per hectare. Immature stands support stocking of slightly more than 60 cubic meters per hectare.

C.7.1.3 Other Sectors

Supporting 297 thousand hectares of forested land and 40 million cubic meters of growing stock, Other Sector forests accounts for 8 percent of the area and 7 percent of the volume. More than 15 percent of the stocked forest land and almost 25 percent of the growing stock supports coniferous species. The stocking in coniferous stands reaches almost 200 cubic meters per hectare, while stocking in the deciduous stands amounts to almost 135 cubic meters per hectare.

Mature and overmature component of the coniferous forested land exceeds 35 percent while that in the deciduous stands is approximately 30 percent. Supporting 2 million cubic meters and 12 million cubic meters respectively, stocking in mature and overmature coniferous stands amounts to almost 100 cubic meters per hectare, and 170 cubic meters per hectare in deciduous stands. Immature coniferous stands containing 7 million cubic meters on 30 thousand hectares support stocking of more than 230 cubic meters. In comparison, deciduous immature stands support 18 million cubic meters on 173 thousand hectares for a stocking of 105 cubic meters per hectare.

C.7.2 Species Distribution

The forest inventory of the North Caucuses Economic region is dominated by the deciduous forest resource, accounting for almost 85 percent of the stocked forest land and four-fifths of the growing stock. While coniferous stands account for slightly more than 10 percent of the stocked forest land and 15 percent of the growing stock, some 4 percent of the forest land and 3 percent of growing stock are located in stands predominated by the other species. **Table B.2** presents data describing the forest resources segregated by species.

C.7.2.1 Coniferous Association

The coniferous resource consists almost entirely of stands dominated by pine species and true fir species. Minor amounts of spruce are present, but do not contribute more than 4 percent of the area or 10 percent of the volume. Pine stands accounts for more than 75 percent of the area and almost 45 percent of the volume. True firs, in contrast, account for only one-fifth of the area, and nearly one-half of the volume. On an aggregated basis, spruce stands contain the highest stocking per hectare, amounting to almost 620 cubic meters while true fir stands support stacking of 560 cubic meters per hectare. Stocking in pine stands amounts to only 125 cubic meters per hectare.

C.7.2.2 Deciduous Association

Deciduous species account for the majority of the forest resource, containing 85 percent of the forest inventory. By a large extent, the deciduous resource is dominated by the oak species and beech species, which account for 70 percent of the forested area and nearly four-fifths of the growing stock. Birch and aspen together account for less than 10 percent of the forest resource.

Beech stands support a higher stocking per hectare than other deciduous stands, amounting to more than 250 cubic meters per hectare. Oaks stands contain stocking which varies from 116 cubic meters to 188 cubic meters per hectare. Aspen stands contain much higher stocking amounting to nearly 145 cubic meters per hectare, while birch supports stocking of some 90 cubic meters per hectare.

C.7.3 Accessibility

Table C.15 provides a distribution of the forest resources of the North Caucuses Economic region segregated by accessibility classes. Exploitable forests amount to 2 million hectares and 292 million cubic meters of growing stock, or almost three-fifths

of the stocked area and slightly more than one-half of the growing stock. Reserve forests amount to 1.6 million hectares and 263 million cubic meters of growing stock.

C.7.3.1 Exploitable

The forest sector component accounts for the largest share of exploitable forest resource, amounting to almost 70 percent of the stocked area and nearly 80 percent of the volume. Agricultural forests, while containing nearly one-fifth of the area, account for some 10 percent of the growing stock. The forest resource in other ownerships contains almost 15 percent of the stocked forest land and growing stock.

C.7.3.1.1 Forest Sector Short to Medium Term Forests

The exploitable resource amounts to some 1.4 million hectares supporting nearly 226 million cubic meters of growing stock. Coniferous species account for 5 percent of the forested area and 6 percent of the growing stock, with the balance made up solely of deciduous stands. Forested stands supporting species other than the principal ones are conspicuous by their virtual absence. Stocking per hectare amounts to more than 170 cubic meters per hectare in coniferous stands and some 160 cubic meters in deciduous stands. What little forested area under other species does not contribute in meaningful way to industrial potential, having stocking of only 50 cubic meters per hectare.

Mature and overmature forests account for one-quarter of the forested area, or 372 thousand hectares, and almost 40 percent of the growing stock, or 87 million cubic meters. The mature and overmature component in coniferous stands accounts for 15 thousand hectares and 8 million cubic meters of growing stock yielding stocking in mature and overmature stands of almost 515 cubic meters. The mature and overmature component in deciduous stands, accounting for 357 thousand hectares and 79 million cubic meters of growing stock, provide a stocking per hectare of 220 cubic meters.

C.7.3.1.2 Agricultural Sector

Agricultural forests have been reviewed earlier in section **C.7.1.2.**

C.7.3.1.3 Other Ministries

This resource has also been discussed in section **C.7.1.3.**

C.7.3.2 Reserve

Reserve forests amount to 1.6 million hectares and 263 million cubic meters of growing stock, or 43 percent and 47 percent respectively of the total forest resource. Nearly all of the stocked forest area and growing stock is located in forests of *Goskomles.*

C.7.3.2.1 Forest Sector Short to Medium Term Forests

Reserve forests, accounting for 1.6 million hectares and nearly 261 million cubic meters of growing stock, represented virtually all of the stocked forest land and growing stock in reserve status. Coniferous species, occupying 269 thousand hectares and 65 million cubic meters of growing stock, account for 17 percent of the stocked forest land and 25 percent of the growing stock. Stocking of more than 165 cubic meters per hectare are located in reserve forests with a range from 245 cubic meters in coniferous forests to 130 cubic meters in other species.

The mature and overmature component of the coniferous stands accounts for one-quarter of the stocked land and one-half of the growing stock, providing stocking of almost 500 cubic meters. Stocking in the immature coniferous stands amounts to slightly more than 155 cubic meters per hectare. The mature and overmature component

in the deciduous stands amounts to almost one-third of the area and one-half of he growing stock, producing a stocking of almost 235 cubic meters. The corresponding stocking in the immature stands amounts to almost 115 cubic meters per hectare.

C.7.3.2.2 Goskomles Forest Set Aside for Long-Term Uses

Long-term forests have been discussed in section **C.7.1.1.3**.

C.7.4 THE NORTH CAUCUSES ALLOWABLE ANNUAL CUT

The total AAC contributed by the forest resource of the North Caucuses region amounts to slightly more than 2 million cubic meters. Some 10 percent of the total is contributed by the reserve stands with the balance of almost 1.9 million cubic meters flowing from the presently exploitable forest (**Table B.5**).

C.7.4.1 The Exploitable Allowable Annual Cut

The exploitable AAC consists of 1.9 million cubic meters, of which the largest share is contributed by the forest sector resource (85 percent). The balance of 276 thousand cubic meters flows from the non-forest sector forest resource.

C.7.4.1.1 The Forest Sector Allowable Annual Cut

The forest sector AAC amounts to almost 1.6 million cubic meters.[60] Virtually all of this amount is contributed by the currently accessible AAC.

C.7.4.1.1.1 The Currently Accessible Allowable Annual Cut

The forests of the North Caucuses Economic region support an AAC estimated to be 1.6 million cubic meters. More than 95 percent of the AAC is contributed by deciduous stands, amounting to 1.5 million cubic meters. The principal species association from which the deciduous AAC flows are oak and beech, which contributed 0.7 million and almost 0.4 million cubic meters respectively. The small share of coniferous AAC is contributed completely from spruce/true fir stands.

C.7.4.1.1.2 The Potentially Accessible Allowable Annual Cut

All of the AAC is currently believed to be physically accessible at the present time.

C.7.4.1.2 The Non-Forest Sector Allowable Annual Cut

The total volume contributed amounts to some 275 thousand cubic meters, nearly all of which consists of deciduous species.[61] The principal species consist of oak and beech.

Footnotes

[60]The per hectare contribution to AAC from the exploitable Forest Sector lands amounts to 2.0 cubic meters in coniferous stands and 1.5 cubic meters in deciduous stands. While the coniferous component is higher than the deciduous component, care should be exercised when interpreting this result. The coniferous resource and exploitable AAC comprise a small proportion of the overall AAC. Differences in area or coniferous AAC could lead to large swings in the values. In fact, employing the AAC figures for 1990 in the stead of those for 1988 show figures of 0.9 cubic meters in coniferous stands and 1.3 cubic meters in deciduous stands. While the coniferous component appears to be greater than the deciduous component, due to the above, the derived AAC cannot be rejected.

[61]The per hectare AAC supported by the non-Forest Sector lands amounts to 0.2 cubic meters in coniferous stands and 0.4 cubic meters in deciduous stands. The small number in the coniferous stands appears to be

Footnotes *continued on next page*

C.7.4.2 The Reserve Allowable Annual Cut

In addition to this volume, the forest resource in reserve stands supports an AAC of some 200 thousand cubic meters per year, up from the 50 thousand cubic meters evident in the late 1970s.[62] Nearly all of this amount is located in deciduous stands.

C.8 URAL ECONOMIC REGION

The Ural Economic Region, located south of the North Economic region and adjacent to the West Siberia region (**Map A**), accounts for only 5 percent of the forested area and 6 percent of the growing stock of Russia, or 36 million hectares and nearly 5 billion cubic meters. Of the 8 separate regions of European Russia, this economic region is second in size after the North Economic Region. Unlike the North Region, coniferous species account for some 55 percent of the forested area and 60 percent of the growing stock, much less than the 80 percent level experienced in the North Economic region. **Table C.1** shows for selected forest indicators the distribution among the different economic regions of Russia.

C.8.1 The Forest Resource According to Ownership

The Forest Sector forest resource account for four-fifths of the stocked forest land and growing stock. Agricultural forests account for another 15 percent respectively, while Other Sector forests represent only 3 percents of the total. **Table C.16** shows the forest resources of the Ural Economic region segregated into these broad use categories.

C.8.1.1 Forest Sector

Forest assigned to long-term uses do not account for a significant share of the forested area or growing stock. The forest resources located in the boundaries of the former *Goskomles* amount to more than 80 percent of the stocked forest land and growing stock, while those allocated to the former Ministry of the Timber Industry account for approximately one-fifth of the forest sector resource.

C.8.1.1.1 Goskomles Short to Medium Term Forests

Accounting for some 25 million hectares of forest land, more than 95 percent are considered stocked. Coniferous forests occupy the largest share of the forested land, representing slightly more than 50 percent of the 24 million stocked hectares. Deciduous species accounts for another 11 million hectares. The share of the forest resource allocated to other species is virtually non-existent. Total growing stock, corresponding to the area of stocked forest land, amounts to 3.3 billion cubic meters. Coniferous forests amount to almost 60 percent of the aggregated regional total with the balance consisting of deciduous stands. Other species are conspicuous by their virtual absence. The average stocking per hectare, accordingly, amounts to almost 150 cubic meters per hectare in coniferous stands, and some 120 cubic meters per hectare in

Footnotes *continued*

decidedly different than those evident elsewhere in the European part of Russia. However, the small numbers connected with the coniferous resource suggest that changes in either the area or the AAC could be magnified in the per hectare AAC.

[62]The low per hectare AAC supported by the reserve forest suggests that in the future, this resource cannot be expected to contribute to the fiber availability for the forest sector.

deciduous stands. What forest resource located in other species shows stocking of about 15 cubic meters per hectare.

On an aggregated basis, mature and overmature stands account for approximately one-third of the stocked forest land, slightly lower than is experienced in the coniferous forests (36 percent). The mature and overmature component accounts for a lower share of the deciduous resource, or approximately 27 percent of the deciduous forested area. Mature and overmature coniferous stands support nearly one billion cubic meters of growing stock, indicating a stocking per hectare of more than 200 cubic meters. Deciduous mature and overmature stands, on the other hand contain 551 million cubic meters, yielding stocking per hectare of 175 cubic meters. In comparison, stocking in the immature stands varies from some 115 cubic meters per hectare in the coniferous stands to some 100 cubic meters in the deciduous stands.

C.8.1.1.2 Resources Assigned to the Former Ministry of Forest Industry

The component of the forest resources which was part of the forest industrial ministerial system amount to nearly 20 percent of the forest land, amounting to nearly 5.9 million hectares. Almost 5.5 million hectares are considered stocked. More than 50 percent of the stocked forest land were covered by coniferous forests. The balance consists almost entirely of deciduous stands. Forested land occupied by the non-principle species are conspicuous by their virtual absence. Growing stock supported by the forested land amounts to some 698 million cubic meters, of which more than 70 percent were coniferous species. The average stocking per hectare amounts to more than 125 cubic meters per hectare, with stocking in coniferous stands amounting to 140 cubic meters per hectare, while stocking in deciduous stands to more than 100 cubic meters per hectare.

Growing stock on mature and overmature coniferous stands amounts to 282 million cubic meters standing on nearly 1.4 million hectares, or nearly 56 percent and 40 percent of the coniferous totals respectively. Mature and overmature stands support a stocking of nearly 200 cubic meters per hectare. Stocking in the immature stands, on the other hand, amounts to slightly more than one-half of the average in the mature and overmature stands.

Mature and overmature deciduous stands support 63 million cubic meters of growing stock on 312 thousand hectares, providing a stocking per hectare of nearly 200 cubic meters. Stocking in the immature stands is somewhat less than the coniferous stands at almost 85 cubic meters per hectare.

C.8.1.1.3 Goskomles Forests Set Aside for Long-Term Uses

Lands which have been allocated to Long-Term Uses comprise a small share of the forest resource allocated to the forest sector control, accounting for only 37 thousand hectares of forest land. However only 33 thousand hectares are considered stocked, with 4 million cubic meters of growing stock. Coniferous forests account for slightly more than 50 percent of the forested land and 60 percent of the growing stock. Deciduous forests account for the remainder. Stocked forest land under other species are generally absent. Stocking per hectare varies from 95 cubic meters in deciduous stands to almost 145 cubic meters in the coniferous stands.

The mature and overmature components of the coniferous resource account for almost 30 percent of the forested land and nearly 45 percent of the growing stock. In deciduous stands, the mature and overmature share of the forested land amounts to one-quarter while the share of growing stock reached almost 40 percent. Stocking per hectare in coniferous mature stands approaches 240 cubic meters while in deciduous mature stands, stocking amounted to 155 cubic meters. Stocking in immature stands amounted to 125 cubic meters and nearly 90 cubic meters per hectare respectively.

C.8.1.2 Agricultural Sector

Agricultural forests account for almost 15 percent of the stocked forest land and growing stock in the Ural economic region. Virtually all of the forest land is considered stocked with either coniferous or deciduous species. The growing stock supported by the forested land amounts to 739 million cubic meters. The coniferous forest resources of the agriculture interests account for more than 40 percent of the stocked forest area and almost one-half of the growing stock. The resulting stocking per hectare shows almost 185 cubic meters in coniferous forests. Accounting for some 50 percent of the area and growing stock, stocking in deciduous stands amount for slightly more than 120 cubic meters.

Immature stands represented 80 percent of the coniferous and deciduous forested. Of the 382 million cubic meters of coniferous growing stock, 96 million cubic meters are considered mature and overmature, indicating a stocking per hectare of almost 245 cubic meters. Immature coniferous stands support a stocking of about 170 cubic meters. The mature and overmature component of the deciduous resource accounts for 100 million cubic meters of growing stock, suggesting a stocking of more than 175 cubic meters per hectare. Immature stands support stocking of almost 110 cubic meters per hectare.

C.8.1.3 Other Sectors

Supporting 1.1 million hectares of forest land, nearly all are considered stocked. Three-quarters of the stocked forest land supports coniferous species with the balance supporting deciduous species. Growing stock amounts to 147 million cubic meters, two-thirds of which consist of coniferous species. Stocking in coniferous stands amounts to 140 cubic meters per hectare. while stocking in the deciduous stands amounts to 160 cubic meters per hectare.

Mature and overmature component of the forested land amounts to some 25 percent in coniferous forests and 45 percent in deciduous stands. Supporting 39 million cubic meters and 22 million cubic meters respectively, stocking in mature and overmature coniferous stands amounts to more than 210 cubic meters per hectare and some 175 cubic meters per hectare in deciduous stands. In comparison, stocking in immature stands amounts to more than 115 cubic meters and 145 cubic meters respectively.

C.8.2 Species Distribution

Coniferous stands account for 55 percent of the stocked forest land and 60 percent of the growing stock. Deciduous species account for the balance. Only marginal amounts of the forest resource are located in the category of other species. **Table B.2** presents data describing the forest resources segregated by species.

C.8.2.1 Coniferous Association

The coniferous resource consists mainly of spruce and pine stands which together account for 93 percent of the stocked coniferous forest land and growing stock. Korean pines and true firs account for another 7 percent while larch species make-up one percent. On an aggregated basis, spruce stands support stocking per hectare, amounting to almost 150 cubic meters, while pine stands reach 140 cubic meters. True fir and Korean pine stands support stocking of some 160 cubic meters and 200 cubic meters per hectare. What larch is present supports stocking of 150 cubic meters per hectare.

C.8.2.2 Deciduous Association

By a large extent, the deciduous resource is dominated by the birch species, accounting for two-thirds of the area and 70 percent of the growing stock. Aspen accounts for

some 15 percent and some 20 percent of the stocked forest land and growing stock respectively. The balance is made up of unidentified deciduous species. Minor amounts of oak appear to be present. Birch stands support a lower stocking per hectare than most other deciduous stands, amounting to slightly more than 110 cubic meters per hectare. Aspen stands contain much higher stocking approaching 130 cubic meters per hectare. What oak stands are present have a stocking per hectare in the vacinity of 115 cubic meters pr hectare.

C.8.3 Accessibility

Table C.17 provides a distribution of the forest resources of the Ural Economic region segregated by accessibility classes. Exploitable forests, containing 31 million hectares and 4 billion cubic meters of growing stock, account for seven-eighties of the stocked land and almost 85 percent of the growing stock. Reserve forest account for 4.6 million hectares and 790 million cubic meters of growing stock.

C.8.3.1 Exploitable

Exploitable forests consist of those within the responsibility of the former *Goskomles* plus agricultural forests and forest allocated to Other sectors. The largest share, accounting for 80 percent of the stocked forest land and concomitant growing stock, lies within the boundaries of the responsibility of the successor organs to *Goskomles*. The agricultural forest resource accounts for another 18 percent of the forest resource while other sectoral forests account for the remaining 2 to 3 percent.

C.8.3.1.1 Forest Sector Short to Medium Term Forests

The 25 million stocked hectares supports slightly more than 3 billion cubic meters of growing stock. Coniferous species account for 55 percent of the forested area and 60 percent of the growing stock. The balance consists of deciduous stands. Forested stands supporting species other than the principal ones are conspicuous by their near absence. Stocking per hectare amounts to more than 135 cubic meters per hectare in coniferous stands and almost 115 in the deciduous stands. What little forested area under other species does not contribute in meaningful way to industrial potential.

Mature and overmature forests account for one-third of the coniferous stocked forest land and one-half of the concomitant growing stock. The stocking pre hectare in the mature and overmature stands amounts to slightly more than 200 cubic meters per hectare. The mature and overmature component of deciduous stands amounts to almost 30 percent of the area and 40 percent of the growing stock. The resulting stocking per hectare amounts to some 175 cubic meters. The corresponding stocking in the immature component of the coniferous and deciduous stands amounts to almost 100 cubic meters and 90 cubic meters respectively.

C.8.3.1.2 Agricultural Sector

Agricultural forests have been discussed earlier in section **C.8.1.2.**

C.8.3.1.3 Other Sectors

The forest resource sequestered with other organizations have been discussed earlier in section **C.8.1.3.**

C.8.3.2 Reserve

Reserve forests amount to 4.6 million hectares and 790 million cubic meters of growing stock, or 13 percent and 16 percent respectively of the total forest resource. Virtually all

of the stocked forest area and growing stock is located in forests belonging to *Goskomles*.

C.8.3.2.1 Forest Sector Forests for Short to Medium Term Needs

Reserve forests account for 4.6 million hectares and nearly 790 million cubic meters of growing stock. Coniferous species, occupying 2.5 million hectares, account for 54 percent of the total reserve aggregated forests. Stocking of 171 cubic meters per hectare are located in reserve forests with a range from 201 cubic meters in coniferous forests to 17 cubic meters in other species.

C.8.3.2.2 Goskomles Forests for Long Term Uses

The forest resources in this category have been discussed in section **C.8.1.1.3**.

C.8.4 The Ural Allowable Annual Cut

The total AAC contributed by the forest resources of the Ural Economic region amounts to 64 million cubic meters, of which the reserve forest contributes almost 9 million cubic meters, or nearly 15 percent of the total. The exploitable forest resource supports an AAC approaching 56 million cubic meters (**Table B.5**).

C.8.4.1 The Exploitable Allowable Annual Cut

The AAC supported by the exploitable resource amounts to 56 million cubic meters, of which the forest sector accounts for 52 million cubic meters, or slightly more than 90 percent of the exploitable total. The non-forest sector resource supports an AAC of 3.6 million cubic meters.

C.8.4.1.1 The Forest Sector Allowable Annual Cut

The forest sector AAC can be divided into two components based on the degree to which the forest resource is thought to be accessible or not accessible at the present time.[63] Almost 90 percent, or 46.5 million cubic meters, are believed to be accessible at the present time. The balance of 5.6 million cubic meters are located in stands which are expected to become accessible within the course of the next twenty years.

C.8.4.1.1.1 The Currently Accessible Allowable Annual Cut

The forests of the Ural Economic region supports an AAC estimated to be 46 million cubic meters. Nearly 60 percent of the AAC is contributed by deciduous stands, the principal specie association being birch and aspen. The 40 percent accounted for by the coniferous forests consists of contributions of more than two-thirds from spruce/true fir stands and one-third from pine stands.

C.8.4.1.1.2 The Potentially Accessible Allowable Annual Cut

The potentially accessible AAC, amounting to 6 million cubic meters, consists of a deciduous component (3.5 million cubic meters) and a coniferous component (2.5

Footnotes

[63]The per hectare AAC supported by the Forest Sector resource amounts to 2.1 cubic meters in coniferous forest and 2.9 cubic meters in deciduous forest. These figures are similar to those encountered in the Volgo-Vyatskiy Economic region.

million cubic meters). Two-thirds of the coniferous component is contributed by pine stands with the balance by spruce/true fir stands. In the deciduous component, birch stands account for two-thirds of the total with the balance consisting of aspen.

C.8.4.1.2 The Non-Forest Sector Allowable Annual Cut

The forest resource not under control by the forest authorities contributes 3.5 million cubic meters of AAC, nearly three-fifths of which consist of contributions from deciduous stands.[64] Birch dominates the deciduous component accounting for two-thirds of the total while spruce/fir dominate the coniferous total.

C.8.4.2 The Reserve Allowable Annual Cut

In addition to the fiber flow, another 9 million cubic meters of fiber are supported in the reserve forests. Some four-fifths of the reserve AAC is contributed by the coniferous forest (7 million cubic meters). The balance of 1.7 million cubic meters flows from the deciduous resource.[65]

C.9 West Siberia Economic Region

The West Siberian Economic Region, the smallest of the three economic regions located outside of European Russia (**Map A**), still accounts for a larger area of stocked forest land and growing stock that any single region inside of European Russia. The West Siberian Economic region accounts for 12 percent of the stocked forest land and 13 percent of the growing stock of Russia, or 90 million hectares and nearly 11 billion cubic meters. **Table C.1** shows for selected forest indicators, the distribution among the different economic regions of Russia.

C.9.1 The Forest Resource According to Ownership

The Forest Sector category accounted for seven-eighths of the stocked forest land and nearly 90 percent of the growing stock. Agricultural forests accounts for another 10 percent, while Other Sector forests represent the remainder, amounting to one percent of the stocked area and 2 percent of the growing stock. **Table C.18** shows the forest resources of the West Siberian Economic region segregated into these broad use categories.

C.9.1.1 Forest Sector

Forest assigned to the Former Forest Industry Ministry do not account for a significant share of the forested area or growing stock, amounting to only 83 thousand hectares of stocked land and 13 million cubic meters. The forest resources located in the boundaries of the former *Goskomles* amount to 85 percent of the stocked forest land

Footnotes

[64]The per hectare AAC supported by the non-Forest Sector resource amounts to 0.5 cubic meters in coniferous forest and 0.7 cubic meters in deciduous forest. These figures are consistent with those in other regions of the European part of Russia.

[65]The AAC present in the reserve forests of the Ural Economic region stems from after 1990. Thus, an inferred per hectare contribution from coniferous stands of 2.8 cubic meters may suggest that there has been a transfer of forest land from the exploitable to the reserve categories since the effective date of the inventory (1988) rather than signifying land which is precluded from harvest due to environmental factors. Consequently, care should be exercised when utilizing this figure. An inferred figure for the deciduous component of 0.8 cubic meters falls within expectations for reserve forest which cannot be considered available in the long-term.

and nearly 90 percent of the growing stock. Forest set aside for long-term uses account for 5 percent of the area and inventory.

C.9.1.1.1 Goskomles Short to Medium Terms Forests

Accounting for nearly 79 million hectares of forest land, almost 74 million hectares are considered stocked. Coniferous forests occupy the largest share of the forested land, representing 70 percent of the forested area and concomitant growing stock. Except for 499 thousand hectares and 5 million cubic meters under other species, deciduous stands account for the balance. Total growing stock, corresponding to the area of stocked forest land, amounts to 9 billion cubic meters. Coniferous forests contribute 70 percent of the aggregated regional total with the balance being comprised of deciduous species. Other species are nominally present. The average stocking per hectare, accordingly, amounts to almost 125 cubic meters per hectare in coniferous stands, and nearly 130 cubic meters per hectare in deciduous stands. What forest resource located in other species shows stocking of only 10 cubic meters per hectare.

On an aggregated basis, mature and overmature stands account for approximately 55 of the stocked forest land, with that in coniferous forests amounting to some 55 percent of the coniferous total. In deciduous forests, mature and overmature component accounts for nearly 60 percent of the total. Mature and overmature coniferous stands, supporting 4 billion cubic meters of growing stock, have a stocking per hectare of nearly 140 cubic meters. Deciduous mature and overmature stands, on the other hand contain some 2 billion cubic meters, thus yielding stocking per hectare of nearly 170 cubic meters per hectare. In comparison, stocking in the immature stands varies from 105 cubic meters per hectare in the coniferous stands to some 70 cubic meters in the deciduous stands.

C.9.1.1.2 Resources Assigned to the Former Ministry of Forest Industry

The component of the forest resources which were part of the forest industrial ministerial system do not contribute significantly to the forest resources of West Siberia. The 83 thousand stocked hectares and 13 million cubic meters represent less than one percent of the forest resources under control of the forest sector.

The coniferous component accounts for four-fifths of the stocked forest land and almost 85 percent of the growing stock, providing a stocking per hectare of nearly 160 cubic meters per hectare. The stocking in the deciduous stands, accordingly, amount to slightly more than 130 cubic meters per hectare.

The mature and overmature component of coniferous stands accounts for slightly more than two-thirds of the area and slightly more than 40 percent of the growing stock, providing a stocking of 185 cubic meters per hectare. Corresponding numbers in deciduous stands are 60 percent and 80 percent with a stocking of nearly 175 cubic meters per hectare. Stocking in the immature component of coniferous stands amounts to 145 cubic meters per hectare and slightly more than 65 cubic meters per hectare.

C.9.1.1.3 Goskomles Forests Set Aside for Long-Term Uses

Lands which have been allocated to Long-Term Uses amount to 8 million hectares, of which 60 percent are considered capable of sustaining forests. Nearly all of this forest land, or 5 million hectares, is stocked. Coniferous forests account for 95 percent of the forested land while deciduous forests account for the remainder. Stocked forest land under other species account for less than one percent of the stocked area. Coniferous growing stock supported by the forested area amounts to 344 million cubic meters, and 40 million cubic meters in the deciduous stands. Stocking per hectare is very modest, varying from some 75 cubic meters in coniferous stands to almost 80 cubic meters in the deciduous stands.

The mature and overmature components of the coniferous resource account for 70 percent of the forested land and two-thirds of the growing stock. In deciduous stands, the mature and overmature share of the forested land amounts to 69 percent while the share of growing stock reached almost 85 percent. Stocking per hectare in coniferous mature and immature stands amounts to approximately between some 70 and 80 cubic meters while in deciduous mature and immature stands, stocking amounted to between some 40 and 90 cubic meters.

C.9.1.2 Agricultural Sector

All of the land located in agriculture control, amounting to 9.5 million hectares, is considered forest land. Virtually all of the forest land is considered stocked with either coniferous or deciduous species. The growing stock supported by the forested land amounts to 958 million cubic meters. The resulting stocking per hectare approaches 105 cubic meters.

The forest resources of the agriculture interests are concentrated in deciduous species which account for more than four-fifths of the stocked forest area and three-quarters of the growing stock. The resulting stocking per hectare shows almost 145 cubic meters in coniferous forests and more than 95 cubic meters in deciduous stands.

More two-thirds of the coniferous and four-fifths of the deciduous forested areas are concentrated in immature stands. Of the 228 million cubic meters of coniferous growing stock, about 81 million cubic meters are considered mature and overmature, indicating a stocking per hectare of almost 160 cubic meters. Immature coniferous stands support a stocking of about 135 cubic meters. Almost 171 million cubic meters of deciduous growing stock are believed to be mature and overmature, suggesting a stocking of more than 125 cubic meters per hectare. Immature stands support stocking of 90 cubic meters per hectare.

C.9.1.3 Other Sectors

Supporting more than 2 million hectares of forest land, nearly all are considered stocked, primarily with coniferous stands Some 70 percent of the stocked forest land supports coniferous forest while almost one-quarter support deciduous species. Stands containing other species account for slightly more than 5 percent of the stocked area. Supporting 266 million cubic meters of growing stock, three-quarters are contributed by coniferous forests, the stocking of which amounts to almost 145 cubic meters per hectare. Stocking in the deciduous stands is somewhat less, amounting to almost 95 cubic meters per hectare.

Mature and overmature component of the forested land amounts to some 30 percent of stocked land and 25 percent of the growing stock in coniferous forests and more than 55 percent and 75 percent in deciduous species. Supporting 51 million cubic meters and 49 million cubic meters respectively, stocking in mature and overmature coniferous stands amounted to 125 cubic meters per hectare and nearly 170 cubic meters per hectare in deciduous stands. Stocking in immature stands amounted to more than 145 cubic meters in coniferous stands and more than 70 cubic meters in deciduous stands.

C.9.2 Species Distribution

The coniferous forest inventory of the West Siberian Economic region accounts for 70 percent of the stocked forest land and growing stock. Deciduous species account for the remaining 30 percent of the forested area and growing stock. Only marginal amounts of the forest resource are located in the category of other species. **Table B.2** presents data describing the forest resources segregated by species.

C.9.2.1 Coniferous Association

The coniferous resource consists of pine and Korean pine stands, which together account for nearly three-quarters of the forested area and growing stock. The balance consists in roughly equal amounts of spruce, true fir, and larch stands. On an aggregated basis, Korean pine supports the highest stocking of nearly 165 cubic meters per hectare, followed by true fir stands at more than 130 cubic meters per hectare. Spruce stands support stocking of almost 120 cubic meters, while pine stands and larch stands support stocking in the vacinity of 105 cubic meters per hectare.

C.9.2.2 Deciduous Association

Deciduous stands, accounting for the remaining 30 percent of the forest inventory, are dominated by the birch, which represent more than 70 percent of the forested area and nearly 80 percent of the growing stock. Aspen accounts for the remainder. Species such as oak and beech appear to be non-existent. Birch stands support a lower stocking per hectare than most other deciduous stands, amounting to slightly more than 115 cubic meters per hectare. Aspen stands contain much higher stocking containing nearly 165 cubic meters per hectare.

C.9.3 Accessibility

Table C.19 provides a distribution of the forest resources of the West Siberian Economic region segregated by accessibility classes. Exploitable forests, containing 64 million hectares and 8.2 billion cubic meters of growing stock, account for slightly more than 70 percent of the stocked area and three-quarters of the growing stock. Reserve forests contain 26 million hectares supporting 2.6 billion cubic meters of growing stock.

C.9.3.1 Exploitable

Forests allocated to other sectors play a minor role in the size of forest resource considered to be exploitable, accounting for just three percent of the forest resource. The largest share, accounting for 80 percent of the stocked forest land and nearly 85 percent of the growing stock, lies within the boundaries of the responsibility of the successor organs to *Goskomles* . Agricultural forests account for nearly 15 percent of the area and 12 percent of the growing stock.

C.9.3.1.1 Forest Sector Forests for Short to Medium Term Needs

The 52 million hectares of stocked forest land support nearly 7 billion cubic meters of growing stock. Coniferous stands account for two-thirds of the forested area and growing stock, with the balance made up solely of deciduous stands. Forested stands supporting species other than the principal ones are conspicuous by their virtual absence. Stocking per hectare amounts to more than 130 cubic meter in coniferous stands and 135 in the deciduous stands. What little forested area under other species does not contribute in meaningful way to industrial potential, having stocking of almost 20 cubic meters per hectare.

Mature and overmature forests account for slightly more than one-half of the forested area and almost two-thirds of the growing stock of the coniferous inventory. Stocking in the mature and overmature coniferous stands amounts to nearly 160 cubic meters per hectare. The mature and overmature component of the deciduous stands occupies three-fifths of the stocked forest land and slightly more than three-quarters of the growing stock. The stocking per hectare, accordingly, amounts to almost 180 cubic meters.

C.9.3.1.2 Agricultural Sector

Agricultural forests have been discussed in section **C.9.1.2.**

C.9.3.1.3 Other Sectors

The forest resource sequestered with other sectors has been examined previously in section **C.9.1.3.**

C.9.3.2 Reserve

Reserve forests have been reviewed in section **C.9.1.3.**

C.9.3.2.1 Forest Sector for Short to Medium Term Needs

Reserve forests, accounting for 21 million hectares and nearly 2.2 billion cubic meters of growing stock, represented 85 percent of the reserve forested area and growing stock. Coniferous species, occupying 18 million hectares, account for slightly more than 85 percent of the stocked forest land and 92 percent of the growing stock. Stocking of almost 105 cubic meters per hectare are located in reserve forests with a range from some 110 cubic meters in coniferous forests to 75 cubic meters in other species.

C.9.3.2.2 Goskomles Forest for Long-term Uses

Long-term utilization forests, located in the reserve category, have been discussed in section **9.1.1.3.**

C.9.4 THE WEST SIBERIAN ALLOWABLE ANNUAL CUT

The total AAC supported by the forest resource of West Siberia amounts to 124 million cubic meters. More than one-quarter is located in stands which are not expected to become accessible over the next twenty years. The balance of 90 million cubic meters is contributed by the exploitable forest resource (**Table B.5**).

C.9.4.1 The Exploitable Allowable Annual Cut

The share of the exploitable AAC contributed by the non-forest resource is not large, amounting to about one-fifteenth, or 7 million cubic meters, of the 90 million cubic meters considered to be exploitable. The largest share is provided by the forest sector resource, amounting to 83 million cubic meters.

C.9.4.1.1 The Forest Sector Allowable Annual Cut

Not all of the 83 million cubic meters of AAC from the forest sector resource is thought to be accessible at the present time.[66] Almost 55 percent of the total, or 44 million cubic meters, is located in stands which are not accessible at the present time, but which

Footnotes

[66]The per hectare contribution of the Forest Sector resource from exploitable coniferous stands amounts to 1.4 cubic meters and from deciduous stands 2.9 cubic meters. The deciduous figure is similar to that experienced in the Ural Economic region, and so seems reasonable. While the coniferous figure is lower than that experience in the Ural region, site quality is expected to decline as regions examined are located outside of the European part of Russia. Thus, the coniferous figure is not believed to be unreasonable.

are thought to become accessible within the next twenty years. The balance of 39 million cubic meters is located in the forest resource which is believed to support a currently accessible AAC.

C.9.4.1.1.1 The Currently Accessible Allowable Annual Cut

The share of the AAC which is currently accessible amounts to only 39 million cubic meters. Nearly two-thirds of the AAC flows from deciduous stands, amounting to 25 million cubic meters. The principal species association from which the deciduous AAC originates is birch. The birch association contributes almost 17 million cubic meters to the AAC. The balance flows primarily from the aspen stands. The coniferous AAC, amounting to 14 million cubic meters, consists mainly of contributions from pine stands (63 percent) and spruce/true for (33 percent). Larch stands contribute almost 5 percent of the total AAC.

C.9.4.1.1.2 The Potentially Accessible Allowable Annual Cut

The potentially accessible AAC, amounting to 44 million cubic meters, comes mainly from deciduous stands, which account of two-thirds of the total. Birch is the principal contributor, accounting for two-thirds of the deciduous potential AAC, with aspen accounting for most of the remainder. In the coniferous component, contributions from pine stands account for some 60 percent with spruce/true accounting for most of the remainder save 6 percent coming from the larch stands.

C.9.4.1.2 The Non-Forest Sector Allowable Annual Cut

The non-forest sector resource is expected to contribute one-fifteenth of the exploitable AAC, or 6.7 million cubic meters.[67] Deciduous stands account for five-sixths of the total, the major species being birch, followed by aspen. The coniferous component, accounting for one million cubic meters, consists of contributions from pine stands (60 percent) and from spruce/true fir stands (40 percent).

C.9.4.2 The Reserve Allowable Annual Cut

In addition to this, the reserve stands are believed to support an AAC of almost 34 million cubic meters, up considerably from the 20 million cubic meters evident in the late 1970s.[68] The largest share of the reserve AAC is contributed by the coniferous

Footnotes

[67]While the per hectare contribution to the non-Forest Sector AAC from the deciduous stands, amounting to 0.7 cubic meters, is consistent with experience in European Russia, the value evident in coniferous stands, 0.4 cubic meters, is a little lower. Although there is a difference between West Siberia and figures evident in European Russia, it is believed connected with a difference in site and stocking class, and accordingly is not sufficient to discard the non-Forest Sector AACs derived for West Siberia.

[68]The reserve AAC has increased since the end of the 1970s, rising by an estimated 14 million cubic meters to 34 million cubic meters. Without having a clear idea of the changes brought to the forest resource classification between exploitable and reserve, basing per hectare contributions on 1988 area data and estimated 1991 AAC data will give unclear answers. Thus, the per hectare values are calculated employing 1988 area and pre 1980 reserve AAC figures. While there is still uncertainty connected with using numbers from two different periods (pre 1980, and post 1980), for the purposes of testing the validity of the data underlying the analysis, it is believed sufficient.

The per hectare contribution from coniferous stands amounted to 0.5 cubic meters while that from deciduous stands amounts to 1.6 cubic meters. The AAC figure for the deciduous stands and from the coniferous stands are less than that evident in the exploitable forest resource, consistent with expectations of a lower quality resource located in the reserve stands. While the data is not as convincing for the reserve forest of West

Footnotes *continued on next page*

resource, which amounts to 29 million, or 85 percent of the total reserve AAC. The balance of 5 million cubic meters flows from the deciduous resource.

C.10 East Siberia Economic Region

The East Siberian Economic Region, located in the Asian part of Russia between West Siberia and the Far East regions (**Map A**), accounts for 30 percent of the forested area and 36 percent of the growing stock of Russia, or 234 million hectares of stocked forest land and 29 billion cubic meters of growing stock. Of the separate regions of Russia, the East Siberian economic region is second in size of the forest resource after the Far East Economic Region. Coniferous species dominate the forest resource, accounting for 80 percent of the forested area and almost 90 percent of the growing stock. **Table C.1** which shows for selected forest indicators, the distribution among the different economic regions of Russia.

C.10.1 The Forest Resource According to Ownership

The Forest Sector forests account for 95 percent of the stocked forest land and growing stock. Agricultural forests account for another 3 percent, while Other Sector forests represent the balance of 2 percent. **Table C.20** shows the forest resources of the East Siberian Economic region segregated into these three broad use categories.

C.10.1.1 Forest Sector

Forest assigned to Long-term uses do not account for a significant share of the forested area or growing stock. Forest resources under control of the former forest industry ministry account for only 2 percent and three percent of the stocked forest land and growing stock respectively. The forest resources located in the boundaries of the former *Goskomles* account for the majority, amounting to more than 97 percent of the stocked forest land and growing stock.

C.10.1.1.1 Goskomles Short to Medium Term Forests

Accounting for 238 million hectares of forest land, nearly 218 million hectares are considered stocked with 27 billion cubic meters of growing stock. Coniferous forests occupy the largest share of the forested land, representing slightly more than 80 percent of the stocked land and 90 percent of the growing stock. Deciduous species account for another 15 percent of the stocked land and 9 percent of the growing stock. The share of the forest resource allocated to other species amounts to 5 percent of the stocked forest land but only one percent of the growing stock. The average stocking per hectare, then, amounts to more than 135 cubic meters per hectare in coniferous stands, and 85 cubic meters per hectare in deciduous stands. What forest resource located in other species shows stocking of almost 25 cubic meters per hectare.

On an aggregated basis, mature and overmature stands account for approximately 60 percent of the stocked forest land, with the share of the coniferous resource amounting to nearly 65 percent of the coniferous total. The mature and overmature component of the deciduous forests account for one-third of the deciduous forested area. Mature and overmature coniferous stands support 16 billion cubic meters of growing stock, indicating a stocking per hectare of nearly 150 cubic meters. Deciduous mature and

Footnotes *continued*

Siberia, the non-contribution to currently and potentially accessible fiber indicates that the uncertainty is not material for the present analysis.

overmature stands, on the other hand contain some 1.5 billion cubic meters, yielding stocking per hectare of 135 cubic meters. In comparison, stocking in the immature stands varies from 115 cubic meters per hectare in the coniferous stands to almost 60 cubic meters in the deciduous stands.

C.10.1.1.2 Resources Assigned to the Former Ministry of Forest Industry

The component of the forest resources which were part of the forest industrial ministerial system while not large, still amounted to 2 percent of the forested land, or nearly 5 million hectares. More than one billion cubic meters were supported by the stocked forest land indicating an average stocking of more than 210 cubic meters per hectare.

Nearly 90 percent of the stocked forest land were covered by coniferous forests which accounted for a similar share of the growing stock. The balance consisted of deciduous forest. Forested land occupied by the non-principle species were conspicuous by their absence. Stocking in coniferous stands amount to slightly more than 230 cubic meters per hectare, while stocking in deciduous stands amounts to 125 cubic meters per hectare.

Growing stock on mature and overmature coniferous stands amounts to 627 million cubic meters standing on 2.4 million hectares, or two-thirds and 60 percent of the coniferous totals respectively. Mature and overmature stands support a stocking of nearly 260 cubic meters per hectare, while stocking in the immature stands amounts to 190 cubic meters.

Mature and overmature deciduous stands support some 83 million cubic meters of growing stock on 457 thousand hectares, providing a stocking per hectare of nearly 180 cubic meters. Stocking in the immature stands amounts to almost 75 cubic meters per hectare.

C.10.1.1.3 Goskomles Forests Set Aside for Long-Term Uses

Lands which have been allocated to Long-Term Uses, while accounting for less than one percent of the forest resources of East Siberia, still amount to 156 thousand hectares of stocked forest land. While growing stock supported by the forested area amounts to almost 15 million cubic meters, stocking per hectare is very modest, amounting to almost 100 cubic meters.

Coniferous forests account for slightly more than 50 percent of the forested land. Deciduous forests account for slightly more than one-third, with the balance, amounting to almost 15 percent, comprised by other species. Growing stock supported by the coniferous forested area amounts to 10 million cubic meters, providing a stocking per hectare of slightly more than 145 cubic meters. The 4 million cubic meters of growing stock located in deciduous stands provides a stocking of some 80 cubic meters per hectare.

The mature and overmature components of the coniferous resource account for one-third of the forested area and almost 40 percent of the coniferous growing stock. In deciduous stands, the mature and overmature share of the forested land amounted to almost 40 percent while the share of growing stock reached 45 percent. Stocking per hectare in coniferous mature stands amounted to 145 cubic meters per hectare while stocking in the immature stands amounted to almost 120 cubic meters. The corresponding stocking in deciduous stands amounts to 100 cubic meters in the mature an overmature component and 70 cubic meters in the immature component.

C.10.1.2 Agricultural Sector

Of the 7.3 million hectares of forest land lying within agricultural forests, 7 million, or 96 percent, are stocked with 826 million cubic meters of inventory. Unlike the forest resource in the Forest Sector, coniferous forest resource accounts for only one-half of the area and two-thirds of the growing stock, much less than the four-fifths and 90 percent prevalent in the forest sector resource. The resulting stocking per hectare shows 145 cubic meters in coniferous forests and almost 90 cubic meters in deciduous stands.

Immature stands account for some 15 percent of the forested and almost 25 percent of the growing stock. Similar ratios exist for coniferous and deciduous components. Of the 3.7 million hectares and 533 million cubic meters of coniferous growing stock, about 625 thousand hectares and 119 million cubic meters are considered mature and overmature, indicating a stocking per hectare of almost 190 cubic meters. Immature coniferous stands support a stocking of about 135 cubic meters. Almost 73 million cubic meters of deciduous growing stock on 511 thousand hectares are believed to be mature and overmature, suggesting a stocking of more than 140 cubic meters per hectare. Immature stands support stocking of almost 80 cubic meters per hectare.

C.10.1.3 Other Sectors

While accounting for similar area of land as agriculture, the share of land which can support forests is decidedly less in other ownership. While all land in agriculture is considered capable of supporting forests, only four-fifths are so considered in other sectors. Of the 7. 6 million hectares of land, nearly 5 million are classified as forest land. Of the forest land, more than 90 percent are considered stocked with 573 million cubic meters of inventory. While conifer stands still account for more than 70 percent of the forested area and nearly 90 percent of the volume, the share made up of other species accounts for some 10 percent of the stocked area and 3 percent of the growing stock. Deciduous species comprise the balance of 15 percent and 10 percent respectively. The average stocking amounts to almost 130 cubic meters per hectare, with that in coniferous higher at 155 cubic meters than deciduous, in which stocking amounts to 80 cubic meters per hectare.

Mature and overmature component of the forested land compares favorably to that existing in the forest sector control, but differs when the individual specie components are examined. More than three-fifths of the deciduous stands are considered mature or overmature compared to one-third in the forest sector forests. The share in coniferous category is similar, but still less with one-half being in the mature and overmature category compared with the three-fifths in the forest sector. Supporting 298 million cubic meters and 41 million cubic meters respectively, stocking in mature and overmature coniferous stands amounted to 175 cubic meters per hectare and almost 95 cubic meters per hectare in deciduous stands. In comparison, stocking in immature stands amounted to almost 135 cubic meters and slightly more than 60 cubic meters respectively.

C.10.2 Species Distribution

The forest inventory of the East Siberian Economic region is dominated by coniferous stands, accounting for 80 percent of the stocked forest land and almost 90 percent of the growing stock. Deciduous species account for 15 percent of the forest forested area and 10 percent of the growing stock. Other species account for 5 percent of the forested area and one percent of the growing stock. **Table B.2** presents data describing the forest resources segregated by species.

C.10.2.1 Coniferous Association

The coniferous resource consists mainly of larch stands which account for almost 60 percent of the area and almost one-half of the growing stock. Pine and Korean Pine are the next most represented, accounting collectively for another 30 percent of the area and 40 percent of the growing stock. Spruce and true fir account for the balance, amounting to almost 15 percent of the area and slightly more than 10 percent the growing stock. On an aggregated basis, larch species contain the lowest stocking per hectare, amounting to almost 115 cubic meters. Stocking in pine stands and Korean Pine stands amount to 170 cubic meters and 190 cubic meters per hectare respectively. The stocking in spruce stands amounts to 140 cubic meters while in true fir stands, the stocking is 175 cubic meters per hectare.

C.10.2.2 Deciduous Association

Deciduous stands account for 15 percent of the area and 10 percent of the growing stock. By a large extent, the deciduous resource is dominated by the birch species, accounting for 85 percent of the forested area and three-quarters of the growing stock. Aspen accounts for the remainder. Species such as oak and beech appear to be non-existent. Birch stands support a lower stocking per hectare than most other deciduous stands, amounting to almost 80 cubic meters per hectare. Aspen stands contain much higher stocking amounting to nearly 140 cubic meters per hectare.

C.10.3 Accessibility

Table C.21 provides a distribution of the forest resources of the East Siberian Economic region segregated by accessibility classes. Exploitable forests, accounting for 124 million hectares of stocked forest land and 17 billion cubic meters of growing stock, account for slightly more than 50 percent of the area and nearly three-fifths of the growing stock, Reserve forests account for 111 million hectares and 12 billion cubic meters of growing stock.

C.10.3.1 Exploitable

Exploitable forests are dominated by those on forest sector managed by *Goskomles*, accounting for more than 90 percent of the stocked forest land and concomitant growing stock. Both agricultural forests and forests "belonging" to "Other Ministries" play a minor role in the size of forest resource considered to be exploitable, accounting collectively for 9 percent of the 124 million hectares and 8 percent of the 17 billion cubic meters of growing stock of exploitable forests.

C.10.3.1.1 Forest Sector Short to Medium Term Forests

The exploitable area supports more than 15 billion cubic meters of growing stock on 112 million hectares of stocked forest land. Coniferous species account for four-fifths of the forested area and nearly 90 percent of the growing stock, with the balance made up solely of deciduous stands. Forested stands supporting species other than the principal ones are conspicuous by their absence. Stocking per hectare amounts to more than 145 cubic meters per hectare in coniferous stands and slightly more than 95 cubic meters in the deciduous stands. What little forested area under other species does not contribute in meaningful way to industrial potential.

Mature and overmature conifers forests account for three-fifths of the coniferous forested area and nearly 70 percent of its growing stock, suggesting stocking of some 165 cubic meter per hectare. Mature and overmature deciduous stands account for one-third of the area and almost 60 percent of the growing stock, providing stocking per hectare of greater than 160 cubic meter per hectare. The stocking in the immature stands

amounts to 115 cubic meters in coniferous stands and almost 65 cubic meters in deciduous stands.

C.10.3.1.2 Agricultural Sector

Agricultural forest has been discussed in section **C.10.1.2.**

C.10.3.1.3 Other Sectors

The forest resource sequestered with other ministries has been examined in section **C.10.1.3.**

C.10.3.2 Reserve

Reserve forests amount to 111 million hectares and 12.5 billion cubic meters of growing stock, or 47 percent and 43 percent respectively of the total forest resource. Virtually all of this resource is located in *Goskomles* forests.

C.10.3.2.1 Goskomles Short to Medium Term Forests

Reserve forests, accounting for 111 million hectares and nearly 12.5 billion cubic meters of growing stock accounting for essentially all of the stocked forest land and growing stock considered to be in reserve forests. Coniferous species, occupying 89 million hectares and containing 11.5 billion cubic meters, account for four-fifths and more than 90 percent of the reserve total aggregated forests respectively. Deciduous stands account for 10 percent and 6 percent respectively. The balance, 10 percent and 2 percent, consists of other species. Stocking of 113 cubic meters per hectare are located in reserve forests with a range from 130 cubic meters in coniferous forests and 23 cubic meters in other species.

C.10.3.2.2 Goskomles Forests dedicated for Long-term Uses

Long-term use forests have been discussed in section **C.10.1.1.3.**

C.10.4 The East Siberian Allowable Annual Cut

The AAC contributed by the forest resources of East Siberia amounts to 279 million cubic meters, the largest of any of the economic regions of Russia. The share contributed by the reserve forest accounts for a significant share of the overall total, reaching almost 45 percent, or 120 million cubic meters. The exploitable AAC amounts to 159 million cubic meters (**Table B.5**).

C.10.4.1 The Exploitable Allowable Annual Cut

The exploitable AAC of 159 million cubic meters is dominated by the forest sector resource which account for more than 95 percent of the total, or 154 million cubic meters. The non-forest sector resource contributes 5 million cubic meters, or less than 5 percent of the total.

C.10.4.1.1 The Forest Sector Allowable Annual Cut

The forest sector AAC, consisting of currently and potentially accessible AAC components, reaches 154 million cubic meters.[69] However, almost 55 percent, or 81 million cubic meters, is thought to be currently accessible at the present time. The balance of 73 million cubic meters is believed to be potentially accessible with the introduction of appropriate technology for harvesting and/or the expansion of the infrastructure.

C.10.4.1.1.1 The Currently Accessible Allowable Annual Cut

The forest sector forests of East Siberia support an estimated 81 million cubic meters. Nearly three-quarters of the AAC flow from coniferous stands, amounting to 58 million cubic meters. The principal species association within the coniferous AAC is pine, which accounted for almost 55 percent of the coniferous total. Spruce/true fir and larch stands in equal shares contribute the balance of the coniferous AAC. Deciduous stands, accounting for the remainder, provide 23 million cubic meters of AAC. The largest share is concentrated in birch forests which represent 70 of the deciduous total. The balance primarily comes from aspen stands.

C.10.4.1.1.2 The Potentially Accessible Allowable Annual Cut

The potentially available AAC, amounting to 73 million cubic meters, is dominated by the coniferous component, which accounts for 70 percent of the total. The dominant specie association in the coniferous component is larch stands which represent slightly more than 50 percent. Spruce/true fir stands account for some 30 percent with pine stands comprising the balance. Birch stands contribute the majority of the 21 million cubic meters of deciduous AAC.

C.10.4.1.2 The Non-Forest Sector Allowable Annual Cut

The non-forest sector resource is expected to provide nearly 5 million cubic meters of wood, one-half of which consists of deciduous stands.[70] Both birch and aspen stands contribute equally to the deciduous component. The coniferous component receives its wood primarily from pine stands with equal shares coming from larch and spruce/true for stands.

C.10.4.2 The Reserve Allowable Annual Cut

In addition to this fiber flow from the presently and potentially accessible resource, another 120 million cubic meters are located in the reserve forests which are not expected to contribute to the fiber flow within the next twenty years.[71] The coniferous

Footnotes

[69]The per hectare contribution to the Forest Sector AAC from one hectare of exploitable coniferous forest amounts to 1.4 cubic meters and from deciduous forest 2.4 cubic meters. These figures are not unexpected given the data evident in West Siberia.

[70]The per hectare contribution from the forested resource of the non-Forest Sector resource amounts to 0.4 cubic meters from coniferous stands and 0.6 cubic meters from the deciduous stands. These figures are consistent with those of West Siberia.

[71]The reserve AAC has risen by about twenty percent since the pre 1980s. While the same difficulties identified in the footnote linked to the West Siberian region can be applied, the data for deciduous stands (1.2 cubic meters) and coniferous stands (1.0 cubic meters) are consistently lower than those in exploitable forest sector resource.

stands contribute the bulk of the reserve AAC, amounting to 85 percent, or 102 million cubic meters. Deciduous forest account for the remaining 18 million cubic meters.

C.11 THE FAR EAST ECONOMIC REGION

The Far East Economic Region, located on the eastern seaboard of Russia (**Map A**), accounts for 36 percent of the forested area and 26 percent of the growing stock of Russia, or 281 million hectares of stocked forest land and 21 billion cubic meters of growing stock. Of the 11 separate economic regions of Russia, this economic region accounts for the largest area and is second only to East Siberia in the size of growing stock. Given its proximity to Pacific Rim markets and preponderance of coniferous species, it is surprising that the timber resources of this economic region are not more widely utilized. **Table C.1** which shows for selected forest indicators, the distribution among the different economic regions of Russia.

C.11.1 The Forest Resource According to Ownership

The Forest Sector category accounted for virtually all of the forest resource in the Far East region. Agricultural forests and other sectors each accounted for approximately one percent of the total. **Table C.22** shows the forest resources of the Far East Economic region segregated into these broad use categories.

C.11.1.1 Forest Sector

Forest assigned to the Former Forest Industry do not account for a significant share of the forested area or growing stock. The forest resources located in the boundaries of the former *Goskomles* amount to more than 80 percent of the stocked forest land and 90 percent of the growing stock. Forest resources allocated for long-term uses account for one-fifth of the area but only 10 percent of the volume.

C.11.1.1.1 Goskomles Short to Medium Term Forests

Accounting for some 314 million hectares of forest land, nearly 248 million hectares are considered stocked with slightly more than 19 billion cubic meters. Conifer forests occupy the largest share of the forested land, representing three-quarters of the stocked hectares and 87 percent of the growing stock. Deciduous stands account for another 24 million hectares and nearly two billion cubic meters. The share of the forest resource allocated to other species is significant, amounting to 35 million hectares and 605 million cubic meters of growing stock. The average stocking per hectare, accordingly, amounts to almost 90 cubic meters per hectare in coniferous stands, and 80 cubic meters per hectare in deciduous stands. What forest resource located in other species shows stocking of only 17 cubic meters per hectare.

On an aggregated basis, mature and overmature stands account for approximately one-half of the stocked forest land and some 60 percent of the growing stock. The mature and overmature component of coniferous forests account for one-half of the forested land and nearly two-thirds of the growing stock. In deciduous forests, on the other hand, the mature and overmature component accounts for nearly two-fifths of the forested area and 55 percent of the growing stock. The stocking per hectare in the mature and overmature coniferous stands amounts to more than 110 cubic meters per hectare. Stocking in the deciduous mature and overmature stands, on the other hand, amount to slightly more than 115 cubic meters per hectare. Stocking in the immature stands varies from almost 65 cubic meters per hectare in the coniferous stands to some 60 cubic meters in the deciduous stands.

C.11.1.1.2 Resources Assigned to the Former Ministry of Forest Industry

The component of the forest resources which were part of the forest industrial ministerial system is not present in the Far East economic region.

C.11.1.1.3 Goskomles Forests Set Aside for Long-Term Uses

Lands which have been allocated to Long-Term Uses amount to more than 82 million hectares, of which less than one half are considered capable of sustaining forests. Only three-fifths of this forest land, or 27 million hectares, are stocked with 1.6 billion cubic meter of growing stock. Forests stocked by other species account for nearly 50 percent of the forested land, with conifer stands occupying slightly more than 40 percent. Deciduous forests account for the remainder. Conifer stands account for nearly three-fifths of the growing stock with other species accounting for slightly more than one-quarter. Deciduous stands account for almost 15 percent. Stocking per hectare is very modest, varying from some 80 - 85 cubic meters in coniferous stands and deciduous stands to almost 35 cubic meters in stands populated by other species.

The mature and overmature components of the coniferous resource account for almost two-thirds of the forested land and three-quarters of the growing stock. In deciduous stands, the mature and overmature share of the forested land amounted to three-quarters while the share of growing stock surpassed 80 percent. Stocking per hectare in coniferous mature stands amount to almost 100 cubic meters while in deciduous mature and overmature stands, stocking amounted to almost 95 cubic meters.

C.11.1.2 Agricultural Sector

Agricultural forests account for almost 2 million hectares of stocked forest land and 100 million cubic meters of growing stock, resulting in a stocking per hectare of slightly more than 55 cubic meters. The forest resources of the agriculture interests are concentrated in deciduous species which account for three-quarters of the stocked forest area and growing stock. The resulting stocking per hectare shows almost 65 cubic meters in coniferous forests and almost 55 cubic meters in deciduous stands.

More than two-thirds of the coniferous and almost 90 percent of the deciduous forested areas are concentrated in immature stands. Of the 26 million cubic meters of coniferous growing stock, 9 million cubic meters are considered mature and overmature, indicating a stocking per hectare of almost 65 cubic meters. Immature coniferous stands support a stocking of some 60 cubic meters. Almost 12 million cubic meters of the 73 million cubic meters of deciduous growing stock are believed to be mature and overmature, suggesting a stocking of almost 90 cubic meters per hectare. Immature stands support stocking of some 50 cubic meters per hectare.

C.11.1.3 Other Sectors

Supporting 4.3 million hectares of forest land, only 3.8 million, or 90 percent, are considered stocked. One-half of the stocked forest land supports coniferous species while almost one-third support deciduous species. The balance, amounting to 765 thousand hectares, support other specie stands. Growing stock amounts to 397 million cubic meters, 70 percent of which consist of coniferous stands. The stocking in coniferous stands amounts to almost 140 cubic meters per hectare. Stocking in the deciduous stands is somewhat less, amounting to almost 90 cubic meters per hectare. Stocking in stands supporting other species amounted to almost 40 cubic meters per hectare.

Mature and overmature component amounts to one-third in coniferous forests and 15 percent in deciduous stands. Supporting 94 million cubic meters and 18 million cubic meters respectively, stocking per hectare in mature and overmature coniferous stands

amounts to 145 cubic meters and almost 120 cubic meters per hectare in deciduous stands. Stocking in immature coniferous stands amounts to 135 cubic meters and almost 85 cubic meters in deciduous stands.

C.11.2 Species Distribution

Coniferous stands account for more than 70 percent of the stocked forest land and almost 85 percent of the growing stock. Deciduous stands account for one-tenth of the stocked forest land and growing stock. A significant amount of the forest resource is located in stands populated with other species, accounting to nearly one-fifth of the stocked area and 5 percent of the growing stock. **Table B.2** presents data describing the forest resources segregated by species.

C.11.2.1 Coniferous Association

The coniferous resource consists almost entirely of stands predominated by larch species, which account for 85 percent of the area and slightly more than 70 percent of the volume. Spruce stands account for another 7 percent of the forested area and 14 percent of the growing stock with the balance made up of primarily of pine stands and cedar stands. On an aggregated basis, larch stands contain the lowest stocking per hectare, amounting to some 75 cubic meters per hectare. Stocking in pine stands is next, amounting to almost 105 cubic meters per hectare. Stocking in spruce stands reaches nearly 180 cubic meters per hectare, while that in cedar stands exceeds 200 cubic meters per hectare.

C.11.2.2 Deciduous Association

By a large extent, the deciduous resource is dominated by the birch, oak, and aspen stands, which account for, respectively, 43 percent, 11 percent and 4 percent of the forested area and 35 percent, 13 percent, and 5 percent of the growing stock. Birch stands support a lower stocking per hectare than most other deciduous stands, amounting to some 60 cubic meters per hectare. Aspen stands support much higher stocking amounting to more than 95 cubic meters per hectare. Oak stands support stocking between 53 and 93 cubic meters per hectare.

C.11.3 Accessibility

Table C.23 provides a distribution of the forest resources of the Far East Economic region segregated by accessibility classes. Exploitable forests, accounting for 112 million hectares of stocked forest land and nearly 12 billion cubic meters of growing stock, represent 40 percent of the area and 55 percent of the volume. Reserve forests amount to 168 million hectares and nearly 10 billion cubic meters of growing stock.

C.11.3.1 Exploitable

Both agricultural forests and forests "belonging" to "Other Sectors" play a minor role in the size of forest resource considered to be exploitable. Forests designated for the forest sector account for 95 percent of the area and volume of exploitable forests, with the balance consisting of agricultural forests and forests designated for the use by organizations other than the forest sector.

C.11.3.1.1 Forest Sector

Of the 248 million hectares of stocked forest land, 107 million are considered exploitable. The exploitable area supports 11 billion cubic meters of growing stock. Coniferous species account for almost 85 percent of the forested area and nearly 90 percent of the growing stock, while deciduous stands account for the balance. Forested stands supporting species other than the principal ones are conspicuous by their

absence. The resulting stocking per hectare amounts to 110 cubic meters and nearly 80 cubic meters in coniferous and deciduous stands respectively.

Mature and overmature forests account for almost 45 percent of the forested area and three-fifths of the growing stock. Almost 90 percent of the mature and overmature forests consist of conifer species which account for 42 million hectares and 6 billion cubic meters of growing stock. Stocking per hectare amounts to nearly 145 cubic meters per hectare in coniferous stands and almost 130 in the deciduous stands. Stocking in stands under other species shows stocking of 115 cubic meters per hectare.

C.11.3.1.2 Agricultural Sector

Agricultural forests have been reviewed in section **C.11.1.2**.

C.11.3.1.3 Other Sectors

The forest resource sequestered with other ministries has been examined previously in section **C.11.1.3**.

C.11.3.2 Reserve

Reserve forests amount to 60 percent of the forested area and 45 percent of the growing stock, or 168 million hectares and nearly 10 billion cubic meters of growing stock. About one-sixth of the stocked forest area and growing stock is located in forests set aside for long-term uses.

C.11.3.2.1 Forest Sector Forests for Short to Medium Term Needs

Reserve forests, accounting for 141 million hectares and nearly 8 billion cubic meters of growing stock, represented 84 percent of the stocked forest land and of the growing stock. Coniferous species, occupying 100 million hectares, account for slightly more than 70 percent of the total reserve aggregated forests. While deciduous species account for 6 million hectares, stocked land under other species accounts for nearly 36 million hectares. Growing stock corresponding to the area are 7 billion cubic meters, 487 million cubic meters and 605 million cubic meters. Stocking of 55 cubic meters per hectare are located in reserve forests with a range from almost 70 cubic meters in coniferous forests, to nearly 85 cubic meters in deciduous, and some 15 cubic meters in other species.

C.11.3.2.2 Goskomles Forests for Long Term Uses

Reserve forests located in long-term uses have been discussed in section **C.11.1.1.3**.

C.11.4 The Far Eastern Allowable Annual Cut

The AAC supported by the forest resources of the Far East amounts to 188 million cubic meters, about 45 percent of which, or 87 million cubic meters, is contributed by the reserve forest. The balance of 55 percent and 101 million cubic meters flows from the exploitable forest (**Table B.5**).

C.11.4.1 The Exploitable Allowable Annual Cut

The exploitable AAC is dominated by the forest sector component, which accounts for almost 99 percent of the exploitable total of 101 million cubic meters, or 100 million cubic meters. The non-forest component amounts to only 1.3 million cubic meters.

C.11.4.1.1 The Forest Sector Allowable Annual Cut

The forest sector AAC, while amounting to 100 million cubic meters, does not contain a large share in the currently accessible category.[72] At the present time, only 38 million cubic meters is so considered, amounting to 38 percent of the forest sector total. The balance of 62 million cubic meters lies in the potentially accessible class of forest resource.

C.11.4.1.1.1 The Currently Accessible Allowable Annual Cut

The forests of the Far Eastern Economic region supports only 38 million cubic meters in presently accessible fiber. Nearly 85 percent of the AAC comes from coniferous stands, or 32 million cubic meters. The principal species association within the coniferous AAC is larch, which accounts for 17 million cubic meters, or almost two-thirds of the coniferous total. Spruce/true fir makes up most of the remainder. Deciduous stands contribute 6 million cubic meters of AAC. The largest share of the fiber supply is concentrated in birch forests which represent approximately one-half of the deciduous total. Oak stands and aspen stands contribute to the final AAC.

C.11.4.1.1.2 The Potentially Accessible Allowable Annual Cut

The potential AAC amounts to 62 million cubic meters. Coniferous stands contribute almost 85 percent of the total, with larch stands accounting for the largest share from the coniferous stands. Birch, aspen and oak are major contributors to the deciduous component of the potential AAC.

C.11.4.1.2 The Non-Forest Sector Allowable Annual Cut

The wood flowing from this resources expected to contribute slightly more than 1.3 million cubic meters, nearly 80 percent of which consists of coniferous species.[73] Birch and aspen stands account for major components of the deciduous fiber flow.

C.11.4.2 The Reserve Allowable Annual Cut

The reserve forest resource supports and AAC of 87 million cubic meters, up marginally from the level of 83 million identified in the late 1970s.[74] More than 90 percent of the volume flows from the coniferous resource, amounting to 77 million cubic meters annually. The balance of 5 million cubic meters is supported by the deciduous resource.

Footnotes

[72]The Forest Sector resource supports a per hectare AAC contribution from coniferous stands of 1.0 cubic meters and 1.0 cubic meters from deciduous stands. Both of these figures are lower than those evident in either West or East Siberia. However, it is believed that the average site class and/or stocking class in the Far East is less than that existing in East or West Siberia.

[73]The per hectare contribution to the non-Forest Sector resource amounts to 0.1 cubic meters from coniferous stands and 0.4 cubic meters from the deciduous stands. While these figures are lower than those in evidence in either the coniferous stands and the deciduous stands of East or West Siberia, the underlying factors could be linked to over utilization rather than some uncertainty.

[74]The coniferous reserve forest supports a per hectare annual contribution to the AAC of 0.8 cubic meters while the contribution from the deciduous component amounts to 0.9 cubic meters. While these numbers are marginally less than those from the exploitable forest sector, the degree to which they reflect a reasonable value is not material to the analysis.

SELECTED REFERENCES

Backman, Charles A. and Waggener, Thomas R, Soviet Timber Resources and Utilization: An Interpretation of the 1988 National Inventory, 1991, WP #35, Seattle: Center for International Trade in Forest Products (CINTRAFOR), University of Washington, 296 pp.

Backman, Charles A., Prospects for Wood Raw Material Exports from Russia to Pacific Rim and European Markets up until the year 2000, Unpublished Doctoral Dissertation, Seattle: University of Washington, 1993, 358 pp.

Barr, Brenton and Kathleen Braden, The Disappearing Russian Forest, London: Rowan & Littlefield, 1988, 252 pp.

FAO Forest Products Annual YearBook for 1990, Rome: FAO, 1991, 335 pp.

Goskomles, *Glavnoye upravleniye lesnikh resursov i lesopol'zovaniya za 1990 goda*, (Primary Management of the Forest Resources and Utilization for 1990), Moscow: Goskomles, 1991a, 156 pp.

Goskomles, *Statisticheskaya Sbornik Lesnoy Fond SSSR v dvukh tomakh, Tom 1* (The Statistical Handbook of the Forest Inventory of the USSR in two Volumes, Volume I), Moscow: Goskomles, 1990, 1005 pp.

Goskomles, *Statisticheskaya Sbornik Lesnoy Fond SSSR v dvukh tomakh, Tom II* (The Statistical Handbook of the Forest Inventory of the USSR in two Volumes, Volume II), Moscow: Goskomles, 1991b, 1021 pp.

Goskomstat Rossii, *Narodnoye khozyaystvo rossiyskoy federatsii v 1991* (National Statistics of the Russian Federation in 1991), Moscow: Goskomstat Rossii, 1992, 607 pp.

Goskomstat Rossii, *Rossiyskaya Federatsiya v 1992 godu* (Russian Federation in 1992), Moscow: Goskomstat Rossii, 1993, 654 pp.

Goskomstat, *Lesnoye khozaystvo RSFSR* (Forest Economy of Russia), Moscow: Goskomstat Rossii, 1991, 68 pp.

Goskomstat, *Lesnoye khozyaystvo SSSR* (The Forest Sector of the USSR), Moscow: Goskomstat SSSR, 1990, 135 pp.

Holowacz, J., Forests of the USSR, The Forestry Chronicle, October 1985, pp. 366-373

Isaev, A.S. (ed.), *Prognoz ispol'zovaniya i vosproizvodstva lesnikh resursov po ekonomicheskim rayonam sssr do 2010 goda v dvukh tomakh* (Prognosis of Forest Utilization and Management of the Forest Resources by Economic Region of the USSR until 2010 in two volumes), Moscow: Goskomles, 1991, Volume I: 508 pp.; Volume II: 486 pp.

Kozhukhov, N.I., *Ekonomika vosproizvodstva lesnikh resursov* (The Economics of Forest Management of the Forest Resource), Moscow: Lesnaya Promishlennost', 1988, 262 pp.

Mezhdunarodniy Institut lesa, *Lesnoye delo* (Forest Business), Moscow: Mezhdunarodniy Institut lesa, 1992, 123 pp.

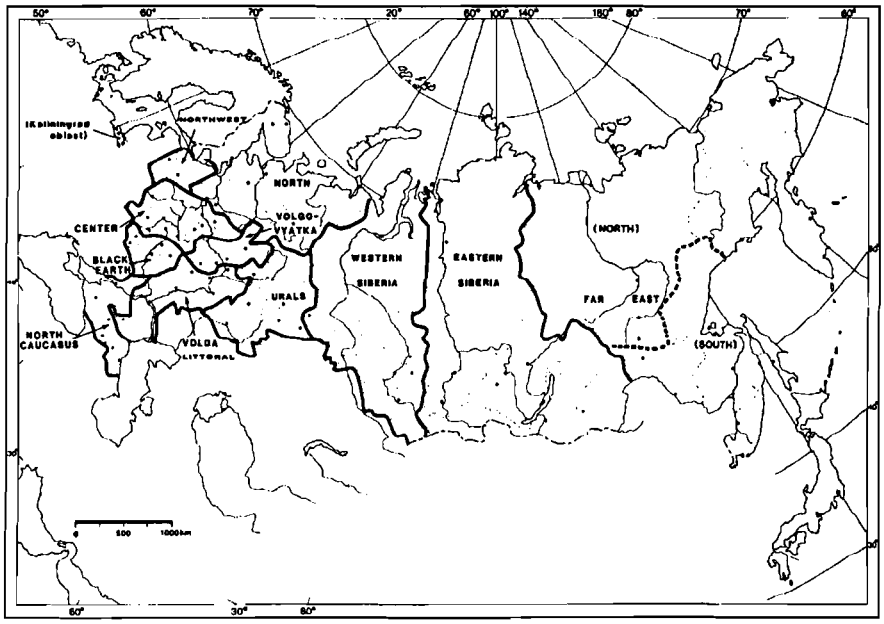
Nilsson, Sten *et alia*, The Forest Resources of the Former European USSR, Laxenburg (Austria)/Pearl River (USA): IIASA/The Parthenon Publishing Group, 1992, 407 pp.

Runyon, K.L., Canada's Timber Supply: Current Status and Outlook, Information Report E-X-45, Ottawa: Forestry Canada, 1991, 132 pp.

Sovetskaya Entsiklopediya, *Lesnaya entsiklopediya v dvukh tomakh, Tom I* (Forest Encyclopedia in Two Volumes, Volume I), Moscow: Sovetskaya Entsiklopediya, 1985, 563 pp.

Sovetskaya Entsiklopediya, *Lesnaya entsiklopediya v dvukh tomakh, Tom II* (Forest Encyclopedia in Two Volumes, Volume II), Moscow: Sovetskaya Entsiklopediya, 1986, 631 pp.

Vorob'ev, G.I. *et alia*, *Ekonomicheskaya geografiya lesnikh resursov sssr* (Economic Geography of the Forest Resources of the USSR), Moscow: Lesnaya Promishlennost', 1979, 406 pp.



Map A: Economic regions of Russia

Source: The disappearing Russian forest, p. 12

TABLE A.1: Soviet Union and Republics - Land Area, Population, and Forest Resources

	Total Land Area	Population	Total Forested Area		Total Growing Stock	
				of which: Accessible		of which: Accessible
	'000 Ha.	'000 People	'000 Ha.	'000 Ha.	'000,000 c.m.	'000,000 c.m.
World	N/A	N/A	3,620,000	N/A	360,000	N/A
Russia	1,707,540	148,041	771,109	446,010	81,644	54,593
European Russia	430,950	115,731	165,998	146,160	20,279	17,873
Asian Russia	1,276,590	32,310	605,111	299,850	61,367	36,720
Soviet Union	2,240,300	288,624	814,252	470,793	85,919	57,792
European USSR	551,540	206,064	192,323	166,634	24,133	20,797
Asian USSR	1,676,030	82,560	621,929	304,159	61,786	36,996
European USSR	551,540	206,064	192,323	166,634	24,133	20,797
European Russia	430,950	115,731	165,998	146,160	20,279	17,873
Ukraine	60,370	51,839	8,621	6,751	1,320	997
Belorussia	20,760	10,259	7,028	6,403	921	835
Moldavia	3,370	4,362	315	202	35	20
Lithuania	6,520	3,723	1,823	1,703	297	271
Latvia	6,450	2,687	2,648	2,301	434	369
Estonia	4,510	1,583	1,811	1,572	259	221
Georgia	6,970	5,456	2,758	1,179	422	170
Azerbaijan	8,660	7,131	992	307	128	35
Armenia	2,980	3,293	329	57	39	5
Asian USSR	1,676,030	82,560	621,929	304,159	61,786	36,996
Russian Asia	1,276,590	32,310	605,111	299,850	61,367	36,720
Uzbekistan	44,740	20,322	1,909	136	11	1
Kazakhstan	271,730	16,691	9,643	4,096	366	271
Kirgiz	19,850	4,367	729	58	23	4
Tadzhistan	14,310	5,248	410	18	6	0
Turkmenistan	48,810	3,622	4,127	0	14	0

Abbreviations: N/A - Not Available; c.m. - cubic meters; ha. - hectares

Source: Goskomles, Goskomstat, Lesnaya Entsiklopediya

TABLE A.2: World and Russia - Forest Resources

(millions of hectares)

	World 1980	USSR 1983	RUSSIA 1988	Europe 1983 (except USSR)	North America 1977	Latin America 1980	Africa 1980	Asia 1976 (except USSR)	Australia & Oceana 1976
Total Land Area	13,033.0	2,144.0	1,707.5	468.0	1,875.0	2,031.0	2,970.0	2,703.0	842.0
Forest Land	4,136.2	938.0	884.1	175.0	620.0	939.5	751.2	522.1	190.4
Stocked Forest Land	2,985.6	810.9	771.1	145.2	583.0	690.5	223.0	451.2	81.8
coniferous	1,082.4	560.0	552.0	86.0	306.0	26.3	3.8	87.8	12.5
deciduous	1,903.2	250.9	219.1	59.2	277.0	664.2	219.2	363.4	69.3
Unstocked Forest Land	1,150.6	127.1	113.0	29.8	37.0	249.0	528.2	70.9	108.6
Degradated Land	408.5	0.0	0.0	0.0	0.0	169.2	166.0	73.3	0.0
Brush	624.2	0.0	0.0	0.0	0.0	145.9	442.8	35.5	0.0

(billions of cubic meters)

	World 1980	USSR 1983	RUSSIA 1988	Europe 1983 (except USSR)	North America 1977	Latin America 1980	Africa 1980	Asia 1976 (except USSR)	Australia & Oceana 1976
Total Volume	356.7	85.9	81.6	14.9	41.7	102.9	50.2	54.4	6.7
of which in stocked forest	338.8	85.9	81.6	14.9	41.7	93.3	45.0	51.5	6.5
Volume of coniferous forests	116.9	66.7	64.0	10.0	29.6	2.0	0.1	8.0	0.5
of which in tropical forests	3.2	0.0	0.0	0.0	0.0	1.9	0.1	1.7	0.0
Volume in deciduous forests	239.8	19.2	17.6	4.9	12.1	100.9	50.1	46.4	6.2
of which in tropical forests	191.1	0.0	0.0	0.0	0.0	97.4	49.6	41.7	0.0
Annual Growth of Wood	3,217	906	821	460	851	230	100	630	40
Annual Harvest	3,020	356	354	334	484	362	434	1,017	33

Source: Lesnaya Entsiklopediya, Goskomles, Vorob'ev

TABLE B.1: Russia - Forest Resources by Ownership

	Total Land Area in the Forest Fund	Forest Land	of which: Stocked	of which:				
				Coniferous Total	of which: M & OM	Deciduous Total	of which: M & OM	Other Species
	(millions of hectares)							
GRAND TOTAL	1,182.555	884.094	771.109	551.999	296.874	157.005	51.862	62.105
OTHER SECTORS	23.392	17.146	15.806	10.113	3.740	4.259	1.372	1.434
AGRICULTURAL SECTOR	43.342	43.342	41.751	15.782	2.605	25.969	3.902	0.000
FOREST SECTOR	1,115.821	823.606	713.552	526.104	290.530	126.777	46.588	60.672
of which:								
Assigned to the Forest Industry	30.101	23.412	22.001	17.245	7.089	4.749	1.306	0.006
Other Forest Economy	983.588	750.749	654.193	488.792	269.590	117.835	42.326	47.566
Assigned to Long-term uses	102.132	49.445	37.357	20.067	13.851	4.192	2.955	13.099

			Total Volume in the Forest Fund	of which:				
				Coniferous Total	of which: M & OM	Deciduous Total	of which: M & OM	Other Species
			(billions of cubic meters)					
GRAND TOTAL			81.644	64.037	39.991	16.224	7.697	1.383
OTHER SECTORS			1.975	1.460	0.600	0.467	0.196	0.048
AGRICULTURAL SECTOR			5.022	2.415	0.489	2.607	0.596	0.000
FOREST SECTOR			74.647	60.163	38.902	13.149	6.905	1.335
of which:								
Assigned to the Forest Industry			3.001	2.448	1.412	0.553	0.259	0.000
Other Forest Economy			69.333	56.162	36.319	12.283	6.400	0.888
Assigned to Long-term uses			2.312	1.553	1.172	0.313	0.246	0.447

Source: Goskomles

TABLE B.2: Russia and Regions - Forest Resource by Major Specie Within Stand

	Conif.	of which: pine	spruce	true fir	larch	cedar	Decid.	of which: oak	beech	other hard wood dec.	birch	aspen	other soft wood dec.	TOT.	of which: Conif.	Decid.
AREA																
RUSSIAN SSR (excl. Kaliningrad)	100%	22%	15%	3%	53%	8%	100%	5%	1%	7%	67%	14%	5%	100%	81%	19%
European Russia of which:	100%	45%	53%	1%	0%	1%	100%	8%	2%	2%	65%	15%	8%	100%	66%	34%
North	100%	40%	60%	0%	1%	0%	100%	0%	0%	0%	89%	10%	1%	100%	81%	19%
Northwest	100%	60%	40%	0%	0%	0%	100%	0%	0%	0%	72%	21%	6%	100%	62%	38%
Central	100%	57%	43%	0%	0%	0%	100%	6%	0%	0%	68%	20%	6%	100%	49%	51%
Volgo-Vyatskiy	100%	63%	37%	0%	0%	0%	100%	6%	0%	0%	68%	20%	6%	100%	51%	49%
Central-Black Earth	100%	99%	1%	0%	0%	0%	100%	69%	0%	4%	9%	9%	9%	100%	29%	71%
Povolzhsk	100%	94%	4%	0%	1%	0%	100%	37%	0%	4%	15%	23%	21%	100%	25%	75%
North Caucasus	100%	77%	4%	19%	0%	0%	100%	40%	28%	15%	9%	2%	7%	100%	12%	88%
Urals	100%	47%	46%	3%	1%	4%	100%	4%	0%	2%	65%	16%	13%	100%	55%	45%
Asian Russia of which:	100%	17%	7%	3%	64%	9%	100%	4%	0%	11%	69%	13%	4%	100%	84%	16%
West Siberia	100%	51%	10%	7%	10%	22%	100%	0%	0%	0%	78%	22%	1%	100%	72%	28%
East Siberia	100%	18%	7%	5%	57%	13%	100%	0%	0%	0%	84%	15%	1%	100%	85%	15%
Far East	100%	6%	7%	1%	85%	2%	100%	11%	0%	32%	43%	4%	9%	100%	88%	12%
GROWING STOCK																
RUSSIAN SSR (excl. Kaliningrad)	100%	24%	18%	4%	42%	12%	100%	6%	1%	7%	60%	20%	6%	100%	82%	18%
European Russia of which:	100%	43%	55%	1%	1%	1%	100%	9%	3%	2%	58%	19%	9%	100%	66%	34%
North	100%	33%	66%	0%	1%	0%	100%	0%	0%	0%	80%	19%	1%	100%	86%	14%
Northwest	100%	55%	45%	0%	0%	0%	100%	0%	0%	0%	68%	26%	5%	100%	61%	39%
Central	100%	59%	41%	0%	0%	0%	100%	5%	0%	0%	66%	23%	5%	100%	50%	50%
Volgo-Vyatskiy	100%	60%	40%	0%	0%	0%	100%	6%	0%	0%	63%	23%	7%	100%	54%	46%
Central-Black Earth	100%	100%	0%	0%	0%	0%	100%	72%	0%	3%	8%	10%	8%	100%	34%	66%
Povolzhsk	100%	97%	2%	0%	0%	0%	100%	33%	0%	2%	16%	25%	24%	100%	30%	70%
North Caucasus	100%	43%	10%	47%	0%	0%	100%	36%	42%	11%	4%	1%	5%	100%	16%	84%
Urals	100%	44%	47%	3%	1%	6%	100%	4%	0%	2%	62%	17%	15%	100%	61%	39%
Asian Russia of which:	100%	20%	10%	5%	51%	15%	100%	3%	0%	10%	62%	20%	4%	100%	87%	13%
West Siberia	100%	44%	9%	7%	9%	30%	100%	0%	0%	0%	72%	28%	0%	100%	71%	29%
East Siberia	100%	22%	7%	7%	47%	18%	100%	0%	0%	0%	75%	24%	0%	100%	90%	10%
Far East	100%	7%	14%	2%	73%	4%	100%	12%	0%	37%	33%	5%	13%	100%	89%	11%

Source: Goskomstat/CAB/IIASA

TABLE B.3: Russia - Forest Resources by Accessibility

	Stocked Forest Land	of which: Immature	Mat. & O.M.	Growing Stock	of which: Immature	Mat. & O.M.
TOTAL	(millions of hectares)			(billions of cubic meters)		
Combined	771.088	N/A	N/A	81.616	N/A	N/A
Coniferous	551.986	255.116	296.870	64.033	24.042	39.991
Deciduous	156.996	105.137	51.858	16.196	8.499	7.696
Other	62.106	N/A	N/A	1.388	N/A	N/A
Forest Sector: Industry + Non LT Uses	676.174	343.617	332.556	72.307	27.732	44.575
Coniferous	506.025	229.350	276.674	58.606	20.874	37.731
Deciduous	122.575	78.946	43.629	12.808	6.150	6.658
Other	47.574	35.321	12.253	0.893	0.708	0.185
Forest Sector: Long-term Uses	37.357	N/A	N/A	2.312	N/A	N/A
Coniferous	20.067	6.215	13.851	1.553	0.381	1.172
Deciduous	4.192	1.237	2.955	0.313	0.067	0.246
Other	13.099	N/A	N/A	0.447	N/A	N/A
Agricultural Sector	41.751	N/A	N/A	5.022	N/A	N/A
Coniferous	15.782	13.177	2.605	2.415	1.926	0.489
Deciduous	25.969	22.067	3.902	2.607	2.011	0.596
Other	0.000	N/A	N/A	0.000	N/A	N/A
Other Sectors	15.806	N/A	N/A	1.975	N/A	N/A
Coniferous	10.113	6.373	3.740	1.460	0.860	0.600
Deciduous	4.259	2.887	1.372	0.467	0.272	0.196
Other	1.434	N/A	N/A	0.048	N/A	N/A
of TOTAL which is: EXPLOITABLE						
Combined	446.010	N/A	N/A	54.593	N/A	N/A
Coniferous	317.779	160.473	157.306	40.976	16.266	24.710
Deciduous	126.771	89.195	37.575	13.568	7.297	6.271
Other	1.461	N/A	N/A	0.049	N/A	N/A
Forest Sector: Industry + Non LT Uses	388.453	205.171	183.282	47.596	18.494	29.101
Coniferous	291.884	140.923	150.961	37.102	13.480	23.622
Deciduous	96.542	64.241	32.301	10.493	5.014	5.479
Other	0.027	0.008	0.019	0.001	0.001	0.001
Forest Sector: Long-term Uses	0.000	N/A	N/A	0.000	N/A	N/A
Coniferous	0.000	0.000	0.000	0.000	0.000	0.000
Deciduous	0.000	0.000	0.000	0.000	0.000	0.000
Other	0.000	N/A	N/A	0.000	N/A	N/A
Agricultural Sector	41.751	N/A	N/A	5.022	N/A	N/A
Coniferous	15.782	13.177	2.605	2.415	1.926	0.489
Deciduous	25.969	22.067	3.902	2.607	2.011	0.596
Other	0.000	N/A	N/A	0.000	N/A	N/A
Other Sectors	15.806	N/A	N/A	1.975	N/A	N/A
Coniferous	10.113	6.373	3.740	1.460	0.860	0.600
Deciduous	4.259	2.887	1.372	0.467	0.272	0.196
Other	1.434	N/A	N/A	0.048	N/A	N/A

Source: Goskomles

TABLE B.4: Russia and Regions - AAC, Stocked Forest Land, and Inferred AAC per Hectare of Stocked Forest Land

	Allowable annual cut			*Stocked forest land*			*Inferred annual growth rate*		
	Forest Sector 1988	Non Forest Sector	Old Res. (before 1980)	Forest Sector Exploit.	Non Forest Sector	Forest Sector Reserve	Forest Sector Exploit.	Non Forest Sector	Forest Sector Reserve
	(thousands of cubic meters)			(millions of hectares)			(cubic meter per hectare)		
				Combined coniferous and deciduous					
RUSSIAN SSR (excl. Kaliningrad)	604,832	29,649	201,150	388.426	56.124	240.174	1.56	0.53	0.84
European Russia of which:	223,547	16,802	4,580	116.702	29.216	20.183	1.92	0.58	0.23
North	85,978	3,433	4,530	60.288	6.843	4.147	1.43	0.50	1.09
Northwest	14,686	2,619	0	5.682	4.235	0.441	2.58	0.62	0.00
Central	27,402	4,634	0	10.960	7.459	1.827	2.50	0.62	0.00
Volgo-Vyatskiy	24,759	1,712	0	9.607	2.858	0.804	2.58	0.60	0.00
Central-Black Earth	1,334	152	0	0.884	0.298	0.274	1.51	0.51	0.00
Povolzhsk	6,203	394	0	2.817	0.780	1.108	2.20	0.50	0.00
North Caucasus	2,176	276	50	1.411	0.664	1.432	1.54	0.42	0.03
Urals	61,009	3,582	0	25.055	6.080	4.535	2.43	0.59	0.00
Asian Russia of which:	381,285	12,829	196,570	271.554	26.862	225.556	1.40	0.48	0.87
West Siberia	103,151	6,657	13,740	52.334	11.126	20.884	1.97	0.60	0.66
East Siberia	173,671	4,911	100,080	112.306	10.955	99.124	1.55	0.45	1.01
Far East	104,463	1,261	82,750	106.915	4.780	105.548	0.98	0.26	0.78
				Coniferous					
RUSSIAN SSR (excl. Kaliningrad)	382,082	10,535	178,020	291.884	25.895	214.141	1.31	0.41	0.83
European Russia of which:	122,010	6,728	4,070	77.970	13.539	13.408	1.56	0.50	0.30
North	66,002	2,095	4,070	49.203	4.697	3.084	1.34	0.45	1.32
Northwest	6,430	788	0	3.473	1.533	0.309	1.85	0.51	0.00
Central	9,864	1,429	0	5.404	2.624	0.916	1.83	0.54	0.00
Volgo-Vyatskiy	9,267	886	0	4.898	1.555	0.431	1.89	0.57	0.00
Central-Black Earth	251	32	0	0.270	0.075	0.070	0.93	0.43	0.00
Povolzhsk	984	98	0	0.744	0.187	0.227	1.32	0.52	0.00
North Caucasus	151	15	0	0.077	0.069	0.269	1.97	0.22	0.00
Urals	29,061	1,385	0	13.900	2.801	2.488	2.09	0.49	0.00
Asian Russia of which:	260,072	3,805	173,950	213.848	12.348	206.327	1.22	0.31	0.84
West Siberia	48,711	1,070	9,200	33.762	3.023	18.085	1.44	0.35	0.51
East Siberia	124,743	2,456	87,450	91.514	6.901	88.578	1.36	0.36	0.99
Far East	86,618	280	77,300	88.572	2.424	99.664	0.98	0.12	0.78
				Deciduous					
RUSSIAN SSR (excl. Kaliningrad)	222,750	19,115	23,130	96.542	30.228	26.033	2.31	0.63	0.89
European Russia of which:	101,537	10,074	510	38.733	15.677	6.775	2.62	0.64	0.08
North	19,976	1,338	460	11.085	2.146	1.063	1.80	0.62	0.43
Northwest	8,256	1,832	0	2.209	2.702	0.131	3.74	0.68	0.00
Central	17,538	3,205	0	5.555	4.835	0.911	3.16	0.66	0.00
Volgo-Vyatskiy	15,492	826	0	4.708	1.303	0.373	3.29	0.63	0.00
Central-Black Earth	1,083	119	0	0.614	0.223	0.204	1.77	0.54	0.00
Povolzhsk	5,219	296	0	2.073	0.593	0.881	2.52	0.50	0.00
North Caucasus	2,025	261	50	1.334	0.595	1.163	1.52	0.44	0.04
Urals	31,948	2,197	0	11.155	3.279	2.047	2.86	0.67	0.00
Asian Russia of which:	121,213	9,024	22,620	57.706	14.514	19.229	2.10	0.62	1.18
West Siberia	54,440	5,588	4,540	18.572	8.104	2.799	2.93	0.69	1.62
East Siberia	48,928	2,455	12,630	20.792	4.054	10.547	2.35	0.61	1.20
Far East	17,845	981	5,450	18.342	2.356	5.883	0.97	0.42	0.93

Source: Goskomstat/CAB/IIASA/International Institute of Forests

TABLE B.5: Russia and Regions - AAC in the Currently Accessible, Potentially Accessible, and Reserve Forest Resource

	Forest Sector Current	Non Forest Current	Forest Sector Potential	Total AAC FS + Non-FS	New Reserve	Old Reserve	Total Reserve	Total AAC
				CONIFEROUS and DECIDUOUS				
				(millions of cubic meters)				
RUSSIAN SSR (excl. Kaliningrad)	339.6	29.6	200.0	569.2	63.2	201.2	264.3	832.9
European Russia of which:	181.3	16.8	21.2	219.3	18.3	4.6	22.9	241.5
North	70.0	3.4	7.1	80.5	8.9	4.5	13.4	93.9
Northwest	10.6	2.6	4.0	17.2	0.0	0.0	0.0	17.2
Central	24.0	4.6	2.8	31.5	0.2	0.0	0.2	31.6
Volgo-Vyatskiy	20.8	1.7	1.7	24.2	0.1	0.0	0.1	24.3
Central-Black Earth	1.1	0.2	0.0	1.2	0.3	0.0	0.3	1.5
Povolzhsk	6.8	0.4	0.0	7.2	0.0	0.0	0.0	6.6
North Caucasus	1.6	0.3	0.0	1.9	0.2	0.1	0.2	2.1
Urals	46.5	3.6	5.6	55.7	8.7	0.0	8.7	64.4
Asian Russia of which:	158.3	12.8	178.8	349.9	44.9	196.6	241.4	591.4
West Siberia	38.8	6.7	44.3	89.8	20.1	13.7	33.8	123.5
East Siberia	81.2	4.9	72.8	158.9	20.4	100.1	120.4	279.3
Far East	38.3	1.3	61.7	101.3	4.5	82.8	87.2	188.5
				CONIFEROUS				
				(millions of cubic meters)				
RUSSIAN SSR (excl. Kaliningrad)	196.1	10.5	129.8	336.5	55.7	178.0	233.7	570.2
European Russia of which:	92.4	6.7	10.9	110.0	17.7	4.1	21.7	131.8
North	51.3	2.1	5.2	58.6	9.5	4.1	13.6	72.1
Northwest	4.7	0.8	1.7	7.2	0.0	0.0	0.0	7.2
Central	7.9	1.4	0.9	10.3	1.0	0.0	1.0	11.3
Volgo-Vyatskiy	7.8	0.9	0.6	9.3	0.0	0.0	0.0	9.4
Central-Black Earth	0.2	0.0	0.0	0.3	0.0	0.0	0.0	0.3
Povolzhsk	0.9	0.1	0.0	1.0	0.0	0.0	0.0	1.1
North Caucasus	0.1	0.0	0.0	0.1	0.0	0.0	0.0	0.1
Urals	19.5	1.4	2.4	23.3	7.0	0.0	7.0	30.3
Asian Russia of which:	103.6	3.8	118.9	226.3	38.1	174.0	212.0	438.3
West Siberia	13.6	1.1	15.6	30.3	19.5	9.2	28.7	59.0
East Siberia	58.1	2.5	52.1	112.7	15.0	87.5	102.5	215.1
Far East	31.8	0.3	51.3	83.4	3.5	77.3	80.8	164.2
				DECIDUOUS				
				(millions of cubic meters)				
RUSSIAN SSR (excl. Kaliningrad)	143.8	19.1	70.2	233.1	8.0	23.1	31.0	263.0
European Russia of which:	88.9	10.1	10.3	109.3	2.2	0.5	2.2	110.3
North	18.7	1.3	1.9	21.9	0.0	0.5	0.0	21.7
Northwest	5.9	1.8	2.2	10.0	0.0	0.0	0.0	10.0
Central	16.1	3.2	1.9	21.2	0.0	0.0	0.0	20.3
Volgo-Vyatskiy	13.0	0.8	1.0	14.9	0.1	0.0	0.1	15.0
Central-Black Earth	0.8	0.1	0.0	1.0	0.3	0.0	0.3	1.2
Povolzhsk	5.9	0.3	0.0	6.2	0.0	0.0	0.0	6.0
North Caucasus	1.5	0.3	0.0	1.8	0.2	0.1	0.2	2.0
Urals	27.0	2.2	3.2	32.4	1.7	0.0	1.7	34.0
Asian Russia of which:	54.7	9.0	59.9	123.6	6.8	22.6	29.4	153.1
West Siberia	25.2	5.6	28.7	59.5	0.5	4.5	5.1	64.6
East Siberia	23.1	2.5	20.7	46.3	5.3	12.6	18.0	64.2
Far East	6.5	1.0	10.4	17.9	0.9	5.5	6.4	24.3

Source: CAB/Vorob'ev/IIASA

TABLE B.6: Soviet Union - Allowable Annual Cut

(thousands of cubic meters)

All Species Groups

	Group 1	Group 2	Group 3	Total
		USSR Region		
1975	48,915	109,530	481,638	640,083
1980	49,701	110,679	477,972	638,352
1985	58,550	109,696	470,024	638,270
1990	59,378	105,175	459,021	623,574
1991	N/A	N/A	N/A	558,080
		European-Uralian USSR		
1975	29,275	89,987	134,601	253,863
1980	30,390	91,095	129,383	250,868
1985	37,783	90,365	122,088	250,236
1990	39,044	87,534	111,891	238,469
1991	N/A	N/A	N/A	217,837
		Asian USSR		
1975	19,640	19,543	347,037	386,220
1980	19,311	19,584	348,589	387,484
1985	20,767	19,331	347,936	388,034
1990	20,334	17,641	347,130	385,105
1991	N/A	N/A	N/A	340,243

Coniferous Species Group

	Group 1	Group 2	Group 3	Total
		USSR Region		
1975	21,771	49,160	336,262	407,193
1980	21,907	49,447	333,213	404,567
1985	28,788	47,317	324,082	400,187
1990	30,543	45,565	315,616	391,724
1991	N/A	N/A	N/A	333,800
		European-Uralian USSR		
1975	9,911	37,318	94,511	141,740
1980	10,337	37,549	90,402	138,288
1985	16,456	36,069	82,172	134,697
1990	18,534	35,954	75,393	129,881
1991	N/A	N/A	N/A	110,300
		Asian USSR		
1975	11,860	11,842	241,751	265,453
1980	11,570	11,898	242,811	266,279
1985	12,332	11,248	241,910	265,490
1990	12,009	9,611	240,223	261,843
1991	N/A	N/A	N/A	223,500

Deciduous Species Group

	Group 1	Group 2	Group 3	Total
		USSR Region		
1975	27,144	60,370	145,376	232,890
1980	27,794	61,232	144,759	233,785
1985	29,762	62,379	145,942	238,083
1990	28,835	59,610	143,405	231,850
1991	N/A	N/A	N/A	224,280
		European-Uralian USSR		
1975	19,364	52,669	40,090	112,123
1980	20,053	53,546	38,981	112,580
1985	21,327	54,296	39,916	115,539
1990	20,510	51,580	36,498	108,588
1991	N/A	N/A	N/A	107,537
		Asian USSR		
1975	7,780	7,701	105,286	120,767
1980	7,741	7,686	105,778	121,205
1985	8,435	8,083	106,026	122,544
1990	8,325	8,030	106,907	123,262
1991	N/A	N/A	N/A	116,743

Source: Kozhukov (1988), Goskomles (1991), International Institute of Forests (1992)

TABLE B.7: Russia and Regions - Allowable Annual Cut

	1980	1985	1986	1987	1988	1989	1990	1991
				(thousands of cubic meters)				
RUSSIAN SSR (excl. Kaliningrad)	618,676	616,961	616,461	614,724	605,257	603,624	602,128	539,601
European Russia of which:	234,387	232,090	230,196	228,756	223,547	221,346	220,156	202,500
North	88,858	92,560	91,159	91,159	85,978	85,978	85,925	77,070
Northwest	13,509	14,277	14,431	14,537	14,686	14,685	14,597	14,550
Central	26,632	26,883	26,919	27,405	27,402	27,412	26,984	26,820
Volgo-Vyatskiy	24,193	24,809	24,587	24,587	24,759	22,629	22,629	22,500
Black Earth	1,362	1,334	1,334	1,334	1,334	1,334	1,334	1,080
Povolzhsk	6,898	7,057	6,609	6,610	6,203	6,203	6,163	6,800
North Caucasus	2,244	2,203	2,190	2,190	2,176	2,176	1,739	1,580
Urals	70,691	62,967	62,967	60,934	61,009	60,929	60,785	52,100
Asian Russia of which:	384,289	384,871	386,265	385,968	381,710	382,278	381,972	337,101
West Siberia	102,861	103,457	103,458	103,473	103,473	103,457	103,152	83,100
East Siberia	174,829	174,175	175,578	175,577	173,773	174,357	174,357	154,000
Far East	106,599	107,239	107,229	106,918	104,464	104,464	104,463	100,001

Source: Goskomstat/CAB/International Institute of Forests

TABLE C.1: Russia and Regions - Forest Resources

	Total Land Area in the Forest Fund	Forest Land	of which: Stocked	of which:				
				Coniferous Total	of which: M & OM	Deciduous Total	of which: M & OM	Other Species
				(millions of hectares)				
RUSSIAN SSR (excl. Kaliningrad)	1,182.555	884.094	771.109	551.999	296.874	157.005	51.862	62.105
European Russia of which:	208.986	173.194	165.732	103.242	45.886	62.197	13.985	0.292
North	105.474	79.074	76.048	60.836	35.786	15.192	4.615	0.020
Northwest	12.672	10.726	10.388	5.334	1.004	5.052	1.070	0.002
Central	22.249	21.096	20.329	8.977	0.915	11.350	1.551	0.002
Volgo-Vyatskiy	14.587	13.950	13.309	6.901	1.406	6.404	1.055	0.004
Central-Black Earth	1.678	1.563	1.469	0.416	0.013	1.045	0.079	0.009
Povolzhsk	5.750	5.232	4.773	1.159	0.075	3.549	0.551	0.064
North Caucasus	4.488	3.846	3.664	0.414	0.103	3.107	0.848	0.142
Urals	42.088	37.708	35.753	19.206	6.585	16.499	4.217	0.049
Asian Russia of which:	973.183	710.615	605.111	448.661	250.980	94.637	37.860	61.813
West Siberia	150.617	95.530	90.095	59.437	32.883	29.984	14.476	0.674
East Siberia	315.383	255.224	234.464	187.074	115.304	35.449	12.307	11.942
Far East	507.182	359.860	280.552	202.151	102.794	29.204	11.077	49.198

	Total Volume in the Forest Fund	of which: Coniferous Total	of which: M & OM	Deciduous Total	of which: M & OM	Other Species
	(billions of cubic meters)					
RUSSIAN SSR (excl. Kaliningrad)	81.644	64.037	39.991	16.224	7.697	1.383
European Russia of which:	20.239	12.974	6.679	7.244	2.439	0.021
North	7.600	6.428	4.484	1.171	0.590	0.001
Northwest	1.625	0.879	0.245	0.746	0.242	0.000
Central	3.042	1.468	0.227	1.574	0.338	0.000
Volgo-Vyatskiy	1.787	0.994	0.304	0.793	0.242	0.000
Central-Black Earth	0.183	0.062	0.004	0.121	0.015	0.000
Povolzhsk	0.573	0.171	0.024	0.401	0.091	0.001
North Caucasus	0.580	0.088	0.044	0.473	0.186	0.018
Urals	4.850	2.883	1.348	1.966	0.737	0.001
Asian Russia of which:	61.367	51.049	33.309	8.955	5.254	1.363
West Siberia	10.794	7.221	4.365	3.567	2.348	0.006
East Siberia	29.315	25.966	17.505	3.073	1.663	0.276
Far East	21.258	17.862	11.439	2.315	1.244	1.081

Source: Goskomles

TABLE C.2: North Economic Region - Forest Resources by Ownership

	Total Land Area in the Forest Fund	Forest Land	of which: Stocked	of which: Coniferous Total	of which: M & OM	Deciduous Total	of which: M & OM	Other Species
				(millions of hectares)				
GRAND TOTAL	105.474	79.074	76.048	60.836	35.786	15.192	4.615	0.020
OTHER SECTORS	2.410	1.954	1.886	1.558	0.651	0.328	0.109	0.000
AGRICULTURAL SECTOR	5.018	5.018	4.957	3.139	0.562	1.818	0.456	0.000
FOREST SECTOR	98.047	72.102	69.205	56.139	34.619	13.046	4.049	0.020
of which:								
Assigned to the Forest Industry	14.560	9.434	8.784	7.846	2.746	0.937	0.207	0.000
Other Forest Economy	72.990	57.858	55.654	44.442	28.445	11.211	3.219	0.001
Assigned to Long-term uses	10.497	4.810	4.768	3.851	3.427	0.897	0.624	0.020

	Total Volume in the Forest Fund	of which: Coniferous Total	of which: M & OM	Deciduous Total	of which: M & OM	Other Species
		(billions of cubic meters)				
GRAND TOTAL	7.600	6.428	4.484	1.171	0.590	0.001
OTHER SECTORS	0.215	0.193	0.091	0.021	0.012	0.000
AGRICULTURAL SECTOR	0.678	0.481	0.099	0.197	0.086	0.000
FOREST SECTOR	6.707	5.754	4.294	0.953	0.492	0.000
of which:						
Assigned to the Forest Industry	0.786	0.712	0.369	0.074	0.033	0.000
Other Forest Economy	5.625	4.778	3.689	0.847	0.434	0.000
Assigned to Long-term uses	0.296	0.264	0.236	0.032	0.025	0.000

Source: Goskomles

TABLE C.3: North Economic Region - Forest Resources by Accessibility

	Stocked Forest Land	of which: Immature	Mat. & O.M.	Growing Stock	of which: Immature	Mat. & O.M.
TOTAL	(millions of hectares)			(billions of cubic meters)		
Combined	76.047	N/A	N/A	7.599	N/A	N/A
Coniferous	60.835	25.049	35.786	6.428	1.944	4.484
Deciduous	15.192	10.577	4.615	1.171	0.582	0.590
Other	0.020	N/A	N/A	0.000	N/A	N/A
Forest Sector: Industry + Non LT Uses	64.436	29.864	34.572	6.411	1.885	4.525
Coniferous	52.287	21.141	31.146	5.490	1.432	4.058
Deciduous	12.148	8.723	3.426	0.921	0.454	0.467
Other	0.001	0.000	0.000	0.000	0.000	0.000
Forest Sector: Long-term Uses	4.768	N/A	N/A	0.296	N/A	N/A
Coniferous	3.851	0.424	3.427	0.264	0.028	0.236
Deciduous	0.897	0.273	0.624	0.032	0.007	0.025
Other	0.020	N/A	N/A	0.000	N/A	N/A
Agricultural Sector	4.957	N/A	N/A	0.678	N/A	N/A
Coniferous	3.139	2.576	0.562	0.481	0.382	0.099
Deciduous	1.818	1.362	0.456	0.197	0.111	0.086
Other	0.000	N/A	N/A	0.000	N/A	N/A
Other Sectors	1.886	N/A	N/A	0.215	N/A	N/A
Coniferous	1.558	0.907	0.651	0.193	0.103	0.091
Deciduous	0.328	0.219	0.109	0.021	0.010	0.012
Other	0.000	N/A	N/A	0.000	N/A	N/A
of TOTAL which is: EXPLOITABLE						
Combined	67.131	N/A	N/A	7.040	N/A	N/A
Coniferous	53.900	23.606	30.294	5.945	1.840	4.105
Deciduous	13.231	9.997	3.234	1.094	0.557	0.537
Other	0.000	N/A	N/A	0.000	N/A	N/A
Forest Sector: Industry + Non LT Uses	60.288	28.539	31.750	6.147	1.793	4.355
Coniferous	49.203	20.122	29.081	5.271	1.356	3.916
Deciduous	11.085	8.416	2.668	0.876	0.437	0.439
Other	0.000	0.000	0.000	0.000	0.000	0.000
Forest Sector: Long-term Uses	0.000	N/A	N/A	0.000	N/A	N/A
Coniferous	0.000	0.000	0.000	0.000	0.000	0.000
Deciduous	0.000	0.000	0.000	0.000	0.000	0.000
Other	0.000	N/A	N/A	0.000	N/A	N/A
Agricultural Sector	4.957	N/A	N/A	0.678	N/A	N/A
Coniferous	3.139	2.576	0.562	0.481	0.382	0.099
Deciduous	1.818	1.362	0.456	0.197	0.111	0.086
Other	0.000	N/A	N/A	0.000	N/A	N/A
Other Sectors	1.886	N/A	N/A	0.215	N/A	N/A
Coniferous	1.558	0.907	0.651	0.193	0.103	0.091
Deciduous	0.328	0.219	0.109	0.021	0.010	0.012
Other	0.000	N/A	N/A	0.000	N/A	N/A

Source: Goskomles

TABLE C.4: Northwest Economic Region - Forest Resources by Ownership

	Total Land Area in the Forest Fund	Forest Land	of which: Stocked	of which: Coniferous Total	of which: M & OM	Deciduous Total	of which: M & OM	Other Species
				(millions of hectares)				
GRAND TOTAL	12.672	10.726	10.388	5.334	1.004	5.052	1.070	0.002
OTHER SECTORS	0.753	0.586	0.566	0.353	0.035	0.213	0.039	0.000
AGRICULTURAL SECTOR	3.734	3.734	3.668	1.180	0.143	2.489	0.285	0.000
FOREST SECTOR	8.184	6.406	6.153	3.801	0.827	2.350	0.746	0.002
of which:								
Assigned to the Forest Industry	3.420	2.656	2.532	1.638	0.486	0.894	0.282	0.000
Other Forest Economy	4.706	3.739	3.609	2.154	0.341	1.453	0.464	0.002
Assigned to Long-term uses	0.058	0.012	0.011	0.008	0.001	0.003	0.001	0.000

	Total Volume in the Forest Fund	of which: Coniferous Total	of which: M & OM	Deciduous Total	of which: M & OM	Other Species
		(billions of cubic meters)				
GRAND TOTAL	1.625	0.879	0.245	0.746	0.242	0.000
OTHER SECTORS	0.083	0.054	0.008	0.030	0.008	0.000
AGRICULTURAL SECTOR	0.514	0.198	0.032	0.316	0.057	0.000
FOREST SECTOR	1.028	0.628	0.206	0.400	0.176	0.000
of which:						
Assigned to the Forest Industry	0.421	0.271	0.122	0.151	0.068	0.000
Other Forest Economy	0.605	0.356	0.084	0.249	0.108	0.000
Assigned to Long-term uses	0.001	0.001	0.000	0.000	0.000	0.000

Source: Goskomles

TABLE C.5: Northwest Economic Region - Forest Resources by Accessibility

	Stocked Forest Land	of which: Immature	Mat. & O.M.	Growing Stock	of which: Immature	Mat. & O.M.
TOTAL	(millions of hectares)			(billions of cubic meters)		
Combined	10.370	N/A	N/A	1.622	N/A	N/A
Coniferous	5.323	4.323	1.000	0.878	0.633	0.244
Deciduous	5.045	3.979	1.066	0.745	0.504	0.241
Other	0.002	N/A	N/A	0.000	N/A	N/A
Forest Sector: Industry + Non LT Uses	6.124	4.558	1.567	1.024	0.643	0.380
Coniferous	3.782	2.960	0.822	0.625	0.420	0.205
Deciduous	2.340	1.598	0.742	0.399	0.223	0.175
Other	0.002	0.000	0.002	0.000	0.000	0.000
Forest Sector: Long-term Uses	0.011	N/A	N/A	0.001	N/A	N/A
Coniferous	0.008	0.007	0.001	0.001	0.001	0.000
Deciduous	0.003	0.003	0.001	0.000	0.000	0.000
Other	0.000	N/A	N/A	0.000	N/A	N/A
Agricultural Sector	3.668	N/A	N/A	0.514	N/A	N/A
Coniferous	1.180	1.037	0.143	0.198	0.166	0.032
Deciduous	2.489	2.204	0.285	0.316	0.258	0.057
Other	0.000	N/A	N/A	0.000	N/A	N/A
Other Sectors	0.566	N/A	N/A	0.083	N/A	N/A
Coniferous	0.353	0.318	0.035	0.054	0.046	0.008
Deciduous	0.213	0.175	0.039	0.030	0.022	0.008
Other	0.000	N/A	N/A	0.000	N/A	N/A
of TOTAL which is: EXPLOITABLE						
Combined	9.916	N/A	N/A	1.542	N/A	N/A
Coniferous	5.006	4.055	0.951	0.821	0.589	0.232
Deciduous	4.910	3.880	1.031	0.721	0.489	0.232
Other	0.000	N/A	N/A	0.000	N/A	N/A
Forest Sector: Industry + Non LT Uses	5.682	4.201	1.481	0.945	0.585	0.360
Coniferous	3.473	2.699	0.774	0.569	0.376	0.193
Deciduous	2.209	1.502	0.707	0.376	0.209	0.167
Other	0.000	0.000	0.000	0.000	0.000	0.000
Forest Sector: Long-term Uses	0.000	N/A	N/A	0.000	N/A	N/A
Coniferous	0.000	0.000	0.000	0.000	0.000	0.000
Deciduous	0.000	0.000	0.000	0.000	0.000	0.000
Other	0.000	N/A	N/A	0.000	N/A	N/A
Agricultural Sector	3.668	N/A	N/A	0.514	N/A	N/A
Coniferous	1.180	1.037	0.143	0.198	0.166	0.032
Deciduous	2.489	2.204	0.285	0.316	0.258	0.057
Other	0.000	N/A	N/A	0.000	N/A	N/A
Other Sectors	0.566	N/A	N/A	0.083	N/A	N/A
Coniferous	0.353	0.318	0.035	0.054	0.046	0.008
Deciduous	0.213	0.175	0.039	0.030	0.022	0.008
Other	0.000	N/A	N/A	0.000	N/A	N/A

Source: Goskomles

TABLE C.6: Central Economic Region - Forest Resources by Ownership

	Total Land Area in the Forest Fund	Forest Land	of which: Stocked	of which: Coniferous Total	of which: M & OM	Deciduous Total	of which: M & OM	Other Species
				(millions of hectares)				
GRAND TOTAL	22.249	21.096	20.329	8.977	0.915	11.350	1.551	0.002
OTHER SECTORS	1.120	0.992	0.964	0.483	0.037	0.481	0.068	0.000
AGRICULTURAL SECTOR	6.621	6.621	6.495	2.141	0.086	4.354	0.373	0.000
FOREST SECTOR	14.507	13.482	12.870	6.354	0.792	6.515	1.110	0.002
of which:								
Assigned to the Forest Industry	0.066	0.064	0.059	0.026	0.005	0.032	0.011	0.000
Other Forest Economy	14.230	13.333	12.730	6.294	0.781	6.434	1.091	0.002
Assigned to Long-term uses	0.211	0.086	0.081	0.034	0.005	0.048	0.008	0.000

	Total Volume in the Forest Fund	of which: Coniferous Total	of which: M & OM	Deciduous Total	of which: M & OM	Other Species
		(billions of cubic meters)				
GRAND TOTAL	3.042	1.468	0.227	1.574	0.338	0.000
OTHER SECTORS	0.149	0.079	0.010	0.069	0.015	0.000
AGRICULTURAL SECTOR	0.813	0.346	0.020	0.467	0.070	0.000
FOREST SECTOR	2.080	1.043	0.197	1.037	0.252	0.000
of which:						
Assigned to the Forest Industry	0.011	0.005	0.002	0.007	0.003	0.000
Other Forest Economy	2.060	1.034	0.195	1.025	0.248	0.000
Assigned to Long-term uses	0.009	0.004	0.001	0.005	0.001	0.000

Source: Goskomles

TABLE C.7: Central Economic Region - Forest Resources by Accessibility

	Stocked Forest Land	of which: Immature	Mat. & O.M.	Growing Stock	of which: Immature	Mat. & O.M.
TOTAL	(millions of hectares)			(billions of cubic meters)		
Combined	20.328	N/A	N/A	3.042	N/A	N/A
Coniferous	8.977	8.062	0.915	1.468	1.241	0.227
Deciduous	11.350	9.799	1.551	1.573	1.235	0.338
Other	0.001	N/A	N/A	0.001	N/A	N/A
Forest Sector: Industry + Non LT Uses	12.788	10.899	1.889	2.071	1.624	0.447
Coniferous	6.320	5.533	0.787	1.039	0.843	0.196
Deciduous	6.467	5.365	1.101	1.031	0.780	0.251
Other	0.001	0.000	0.002	0.001	0.001	0.000
Forest Sector: Long-term Uses	0.081	N/A	N/A	0.009	N/A	N/A
Coniferous	0.034	0.028	0.005	0.004	0.003	0.001
Deciduous	0.048	0.040	0.008	0.005	0.004	0.001
Other	0.000	N/A	N/A	0.000	N/A	N/A
Agricultural Sector	6.495	N/A	N/A	0.813	N/A	N/A
Coniferous	2.141	2.055	0.086	0.346	0.326	0.020
Deciduous	4.354	3.981	0.373	0.467	0.397	0.070
Other	0.000	N/A	N/A	0.000	N/A	N/A
Other Sectors	0.964	N/A	N/A	0.149	N/A	N/A
Coniferous	0.483	0.446	0.037	0.079	0.069	0.010
Deciduous	0.481	0.412	0.068	0.069	0.054	0.015
Other	0.000	N/A	N/A	0.000	N/A	N/A
of TOTAL which is: EXPLOITABLE						
Combined	18.418	N/A	N/A	2.689	N/A	N/A
Coniferous	8.028	7.166	0.862	1.279	1.065	0.214
Deciduous	10.390	8.980	1.411	1.410	1.103	0.306
Other	0.000	N/A	N/A	0.000	N/A	N/A
Forest Sector: Industry + Non LT Uses	10.960	9.251	1.708	1.728	1.323	0.405
Coniferous	5.404	4.665	0.739	0.854	0.670	0.184
Deciduous	5.555	4.586	0.969	0.873	0.652	0.221
Other	0.000	0.000	0.000	0.000	0.000	0.000
Forest Sector: Long-term Uses	0.000	N/A	N/A	0.000	N/A	N/A
Coniferous	0.000	0.000	0.000	0.000	0.000	0.000
Deciduous	0.000	0.000	0.000	0.000	0.000	0.000
Other	0.000	N/A	N/A	0.000	N/A	N/A
Agricultural Sector	6.495	N/A	N/A	0.813	N/A	N/A
Coniferous	2.141	2.055	0.086	0.346	0.326	0.020
Deciduous	4.354	3.981	0.373	0.467	0.397	0.070
Other	0.000	N/A	N/A	0.000	N/A	N/A
Other Sectors	0.964	N/A	N/A	0.149	N/A	N/A
Coniferous	0.483	0.446	0.037	0.079	0.069	0.010
Deciduous	0.481	0.412	0.068	0.069	0.054	0.015
Other	0.000	N/A	N/A	0.000	N/A	N/A

Source: Goskomles

TABLE C.8: Volgo-Vyatskiy Economic Region - Forest Resources by Ownership

	Total Land Area in the Forest Fund	Forest Land	of which: Stocked	of which: Coniferous Total	of which: M & OM	Deciduous Total	of which: M & OM	Other Species
				(millions of hectares)				
GRAND TOTAL	14.587	13.950	13.309	6.901	1.406	6.404	1.055	0.004
OTHER SECTORS	0.473	0.427	0.409	0.228	0.041	0.181	0.028	0.000
AGRICULTURAL SECTOR	2.478	2.478	2.449	1.327	0.156	1.122	0.099	0.000
FOREST SECTOR	11.636	11.046	10.451	5.347	1.210	5.101	0.928	0.004
of which:								
Assigned to the Forest Industry	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Other Forest Economy	11.527	11.005	10.415	5.329	1.206	5.081	0.926	0.004
Assigned to Long-term uses	0.109	0.041	0.037	0.017	0.004	0.019	0.002	0.000

	Total Volume in the Forest Fund	of which: Coniferous Total	of which: M & OM	Deciduous Total	of which: M & OM	Other Species
		(billions of cubic meters)				
GRAND TOTAL	1.787	0.994	0.304	0.793	0.242	0.000
OTHER SECTORS	0.057	0.034	0.007	0.023	0.009	0.000
AGRICULTURAL SECTOR	0.326	0.208	0.033	0.118	0.018	0.000
FOREST SECTOR	1.405	0.752	0.264	0.653	0.215	0.000
of which:						
Assigned to the Forest Industry	0.000	0.000	0.000	0.000	0.000	0.000
Other Forest Economy	1.401	0.750	0.263	0.651	0.214	0.000
Assigned to Long-term uses	0.003	0.002	0.001	0.001	0.000	0.000

Source: Goskomles

TABLE C.9: Volgo-Vyatskiy Economic Region - Forest Resources by Accessibility

	Stocked Forest Land	of which: Immature	Mat. & O.M.	Growing Stock	of which: Immature	Mat. & O.M.
TOTAL	(millions of hectares)			(billions of cubic meters)		
Combined	13.309	N/A	N/A	1.787	N/A	N/A
Coniferous	6.901	5.495	1.406	0.995	0.690	0.305
Deciduous	6.404	5.349	1.055	0.793	0.552	0.242
Other	0.004	N/A	N/A	-0.001	N/A	N/A
Forest Sector: Industry + Non LT Uses	10.415	8.279	2.136	1.401	0.923	0.478
Coniferous	5.329	4.124	1.206	0.751	0.486	0.264
Deciduous	5.081	4.155	0.926	0.651	0.437	0.214
Other	0.004	0.000	0.004	-0.001	0.000	-0.001
Forest Sector: Long-term Uses	0.037	N/A	N/A	0.003	N/A	N/A
Coniferous	0.017	0.013	0.004	0.002	0.001	0.001
Deciduous	0.019	0.017	0.002	0.001	0.001	0.000
Other	0.000	N/A	N/A	0.000	N/A	N/A
Agricultural Sector	2.449	N/A	N/A	0.326	N/A	N/A
Coniferous	1.327	1.172	0.156	0.208	0.175	0.033
Deciduous	1.122	1.023	0.099	0.118	0.100	0.018
Other	0.000	N/A	N/A	0.000	N/A	N/A
Other Sectors	0.409	N/A	N/A	0.057	N/A	N/A
Coniferous	0.228	0.186	0.041	0.034	0.027	0.007
Deciduous	0.181	0.153	0.028	0.023	0.014	0.009
Other	0.000	N/A	N/A	0.000	N/A	N/A
of TOTAL which is: EXPLOITABLE						
Combined	12.466	N/A	N/A	1.659	N/A	N/A
Coniferous	6.453	5.105	1.348	0.925	0.635	0.291
Deciduous	6.012	5.027	0.985	0.734	0.509	0.225
Other	0.001	N/A	N/A	0.000	N/A	N/A
Forest Sector: Industry + Non LT Uses	9.608	7.597	2.011	1.277	0.828	0.449
Coniferous	4.898	3.747	1.151	0.683	0.433	0.251
Deciduous	4.708	3.850	0.858	0.594	0.396	0.198
Other	0.001	0.000	0.001	0.000	0.000	0.000
Forest Sector: Long-term Uses	0.000	N/A	N/A	0.000	N/A	N/A
Coniferous	0.000	0.000	0.000	0.000	0.000	0.000
Deciduous	0.000	0.000	0.000	0.000	0.000	0.000
Other	0.000	N/A	N/A	0.000	N/A	N/A
Agricultural Sector	2.449	N/A	N/A	0.326	N/A	N/A
Coniferous	1.327	1.172	0.156	0.208	0.175	0.033
Deciduous	1.122	1.023	0.099	0.118	0.100	0.018
Other	0.000	N/A	N/A	0.000	N/A	N/A
Other Sectors	0.409	N/A	N/A	0.057	N/A	N/A
Coniferous	0.228	0.186	0.041	0.034	0.027	0.007
Deciduous	0.181	0.153	0.028	0.023	0.014	0.009
Other	0.000	N/A	N/A	0.000	N/A	N/A

Source: Goskomles

TABLE C.10: Central Black Earth Economic Region - Forest Resources by Ownership

	Total Land Area in the Forest Fund	Forest Land	of which: Stocked	of which:				
				Coniferous Total	of which: M & OM	Deciduous Total	of which: M & OM	Other Species
			(millions of hectares)					
GRAND TOTAL	1.678	1.563	1.469	0.416	0.013	1.045	0.079	0.009
OTHER SECTORS	0.106	0.092	0.087	0.027	0.000	0.061	0.012	0.000
AGRICULTURAL SECTOR	0.224	0.224	0.211	0.049	0.000	0.162	0.009	0.000
FOREST SECTOR	1.348	1.247	1.171	0.341	0.012	0.822	0.057	0.009
of which:								
Assigned to the Forest Industry	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Other Forest Economy	1.341	1.242	1.167	0.340	0.012	0.818	0.057	0.009
Assigned to Long-term uses	0.007	0.005	0.005	0.000	0.000	0.004	0.000	0.000

	Total Volume in the Forest Fund	of which:				
		Coniferous Total	of which: M & OM	Deciduous Total	of which: M & OM	Other Species
	(billions of cubic meters)					
GRAND TOTAL	0.183	0.062	0.004	0.121	0.015	0.000
OTHER SECTORS	0.017	0.006	0.000	0.011	0.003	0.000
AGRICULTURAL SECTOR	0.014	0.004	0.000	0.010	0.001	0.000
FOREST SECTOR	0.152	0.052	0.003	0.100	0.012	0.000
of which:						
Assigned to the Forest Industry	0.000	0.000	0.000	0.000	0.000	0.000
Other Forest Economy	0.152	0.052	0.003	0.099	0.012	0.000
Assigned to Long-term uses	0.001	0.000	0.000	0.001	0.000	0.000

Source: Goskomles

TABLE C.11: Central Black Earth Economic Region - Forest Resources by Accessibility

	Stocked Forest Land	of which: Immature	Mat. & O.M.	Growing Stock	of which: Immature	Mat. & O.M.
TOTAL	(millions of hectares)			(billions of cubic meters)		
Combined	1.469	N/A	N/A	0.183	N/A	N/A
Coniferous	0.416	0.403	0.013	0.062	0.059	0.004
Deciduous	1.045	0.966	0.079	0.121	0.105	0.015
Other	0.009	N/A	N/A	0.000	N/A	N/A
Forest Sector: Industry + Non LT Uses	1.167	1.090	0.077	0.152	0.137	0.015
Coniferous	0.340	0.328	0.012	0.052	0.049	0.003
Deciduous	0.818	0.761	0.057	0.099	0.088	0.012
Other	0.009	0.001	0.008	0.000	0.000	0.000
Forest Sector: Long-term Uses	0.005	N/A	N/A	0.001	N/A	N/A
Coniferous	0.000	0.000	0.000	0.000	0.000	0.000
Deciduous	0.004	0.004	0.000	0.001	0.000	0.000
Other	0.000	N/A	N/A	0.000	N/A	N/A
Agricultural Sector	0.211	N/A	N/A	0.014	N/A	N/A
Coniferous	0.049	0.049	0.000	0.004	0.004	0.000
Deciduous	0.162	0.153	0.009	0.010	0.009	0.001
Other	0.000	N/A	N/A	0.000	N/A	N/A
Other Sectors	0.087	N/A	N/A	0.017	N/A	N/A
Coniferous	0.027	0.026	0.000	0.006	0.006	0.000
Deciduous	0.061	0.049	0.012	0.011	0.008	0.003
Other	0.000	N/A	N/A	0.000	N/A	N/A
of TOTAL which is: EXPLOITABLE						
Combined	1.187	N/A	N/A	0.147	N/A	N/A
Coniferous	0.346	0.335	0.011	0.050	0.047	0.003
Deciduous	0.836	0.771	0.065	0.097	0.084	0.013
Other	0.005	N/A	N/A	0.000	N/A	N/A
Forest Sector: Industry + Non LT Uses	0.889	0.830	0.059	0.117	0.105	0.012
Coniferous	0.270	0.260	0.010	0.040	0.037	0.003
Deciduous	0.614	0.570	0.044	0.076	0.067	0.009
Other	0.005	0.000	0.005	0.000	0.000	0.000
Forest Sector: Long-term Uses	0.000	N/A	N/A	0.000	N/A	N/A
Coniferous	0.000	0.000	0.000	0.000	0.000	0.000
Deciduous	0.000	0.000	0.000	0.000	0.000	0.000
Other	0.000	N/A	N/A	0.000	N/A	N/A
Agricultural Sector	0.211	N/A	N/A	0.014	N/A	N/A
Coniferous	0.049	0.049	0.000	0.004	0.004	0.000
Deciduous	0.162	0.153	0.009	0.010	0.009	0.001
Other	0.000	N/A	N/A	0.000	N/A	N/A
Other Sectors	0.087	N/A	N/A	0.017	N/A	N/A
Coniferous	0.027	0.026	0.000	0.006	0.006	0.000
Deciduous	0.061	0.049	0.012	0.011	0.008	0.003
Other	0.000	N/A	N/A	0.000	N/A	N/A

Source: Goskomles

TABLE C.12: Povolzhskiy Economic Region - Forest Resources by Ownership

	Total Land Area in the Forest Fund	Forest Land	of which: Stocked	of which:				
				Coniferous Total	of which: M & OM	Deciduous Total	of which: M & OM	Other Species
			(millions of hectares)					
GRAND TOTAL	5.750	5.232	4.773	1.159	0.075	3.549	0.551	0.064
OTHER SECTORS	0.326	0.250	0.233	0.041	0.006	0.191	0.041	0.002
AGRICULTURAL SECTOR	0.629	0.629	0.549	0.147	0.000	0.402	0.048	0.000
FOREST SECTOR	4.795	4.353	3.991	0.972	0.069	2.956	0.462	0.062
of which:								
Assigned to the Forest Industry	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Other Forest Economy	4.784	4.350	3.988	0.971	0.069	2.954	0.462	0.062
Assigned to Long-term uses	0.011	0.003	0.003	0.001	0.000	0.002	0.000	0.000

	Total Volume in the Forest Fund	of which:				
		Coniferous Total	of which: M & OM	Deciduous Total	of which: M & OM	Other Species
	(billions of cubic meters)					
GRAND TOTAL	0.573	0.171	0.024	0.401	0.091	0.001
OTHER SECTORS	0.029	0.007	0.002	0.022	0.007	0.000
AGRICULTURAL SECTOR	0.029	0.008	0.000	0.021	0.004	0.000
FOREST SECTOR	0.515	0.157	0.022	0.358	0.081	0.001
of which:						
Assigned to the Forest Industry	0.000	0.000	0.000	0.000	0.000	0.000
Other Forest Economy	0.515	0.156	0.022	0.357	0.081	0.001
Assigned to Long-term uses	0.000	0.000	0.000	0.000	0.000	0.000

Source: Goskomles

TABLE C.13: Povolzhskiy Economic Region - Forest Resources by Accessibility

	Stocked Forest Land	of which: Immature	Mat. & O.M.	Growing Stock	of which: Immature	Mat. & O.M.
TOTAL	(millions of hectares)			(billions of cubic meters)		
Combined	4.772	N/A	N/A	0.573	N/A	N/A
Coniferous	1.159	1.084	0.075	0.171	0.147	0.024
Deciduous	3.549	2.999	0.551	0.400	0.309	0.091
Other	0.064	N/A	N/A	0.002	N/A	N/A
Forest Sector: Industry + Non LT Uses	3.988	3.413	0.575	0.515	0.411	0.103
Coniferous	0.971	0.903	0.069	0.156	0.134	0.022
Deciduous	2.954	2.493	0.462	0.356	0.276	0.081
Other	0.062	0.018	0.045	0.002	0.001	0.001
Forest Sector: Long-term Uses	0.003	N/A	N/A	0.000	N/A	N/A
Coniferous	0.001	0.001	0.000	0.000	0.000	0.000
Deciduous	0.002	0.002	0.000	0.000	0.000	0.000
Other	0.000	N/A	N/A	0.000	N/A	N/A
Agricultural Sector	0.549	N/A	N/A	0.029	N/A	N/A
Coniferous	0.147	0.146	0.000	0.008	0.008	0.000
Deciduous	0.402	0.354	0.048	0.021	0.017	0.004
Other	0.000	N/A	N/A	0.000	N/A	N/A
Other Sectors	0.233	N/A	N/A	0.029	N/A	N/A
Coniferous	0.041	0.035	0.006	0.007	0.005	0.002
Deciduous	0.191	0.150	0.041	0.022	0.015	0.007
Other	0.002	N/A	N/A	0.000	N/A	N/A
of TOTAL which is: EXPLOITABLE						
Combined	3.602	N/A	N/A	0.412	N/A	N/A
Coniferous	0.931	0.874	0.057	0.129	0.112	0.018
Deciduous	2.666	2.220	0.446	0.282	0.210	0.072
Other	0.005	N/A	N/A	0.000	N/A	N/A
Forest Sector: Industry + Non LT Uses	2.820	2.410	0.410	0.354	0.277	0.077
Coniferous	0.744	0.693	0.051	0.115	0.099	0.016
Deciduous	2.073	1.716	0.357	0.239	0.178	0.061
Other	0.003	0.000	0.003	0.000	0.000	0.000
Forest Sector: Long-term Uses	0.000	N/A	N/A	0.000	N/A	N/A
Coniferous	0.000	0.000	0.000	0.000	0.000	0.000
Deciduous	0.000	0.000	0.000	0.000	0.000	0.000
Other	0.000	N/A	N/A	0.000	N/A	N/A
Agricultural Sector	0.549	N/A	N/A	0.029	N/A	N/A
Coniferous	0.147	0.146	0.000	0.008	0.008	0.000
Deciduous	0.402	0.354	0.048	0.021	0.017	0.004
Other	0.000	N/A	N/A	0.000	N/A	N/A
Other Sectors	0.233	N/A	N/A	0.029	N/A	N/A
Coniferous	0.041	0.035	0.006	0.007	0.005	0.002
Deciduous	0.191	0.150	0.041	0.022	0.015	0.007
Other	0.002	N/A	N/A	0.000	N/A	N/A

Source: Goskomles

TABLE C.14: North Caususes Economic Region - Forest Resources by Ownership

	Total Land Area in the Forest Fund	Forest Land	of which: Stocked	of which: Coniferous Total	of which: M & OM	Deciduous Total	of which: M & OM	Other Species
				(millions of hectares)				
GRAND TOTAL	4.488	3.846	3.664	0.414	0.103	3.107	0.848	0.142
OTHER SECTORS	0.505	0.311	0.297	0.046	0.017	0.241	0.068	0.010
AGRICULTURAL SECTOR	0.410	0.410	0.377	0.022	0.001	0.355	0.035	0.000
FOREST SECTOR	3.573	3.125	2.990	0.346	0.085	2.512	0.746	0.132
of which:								
Assigned to the Forest Industry	0.075	0.071	0.068	0.015	0.011	0.052	0.028	0.001
Other Forest Economy	3.474	3.038	2.906	0.331	0.074	2.445	0.714	0.130
Assigned to Long-term uses	0.024	0.016	0.016	0.000	0.000	0.015	0.003	0.000

	Total Volume in the Forest Fund	of which: Coniferous Total	of which: M & OM	Deciduous Total	of which: M & OM	Other Species
	(billions of cubic meters)					
GRAND TOTAL	0.580	0.088	0.044	0.473	0.186	0.018
OTHER SECTORS	0.040	0.009	0.002	0.030	0.012	0.001
AGRICULTURAL SECTOR	0.025	0.001	0.000	0.024	0.004	0.000
FOREST SECTOR	0.514	0.078	0.042	0.419	0.170	0.017
of which:						
Assigned to the Forest Industry	0.018	0.007	0.006	0.010	0.007	0.000
Other Forest Economy	0.494	0.071	0.036	0.406	0.162	0.017
Assigned to Long-term uses	0.003	0.000	0.000	0.002	0.001	0.000

Source: Goskomles

TABLE C.15: North Caucuses Economic Region - Forest Resources by Accessibility

	Stocked Forest Land	of which: Immature	Mat. & O.M.	Growing Stock	of which: Immature	Mat. & O.M.
TOTAL	(millions of hectares)			(billions of cubic meters)		
Combined	3.664	N/A	N/A	0.555	N/A	N/A
Coniferous	0.414	0.312	0.103	0.089	0.045	0.044
Deciduous	3.107	2.259	0.848	0.448	0.262	0.186
Other	0.142	N/A	N/A	0.018	N/A	N/A
Forest Sector: Industry + Non LT Uses	2.974	2.083	0.891	0.487	0.264	0.223
Coniferous	0.346	0.260	0.085	0.079	0.037	0.042
Deciduous	2.497	1.755	0.742	0.391	0.222	0.169
Other	0.131	0.068	0.063	0.017	0.005	0.011
Forest Sector: Long-term Uses	0.016	N/A	N/A	0.003	N/A	N/A
Coniferous	0.000	0.000	0.000	0.000	0.000	0.000
Deciduous	0.015	0.012	0.003	0.002	0.002	0.001
Other	0.000	N/A	N/A	0.000	N/A	N/A
Agricultural Sector	0.377	N/A	N/A	0.025	N/A	N/A
Coniferous	0.022	0.022	0.001	0.001	0.001	0.000
Deciduous	0.355	0.320	0.035	0.024	0.020	0.004
Other	0.000	N/A	N/A	0.000	N/A	N/A
Other Sectors	0.297	N/A	N/A	0.040	N/A	N/A
Coniferous	0.046	0.030	0.017	0.009	0.008	0.002
Deciduous	0.241	0.173	0.068	0.030	0.018	0.012
Other	0.010	N/A	N/A	0.001	N/A	N/A
of TOTAL which is: EXPLOITABLE						
Combined	2.089	N/A	N/A	0.292	N/A	N/A
Coniferous	0.145	0.113	0.032	0.023	0.014	0.009
Deciduous	1.929	1.470	0.459	0.267	0.172	0.095
Other	0.014	N/A	N/A	0.001	N/A	N/A
Forest Sector: Industry + Non LT Uses	1.415	1.043	0.372	0.226	0.140	0.087
Coniferous	0.077	0.062	0.015	0.013	0.005	0.008
Deciduous	1.334	0.977	0.357	0.213	0.134	0.079
Other	0.004	0.004	0.001	0.000	0.000	0.000
Forest Sector: Long-term Uses	0.000	N/A	N/A	0.000	N/A	N/A
Coniferous	0.000	0.000	0.000	0.000	0.000	0.000
Deciduous	0.000	0.000	0.000	0.000	0.000	0.000
Other	0.000	N/A	N/A	0.000	N/A	N/A
Agricultural Sector	0.377	N/A	N/A	0.025	N/A	N/A
Coniferous	0.022	0.022	0.001	0.001	0.001	0.000
Deciduous	0.355	0.320	0.035	0.024	0.020	0.004
Other	0.000	N/A	N/A	0.000	N/A	N/A
Other Sectors	0.297	N/A	N/A	0.040	N/A	N/A
Coniferous	0.046	0.030	0.017	0.009	0.008	0.002
Deciduous	0.241	0.173	0.068	0.030	0.018	0.012
Other	0.010	N/A	N/A	0.001	N/A	N/A

Source: Goskomles

TABLE C.16: Ural Economic Region - Forest Resources by Ownership

	Total Land Area in the Forest Fund	Forest Land	of which: Stocked	of which: Coniferous Total	of which: M & OM	Deciduous Total	of which: M & OM	Other Species
				(millions of hectares)				
GRAND TOTAL	42.088	37.708	35.753	19.206	6.585	16.499	4.217	0.049
OTHER SECTORS	1.381	1.147	1.020	0.725	0.183	0.295	0.123	0.000
AGRICULTURAL SECTOR	5.213	5.213	5.060	2.076	0.394	2.984	0.569	0.000
FOREST SECTOR	35.495	31.348	29.673	16.405	6.008	13.219	3.525	0.049
of which:								
Assigned to the Forest Industry	6.451	5.873	5.480	3.613	1.403	1.867	0.312	0.000
Other Forest Economy	28.791	25.437	24.161	12.775	4.600	11.337	3.208	0.049
Assigned to Long-term uses	0.253	0.037	0.033	0.017	0.005	0.015	0.004	0.000

	Total Volume in the Forest Fund	of which: Coniferous Total	of which: M & OM	Deciduous Total	of which: M & OM	Other Species
		(billions of cubic meters)				
GRAND TOTAL	4.850	2.883	1.348	1.966	0.737	0.001
OTHER SECTORS	0.147	0.101	0.039	0.045	0.021	0.000
AGRICULTURAL SECTOR	0.739	0.382	0.096	0.357	0.100	0.000
FOREST SECTOR	3.964	2.400	1.213	1.564	0.615	0.001
of which:						
Assigned to the Forest Industry	0.698	0.506	0.282	0.191	0.063	0.000
Other Forest Economy	3.262	1.891	0.930	1.371	0.551	0.001
Assigned to Long-term uses	0.004	0.003	0.001	0.002	0.001	0.000

Source: Goskomles

TABLE C.17: Ural Economic Region - Forest Resources by Accessibility

	Stocked Forest Land	of which: Immature	Mat. & O.M.	Growing Stock	of which: Immature	Mat. & O.M.
TOTAL	(millions of hectares)			(billions of cubic meters)		
Combined	35.751	N/A	N/A	4.850	N/A	N/A
Coniferous	19.205	12.621	6.585	2.883	1.535	1.348
Deciduous	16.497	12.280	4.217	1.966	1.229	0.737
Other	0.049	N/A	N/A	0.001	N/A	N/A
Forest Sector: Industry + Non LT Uses	29.639	20.085	9.554	3.960	2.133	1.827
Coniferous	16.388	10.385	6.003	2.397	1.185	1.212
Deciduous	13.202	9.682	3.520	1.562	0.948	0.614
Other	0.049	0.018	0.031	0.001	0.000	0.001
Forest Sector: Long-term Uses	0.033	N/A	N/A	0.004	N/A	N/A
Coniferous	0.017	0.012	0.005	0.003	0.002	0.001
Deciduous	0.015	0.011	0.004	0.002	0.001	0.001
Other	0.000	N/A	N/A	0.000	N/A	N/A
Agricultural Sector	5.060	N/A	N/A	0.739	N/A	N/A
Coniferous	2.076	1.681	0.394	0.382	0.286	0.096
Deciduous	2.984	2.415	0.569	0.357	0.256	0.100
Other	0.000	N/A	N/A	0.000	N/A	N/A
Other Sectors	1.020	N/A	N/A	0.147	N/A	N/A
Coniferous	0.725	0.542	0.183	0.101	0.063	0.039
Deciduous	0.295	0.172	0.123	0.045	0.024	0.021
Other	0.000	N/A	N/A	0.000	N/A	N/A
of TOTAL which is: EXPLOITABLE						
Combined	31.136	N/A	N/A	4.060	N/A	N/A
Coniferous	16.701	10.830	5.871	2.382	1.182	1.199
Deciduous	14.435	10.628	3.807	1.678	1.012	0.666
Other	0.001	N/A	N/A	0.000	N/A	N/A
Forest Sector: Industry + Non LT Uses	25.056	16.648	8.409	3.174	1.565	1.609
Coniferous	13.900	8.607	5.293	1.898	0.834	1.065
Deciduous	11.155	8.041	3.115	1.276	0.732	0.544
Other	0.001	0.000	0.001	0.000	0.000	0.000
Forest Sector: Long-term Uses	0.000	N/A	N/A	0.000	N/A	N/A
Coniferous	0.000	0.000	0.000	0.000	0.000	0.000
Deciduous	0.000	0.000	0.000	0.000	0.000	0.000
Other	0.000	N/A	N/A	0.000	N/A	N/A
Agricultural Sector	5.060	N/A	N/A	0.739	N/A	N/A
Coniferous	2.076	1.681	0.394	0.382	0.286	0.096
Deciduous	2.984	2.415	0.569	0.357	0.256	0.100
Other	0.000	N/A	N/A	0.000	N/A	N/A
Other Sectors	1.020	N/A	N/A	0.147	N/A	N/A
Coniferous	0.725	0.542	0.183	0.101	0.063	0.039
Deciduous	0.295	0.172	0.123	0.045	0.024	0.021
Other	0.000	N/A	N/A	0.000	N/A	N/A

Source: Goskomles

TABLE C.18: West Siberia Economic Region - Forest Resources by Ownership

	Total Land Area in the Forest Fund	Forest Land	of which: Stocked	of which:				
				Coniferous Total	of which: M & OM	Deciduous Total	of which: M & OM	Other Species
				(millions of hectares)				
GRAND TOTAL	150.617	95.530	90.095	59.437	32.883	29.984	14.476	0.674
OTHER SECTORS	3.140	2.180	2.084	1.420	0.408	0.512	0.293	0.151
AGRICULTURAL SECTOR	9.542	9.542	9.194	1.602	0.508	7.591	1.376	0.000
FOREST SECTOR	137.935	83.809	78.817	56.414	31.967	21.881	12.807	0.522
of which:								
Assigned to the Forest Industry	0.105	0.086	0.083	0.067	0.024	0.016	0.009	0.000
Other Forest Economy	129.618	78.526	73.635	51.781	28.772	21.355	12.445	0.499
Assigned to Long-term uses	8.213	5.196	5.099	4.567	3.171	0.510	0.352	0.023

	Total Volume in the Forest Fund	of which:				
		Coniferous Total	of which: M & OM	Deciduous Total	of which: M & OM	Other Species
	(billions of cubic meters)					
GRAND TOTAL	10.794	7.221	4.365	3.567	2.348	0.006
OTHER SECTORS	0.266	0.200	0.051	0.065	0.049	0.001
AGRICULTURAL SECTOR	0.958	0.228	0.081	0.729	0.171	0.000
FOREST SECTOR	9.570	6.793	4.234	2.772	2.128	0.005
of which:						
Assigned to the Forest Industry	0.013	0.011	0.004	0.002	0.002	0.000
Other Forest Economy	9.173	6.438	4.001	2.730	2.093	0.005
Assigned to Long-term uses	0.384	0.344	0.228	0.040	0.033	0.000

Source: Goskomles

TABLE C.19: West Siberia Economic Region - Forest Resources by Accessibility

	Stocked Forest Land	of which: Immature	Mat. & O.M.	Growing Stock	of which: Immature	Mat. & O.M.
TOTAL	(millions of hectares)			(billions of cubic meters)		
Combined	90.095	N/A	N/A	10.794	N/A	N/A
Coniferous	59.436	26.553	32.883	7.221	2.856	4.365
Deciduous	29.985	15.508	14.476	3.567	1.219	2.348
Other	0.675	N/A	N/A	0.006	N/A	N/A
Forest Sector: Industry + Non LT Uses	73.718	32.151	41.567	9.186	3.082	6.104
Coniferous	51.846	23.050	28.797	6.448	2.443	4.006
Deciduous	21.371	8.917	12.454	2.733	0.638	2.095
Other	0.500	0.185	0.316	0.005	0.001	0.003
Forest Sector: Long-term Uses	5.099	N/A	N/A	0.384	N/A	N/A
Coniferous	4.567	1.396	3.171	0.344	0.117	0.228
Deciduous	0.510	0.157	0.352	0.040	0.006	0.033
Other	0.023	N/A	N/A	0.000	N/A	N/A
Agricultural Sector	9.194	N/A	N/A	0.958	N/A	N/A
Coniferous	1.602	1.095	0.508	0.228	0.147	0.081
Deciduous	7.591	6.215	1.376	0.729	0.559	0.171
Other	0.000	N/A	N/A	0.000	N/A	N/A
Other Sectors	2.084	N/A	N/A	0.266	N/A	N/A
Coniferous	1.420	1.012	0.408	0.200	0.149	0.051
Deciduous	0.512	0.219	0.293	0.065	0.016	0.049
Other	0.151	N/A	N/A	0.001	N/A	N/A
of TOTAL which is: EXPLOITABLE						
Combined	63.619	N/A	N/A	8.177	N/A	N/A
Coniferous	36.784	18.496	18.288	4.863	1.994	2.869
Deciduous	26.676	14.106	12.569	3.313	1.144	2.168
Other	0.159	N/A	N/A	0.001	N/A	N/A
Forest Sector: Industry + Non LT Uses	52.341	24.063	28.278	6.953	2.268	4.685
Coniferous	33.762	16.389	17.372	4.435	1.698	2.737
Deciduous	18.572	7.672	10.900	2.518	0.570	1.948
Other	0.008	0.002	0.006	0.000	0.000	0.000
Forest Sector: Long-term Uses	0.000	N/A	N/A	0.000	N/A	N/A
Coniferous	0.000	0.000	0.000	0.000	0.000	0.000
Deciduous	0.000	0.000	0.000	0.000	0.000	0.000
Other	0.000	N/A	N/A	0.000	N/A	N/A
Agricultural Sector	9.194	N/A	N/A	0.958	N/A	N/A
Coniferous	1.602	1.095	0.508	0.228	0.147	0.081
Deciduous	7.591	6.215	1.376	0.729	0.559	0.171
Other	0.000	N/A	N/A	0.000	N/A	N/A
Other Sectors	2.084	N/A	N/A	0.266	N/A	N/A
Coniferous	1.420	1.012	0.408	0.200	0.149	0.051
Deciduous	0.512	0.219	0.293	0.065	0.016	0.049
Other	0.151	N/A	N/A	0.001	N/A	N/A

Source: Goskomles

TABLE C.20: East Siberia Economic Region - Forest Resources by Ownership

	Total Land Area in the Forest Fund	Forest Land	of which: Stocked	of which: Coniferous Total	of which: M & OM	Deciduous Total	of which: M & OM	Other Species
				(millions of hectares)				
GRAND TOTAL	315.383	255.224	234.464	187.074	115.304	35.449	12.307	11.942
OTHER SECTORS	7.574	4.913	4.445	3.222	1.712	0.719	0.438	0.505
AGRICULTURAL SECTOR	7.319	7.319	7.016	3.679	0.625	3.336	0.511	0.000
FOREST SECTOR	300.490	242.992	223.004	180.173	112.967	31.395	11.357	11.436
of which:								
Assigned to the Forest Industry	5.425	5.228	4.996	4.040	2.413	0.952	0.457	0.005
Other Forest Economy	294.507	237.527	217.851	176.052	110.525	30.387	10.880	11.412
Assigned to Long-term uses	0.558	0.237	0.156	0.081	0.029	0.056	0.021	0.020

	Total Volume in the Forest Fund	of which: Coniferous Total	of which: M & OM	Deciduous Total	of which: M & OM	Other Species
		(billions of cubic meters)				
GRAND TOTAL	29.315	25.966	17.505	3.073	1.663	0.276
OTHER SECTORS	0.573	0.499	0.298	0.058	0.041	0.016
AGRICULTURAL SECTOR	0.826	0.533	0.119	0.294	0.073	0.000
FOREST SECTOR	27.915	24.935	17.088	2.721	1.549	0.259
of which:						
Assigned to the Forest Industry	1.055	0.936	0.627	0.119	0.083	0.000
Other Forest Economy	26.845	23.988	16.457	2.598	1.464	0.259
Assigned to Long-term uses	0.015	0.010	0.004	0.005	0.002	0.000

Source: Goskomles

TABLE C.21: East Siberia Economic Region - Forest Resources by Accessibility

	Stocked Forest Land	of which: Immature	Mat. & O.M.	Growing Stock	of which: Immature	Mat. & O.M.
TOTAL	(millions of hectares)			(billions of cubic meters)		
Combined	234.464	N/A	N/A	29.315	N/A	N/A
Coniferous	187.074	71.770	115.304	25.962	8.456	17.506
Deciduous	35.449	23.142	12.307	3.073	1.410	1.663
Other	11.942	N/A	N/A	0.280	N/A	N/A
Forest Sector: Industry + Non LT Uses	222.847	97.130	125.717	27.900	9.243	18.657
Coniferous	180.092	67.154	112.938	24.920	7.836	17.084
Deciduous	31.338	20.002	11.336	2.717	1.170	1.546
Other	11.417	9.974	1.443	0.264	0.237	0.026
Forest Sector: Long-term Uses	0.156	N/A	N/A	0.015	N/A	N/A
Coniferous	0.081	0.051	0.029	0.010	0.006	0.004
Deciduous	0.056	0.035	0.021	0.005	0.002	0.002
Other	0.020	N/A	N/A	0.000	N/A	N/A
Agricultural Sector	7.016	N/A	N/A	0.826	N/A	N/A
Coniferous	3.679	3.055	0.625	0.533	0.414	0.119
Deciduous	3.336	2.824	0.511	0.294	0.221	0.073
Other	0.000	N/A	N/A	0.000	N/A	N/A
Other Sectors	4.445	N/A	N/A	0.573	N/A	N/A
Coniferous	3.222	1.510	1.712	0.499	0.200	0.298
Deciduous	0.719	0.281	0.438	0.058	0.017	0.041
Other	0.505	N/A	N/A	0.016	N/A	N/A
of TOTAL which is: EXPLOITABLE						
Combined	123.767	N/A	N/A	16.841	N/A	N/A
Coniferous	98.415	41.418	56.998	14.478	4.905	9.573
Deciduous	24.846	17.030	7.816	2.347	1.118	1.229
Other	0.506	N/A	N/A	0.016	N/A	N/A
Forest Sector: Industry + Non LT Uses	112.306	50.778	61.528	15.442	5.171	10.271
Coniferous	91.514	36.853	54.661	13.446	4.291	9.156
Deciduous	20.792	13.925	6.867	1.995	0.880	1.115
Other	0.000	0.000	0.000	0.000	0.000	0.000
Forest Sector: Long-term Uses	0.000	N/A	N/A	0.000	N/A	N/A
Coniferous	0.000	0.000	0.000	0.000	0.000	0.000
Deciduous	0.000	0.000	0.000	0.000	0.000	0.000
Other	0.000	N/A	N/A	0.000	N/A	N/A
Agricultural Sector	7.016	N/A	N/A	0.826	N/A	N/A
Coniferous	3.679	3.055	0.625	0.533	0.414	0.119
Deciduous	3.336	2.824	0.511	0.294	0.221	0.073
Other	0.000	N/A	N/A	0.000	N/A	N/A
Other Sectors	4.445	N/A	N/A	0.573	N/A	N/A
Coniferous	3.222	1.510	1.712	0.499	0.200	0.298
Deciduous	0.719	0.281	0.438	0.058	0.017	0.041
Other	0.505	N/A	N/A	0.016	N/A	N/A

Source: Goskomles

TABLE C.22: The Far East Economic Region - Forest Resources by Ownership

	Total Land Area in the Forest Fund	Forest Land	of which: Stocked	of which: Coniferous Total	of which: M & OM	Deciduous Total	of which: M & OM	Other Species
				(millions of hectares)				
GRAND TOTAL	507.182	359.860	280.552	202.151	102.794	29.204	11.077	49.198
OTHER SECTORS	5.515	4.272	3.794	2.005	0.649	1.024	0.150	0.765
AGRICULTURAL SECTOR	2.121	2.121	1.752	0.419	0.132	1.333	0.139	0.000
FOREST SECTOR	499.547	353.468	275.006	199.726	102.013	26.848	10.788	48.433
of which:								
Assigned to the Forest Industry	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Other Forest Economy	417.361	314.468	247.859	188.237	94.804	24.226	8.848	35.397
Assigned to Long-term uses	82.186	39.000	27.147	11.490	7.209	2.622	1.940	13.036

	Total Volume in the Forest Fund	of which: Coniferous Total	of which: M & OM	Deciduous Total	of which: M & OM	Other Species
	(billions of cubic meters)					
GRAND TOTAL	21.258	17.862	11.439	2.315	1.244	1.081
OTHER SECTORS	0.397	0.277	0.094	0.091	0.018	0.029
AGRICULTURAL SECTOR	0.100	0.026	0.009	0.073	0.012	0.000
FOREST SECTOR	20.762	17.559	11.336	2.151	1.214	1.051
of which:						
Assigned to the Forest Industry	0.000	0.000	0.000	0.000	0.000	0.000
Other Forest Economy	19.167	16.634	10.636	1.927	1.031	0.605
Assigned to Long-term uses	1.595	0.925	0.701	0.224	0.183	0.446

Source: Goskomles

TABLE C.23: The Far East Economic Region - Forest Resources by Accessibility

	Stocked Forest Land	of which: Immature	Mat. & O.M.	Growing Stock	of which: Immature	Mat. & O.M.
TOTAL	(millions of hectares)			(billions of cubic meters)		
Combined	280.552	N/A	N/A	21.258	N/A	N/A
Coniferous	202.151	99.357	102.794	17.862	6.423	11.439
Deciduous	29.204	18.127	11.077	2.315	1.071	1.244
Other	49.198	N/A	N/A	1.081	N/A	N/A
Forest Sector: Industry + Non LT Uses	247.859	133.867	113.992	19.167	7.356	11.811
Coniferous	188.237	93.432	94.804	16.634	5.999	10.636
Deciduous	24.226	15.378	8.848	1.927	0.896	1.031
Other	35.397	25.057	10.340	0.605	0.461	0.144
Forest Sector: Long-term Uses	27.147	N/A	N/A	1.595	N/A	N/A
Coniferous	11.490	4.281	7.209	0.925	0.224	0.701
Deciduous	2.622	0.682	1.940	0.224	0.041	0.183
Other	13.036	N/A	N/A	0.446	N/A	N/A
Agricultural Sector	1.752	N/A	N/A	0.100	N/A	N/A
Coniferous	0.419	0.288	0.132	0.026	0.018	0.009
Deciduous	1.333	1.194	0.139	0.073	0.061	0.012
Other	0.000	N/A	N/A	0.000	N/A	N/A
Other Sectors	3.794	N/A	N/A	0.397	N/A	N/A
Coniferous	2.005	1.356	0.649	0.277	0.183	0.094
Deciduous	1.024	0.874	0.150	0.091	0.073	0.018
Other	0.765	N/A	N/A	0.029	N/A	N/A
of TOTAL which is: EXPLOITABLE						
Combined	112.465	N/A	N/A	11.702	N/A	N/A
Coniferous	90.997	48.409	42.588	10.069	3.873	6.196
Deciduous	20.698	14.958	5.741	1.604	0.879	0.725
Other	0.770	N/A	N/A	0.030	N/A	N/A
Forest Sector: Industry + Non LT Uses	106.919	59.658	47.262	11.206	4.417	6.789
Coniferous	88.572	46.765	41.807	9.766	3.672	6.094
Deciduous	18.342	12.891	5.452	1.440	0.745	0.695
Other	0.005	0.002	0.003	0.000	0.000	0.000
Forest Sector: Long-term Uses	0.000	N/A	N/A	0.000	N/A	N/A
Coniferous	0.000	0.000	0.000	0.000	0.000	0.000
Deciduous	0.000	0.000	0.000	0.000	0.000	0.000
Other	0.000	N/A	N/A	0.000	N/A	N/A
Agricultural Sector	1.752	N/A	N/A	0.100	N/A	N/A
Coniferous	0.419	0.288	0.132	0.026	0.018	0.009
Deciduous	1.333	1.194	0.139	0.073	0.061	0.012
Other	0.000	N/A	N/A	0.000	N/A	N/A
Other Sectors	3.794	N/A	N/A	0.397	N/A	N/A
Coniferous	2.005	1.356	0.649	0.277	0.183	0.094
Deciduous	1.024	0.874	0.150	0.091	0.073	0.018
Other	0.765	N/A	N/A	0.029	N/A	N/A

Source: Goskomles