Working Paper

The Russian Forest Sector: An Analysis by Four Regions

Dr. Charles A. Backman

WP-95-44
May 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

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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 functions 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 analyses of the topic of forest industry and markets.

SUMMARY

The forest sector of the former Soviet Union, and now Russia, has long fascinated timber interests from around the world. While regionally an important trader, it is the stock of forest resource which has captured the imagination, ever more so now in light of drastically reduced harvest potentials taking place in many parts of the world. While formerly governed by administered price structure, economic criteria and market determined prices are becoming more important in assessing the future role played in, and opportunities provided by the Russian forest sector for, the global community.

Opportunities do exist in the Russian forest sector, but cannot necessarily be taken for granted. In Western Russia, while short to medium term opportunities may be linked to export, in the longer term, rising domestic demand brought on by the introduction of a successful social contract among the difference participants of Russian society could well reward those souls investing now. Opportunities in the eastern part of Russia, due to large distances to the west and an absence of a large domestic demand, are more likely to be found in meeting rising demand in the Pacific Rim countries. However, domestic demand in the western portion of Russia could still be met providing products produced can support the rising tariff structure evident in rail transportation.

In realizing the opportunities discussed above, there are a number of areas which deserve closer attention now which can help the process along. From the resource side, they include utilization of the deciduous fibre supply, increasing ability to monitor and control utilization of the forest resource, and utilizing the surplus labour presently available in the forest sector to improve the forest resource's ability to meet the future demands placed on it by a resurgent domestic economy. From an industry perspective, much can be accomplished by reducing the perceived high risk attached with investing in Russia. This could include ways of increasing the efficiency of the financial infrastructure and capabilities of the informational industry. Furthermore, the differences between a "Western" approach to accounting and the "centrally planned" approach should be reviewed. The existing transportational infrastructure may need to be examined to identify where limited capital should be placed first, so that future growth opportunities linked either to rising domestic demand or export possibilities are not prematurely dissipated. The trade-offs between meeting domestic demand versus seizing export opportunities should be identified so that decision makers can be made aware of possible impacts of their decisions.

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

Chapter and Heading Title **page no.**

1.0 INTRODUCTION 1

2.0 RUSSIA 3
- 2.1 Forest Resources 3
  - 2.1.1 The Global Perspective 3
  - 2.1.2 The Wood Basket 4
    - 2.1.2.1 Growth Potential 5
- 2.2 Forest Supply 6
  - 2.2.1 Introduction 7
  - 2.2.2 Components of Fibre Supply 8
    - 2.2.2.1 Roundwood fiber supply 11
      - 2.2.2.1.1 Monitored harvest 11
      - 2.2.2.1.2 Unmonitored Harvest 13
    - 2.2.2.2 Secondary wood fiber 14
    - 2.2.2.3 Waste paper production 16
    - 2.2.2.4 Roundwood and wood waste imports 17
    - 2.2.2.5 Wood pulp and waste paper imports 17
- 2.3 Forest sector activity 17
  - 2.3.1 Fiber Allocation 17
  - 2.3.2 Forest product utilization 23
- 2.4 Forest Product Trade 25

3.0 EUROPEAN RUSSIA 41
- 3.1 Forest Resources 41
  - 3.1.1 The Russian Perspective 41
  - 3.1.2 The Wood Basket 41
    - 3.1.2.1 Growth Potential 42
- 3.2 Fibre Supply 43
  - 3.2.1 Roundwood Harvest 44
  - 3.2.2 Secondary wood fiber 45
  - 3.2.3 Waste Paper Production 45
  - 3.2.4 Imported Roundwood 46
  - 3.2.5 Imported Pulp 46
- 3.3 Forest sector activity 47
  - 3.3.1 Fiber Allocation 47
  - 3.3.2 Forest Product Utilization 51

4.0 WEST SIBERIA 65
- 4.1 Forest Resources 65
  - 4.1.1 The Russian Perspective 65
  - 4.1.2 The Wood Basket 65
    - 4.1.2.1 Growth Potential 66
- 4.2 Fibre Supply 67
  - 4.2.1 Roundwood Harvest 68
  - 4.2.2 Secondary wood fiber 68
  - 4.2.3 Waste Paper Production 69
  - 4.2.4 Imported Roundwood 69
  - 4.2.5 Imported Pulp 70
- 4.3 Forest sector activity 70
  - 4.3.1 Fiber Allocation 70
  - 4.3.2 Forest Product Utilization 74

Chapter and Heading Title **page no.**

5.0 EAST SIBERIA 89
5.1 Forest Resources 89
5.1.1 The Russian Perspective 89
5.1.2 The Wood Basket 89
5.1.2.1 Growth Potential 90
5.2 Fibre Supply 91
5.2.1 Roundwood Harvest 91
5.2.2 Secondary wood fiber 92
5.2.3 Waste Paper Production 93
5.2.4 Imported Roundwood 93
5.2.5 Imported Pulp 93
5.3 Forest sector activity 93
5.3.1 Fiber Allocation 94
5.3.2 Forest Product Utilization 97

6.0 The FAR EAST 113
6.1 Forest Resources 113
6.1.1 The Russian Perspective 113
6.1.2 The Wood Basket 113
6.1.2.1 Growth Potential 114
6.2 Fibre Supply 115
6.2.1 Roundwood Harvest 115
6.2.2 Secondary wood fiber 116
6.2.3 Waste Paper Production 117
6.2.4 Imported Roundwood 117
6.2.5 Imported Pulp 117
6.3 Forest sector activity 117
6.3.1 Fiber Allocation 117
6.3.2 Forest Product Utilization 120

7.0 PROGNOSIS 135
7.1 Background Factors 135
7.1.1 Prices and Costs 136
7.1.2 Risk 136
7.1.3 Domestic Demand 137
7.2 Results 138

8.0 WRAP-UP 151
8.1 Forest Resource 151
8.2 Industry 152
8.3 Study topics 154

Selected References 157

LIST OF FIGURES

Number **Title** **Page**

FIGURE 2.1 WORLD and REGIONS - Stocked forest land....27
FIGURE 2.2 WORLD and REGIONS - Growing stock....27
FIGURE 2.3 RUSSIA - Stocked forest land....28
FIGURE 2.4 RUSSIA - Growing stock....28
FIGURE 2.5 RUSSIA - Estimated annual growth of forest resources....29
FIGURE 2.6 RUSSIA - Estimated maximum annual accessible fiber....29
FIGURE 2.7 RUSSIA - Estimated fiber supply in wood chip equivalents....30
FIGURE 2.8 RUSSIA - Estimated total harvest from forest resource....30
FIGURE 2.9 RUSSIA - Estimated by-product chip supply and share utilized....31
FIGURE 2.10 RUSSIA - Estimated waste paper supply and share utilized....31
FIGURE 2.11 RUSSIA - Estimated distribution of fibre supply among uses in roundwood equivalents....32
FIGURE 2.12 RUSSIA - Estimated contribution to fibre supply by the components in roundwood equivalents....32
FIGURE 2.13 RUSSIA - Estimated distribution of commercial log supply among uses in roundwood equivalents....33
FIGURE 2.14 RUSSIA - Estimated distribution of residual wood fibre supply among uses in fibre equivalents....33
FIGURE 2.15 RUSSIA - Consumption of paper and paperboard, share available to be recycled, and share recycled....34
FIGURE 2.16 RUSSIA - Estimated raw material supply in the production of paper and paperboard....34
FIGURE 2.17 RUSSIA - Estimated commercial roundwood supply, share consumed domestically, and share exported....35
FIGURE 2.18 RUSSIA - Estimated lumber supply, share consumed domestically, and share exported....35
FIGURE 2.19 RUSSIA - Estimated reconstituted panel supply, share consumed domestically, and share exported....36
FIGURE 2.20 RUSSIA - Estimated pulp supply, share consumed domestically, and share exported....36
FIGURE 2.21 RUSSIA - Estimated paper & paperboard supply, share consumed domestically, and share exported....37
FIGURE 2.22 RUSSIA - Estimated fibre supply, share consumed domestically, and share exported according to product in fibre equivalents....37
FIGURE 2.23 RUSSIA - Estimated total fibre export, share consumed domestically, and share exported according to destination in fibre equivalents....38
FIGURE 2.24 RUSSIA - Estimated commercial roundwood export, share consumed domestically, and share exported according to destination....38
FIGURE 2.25 RUSSIA - Estimated lumber export, share consumed domestically, and share exported according to destination....39
FIGURE 2.26 RUSSIA - Estimated reconstituted panel export, and share exported according to destination....39
FIGURE 2.27 RUSSIA - Estimated pulp export, share consumed domestically, and share exported according to destination....40
FIGURE 2.28 RUSSIA - Estimated paper and paper board export, share consumed domestically, and share exported according to destination....40
FIGURE 3.1 RUSSIA and EUROPEAN RUSSIA - Stocked forest land....53
FIGURE 3.2 RUSSIA and EUROPEAN RUSSIA - Growing stock....53
FIGURE 3.3 EUROPEAN RUSSIA - Stocked forest land....54
FIGURE 3.4 EUROPEAN RUSSIA - Growing stock....54
FIGURE 3.5 EUROPEAN RUSSIA - Estimated annual growth of forest resources....55

Number	Title	Page

FIGURE 3.6 EUROPEAN RUSSIA - Estimated maximum annual accessible fiber.....55
FIGURE 3.7 EUROPEAN RUSSIA - Estimated fiber supply in wood chip equivalents 56
FIGURE 3.8 EUROPEAN RUSSIA - Estimated total harvest from forest resource.....56
FIGURE 3.9 EUROPEAN RUSSIA - Estimated by-product chip supply and share utilized 57
FIGURE 3.10 EUROPEAN RUSSIA - Estimated waste paper supply and share utilized 57
FIGURE 3.11 EUROPEAN RUSSIA - Estimated distribution of fibre supply among uses in roundwood equivalents 58
FIGURE 3.12 EUROPEAN RUSSIA - Estimated contribution to fibre supply by the components in roundwood equivalents 58
FIGURE 3.13 EUROPEAN RUSSIA - Estimated distribution of commercial log supply among uses in roundwood equivalents 59
FIGURE 3.14 EUROPEAN RUSSIA - Estimated distribution of residual wood fibre supply among uses in fibre equivalents 59
FIGURE 3.15 EUROPEAN RUSSIA - Consumption of paper and paperboard, share available to be recycled, and share recycled 60
FIGURE 3.16 EUROPEAN RUSSIA - Estimated raw material supply in the production of paper and paperboard 60
FIGURE 3.17 EUROPEAN RUSSIA - Estimated commercial roundwood supply, share consumed domestically, and share exported.....61
FIGURE 3.18 EUROPEAN RUSSIA - Estimated lumber supply, share consumed domestically, and share exported 61
FIGURE 3.19 EUROPEAN RUSSIA - Estimated reconstituted panel supply, share consumed domestically, and share exported.....62
FIGURE 3.20 EUROPEAN RUSSIA - Estimated pulp supply, share consumed domestically, and share exported 62
FIGURE 3.21 EUROPEAN RUSSIA - Estimated paper & paperboard supply, share consumed domestically, and share exported.....63
FIGURE 3.22 EUROPEAN RUSSIA - Estimated fibre supply, share consumed domestically, and share exported according to product in fibre equivalents.....63
FIGURE 4.1 RUSSIA and WESTERN SIBERIA - Stocked forest land 77
FIGURE 4.2 RUSSIA and WESTERN SIBERIA - Growing stock 77
FIGURE 4.3 WESTERN SIBERIA - Stocked forest land 78
FIGURE 4.4 WESTERN SIBERIA - Growing stock 78
FIGURE 4.5 WESTERN SIBERIA - Estimated annual growth of forest resources.....79
FIGURE 4.6 WESTERN SIBERIA - Estimated maximum annual accessible fiber 79
FIGURE 4.7 WESTERN SIBERIA - Estimated fiber supply in wood chip equivalents.....80
FIGURE 4.8 WESTERN SIBERIA - Estimated total harvest from forest resource 80
FIGURE 4.9 WESTERN SIBERIA - Estimated by-product chip supply and share utilized 81
FIGURE 4.10 WESTERN SIBERIA - Estimated waste paper supply and share utilized 81
FIGURE 4.11 WESTERN SIBERIA - Estimated distribution of fibre supply among uses in roundwood equivalents 82
FIGURE 4.12 WESTERN SIBERIA - Estimated contribution to fibre supply by the components in roundwood equivalents 82
FIGURE 4.13 WESTERN SIBERIA - Estimated distribution of commercial log supply among uses in roundwood equivalents 83
FIGURE 4.14 WESTERN SIBERIA - Estimated distribution of residual wood fibre supply among uses in fibre equivalents 83
FIGURE 4.15 WESTERN SIBERIA - Consumption of paper and paperboard, share available to be recycled, and share recycled 84
FIGURE 4.16 WESTERN SIBERIA - Estimated raw material supply in the production of paper and paperboard.....84

Number	Title	Page

FIGURE 4.17 WESTERN SIBERIA - Estimated commercial roundwood supply, share consumed domestically, and share exported 85
FIGURE 4.18 WESTERN SIBERIA - Estimated lumber supply, share consumed domestically, and share exported 85
FIGURE 4.19 WESTERN SIBERIA - Estimated reconstituted panel supply, share consumed domestically, and share exported 86
FIGURE 4.20 WESTERN SIBERIA - Estimated pulp supply,share consumed domestically, and share exported 86
FIGURE 4.21 WESTERN SIBERIA - Estimated paper & paperboard supply, share consumed domestically, and share exported 87
FIGURE 4.22 WESTERN SIBERIA - Estimated fibre supply, share consumed domestically, and share exported according to product in fibre equivalents 87
FIGURE 5.1 RUSSIA and EASTERN SIBERIA - Stocked forest land 101
FIGURE 5.2 RUSSIA and EASTERN SIBERIA - Growing stock 101
FIGURE 5.3 EASTERN SIBERIA - Stocked forest land 102
FIGURE 5.4 EASTERN SIBERIA - Growing stock 102
FIGURE 5.5 EASTERN SIBERIA - Estimated annual growth of forest resources 103
FIGURE 5.6 EASTERN SIBERIA - Estimated maximum annual accessible fiber 103
FIGURE 5.7 EASTERN SIBERIA - Estimated fiber supply in wood chip equivalents 104
FIGURE 5.8 EASTERN SIBERIA - Estimated total harvest from forest resource 104
FIGURE 5.9 EASTERN SIBERIA - Estimated by-product chip supply and share utilized 105
FIGURE 5.10 EASTERN SIBERIA - Estimated waste paper supply and share utilized 105
FIGURE 5.11 EASTERN SIBERIA - Estimated distribution of fibre supply among uses in roundwood equivalents 106
FIGURE 5.12 EASTERN SIBERIA - Estimated contribution to fibre supply by the components in roundwood equivalents 106
FIGURE 5.13 EASTERN SIBERIA - Estimated distribution of commercial log supply among uses in roundwood equivalents 107
FIGURE 5.14 EASTERN SIBERIA - Estimated distribution of residual wood fibre supply among uses in fibre equivalents 107
FIGURE 5.15 EASTERN SIBERIA - Consumption of paper and paperboard, share available to be recycled, and share recycled 108
FIGURE 5.16 EASTERN SIBERIA - Estimated raw material supply in the production of paper and paperboard 108
FIGURE 5.17 EASTERN SIBERIA - Estimated commercial roundwood supply, share consumed domestically, and share exported 109
FIGURE 5.18 EASTERN SIBERIA - Estimated lumber supply, share consumed domestically, and share exported 109
FIGURE 5.19 EASTERN SIBERIA - Estimated reconstituted panel supply, share consumed domestically, and share exported 110
FIGURE 5.20 EASTERN SIBERIA - Estimated pulp supply,share consumed domestically, and share exported 110
FIGURE 5.21 EASTERN SIBERIA - Estimated paper & paperboard supply, share consumed domestically, and share exported 111
FIGURE 5.22 EASTERN SIBERIA - Estimated fibre supply, share consumed domestically, and share exported according to product in fibre equivalents 111
FIGURE 6.1 RUSSIA and FAR EAST RUSSIA - Stocked forest land 123
FIGURE 6.2 RUSSIA and FAR EAST RUSSIA - Growing stock 123
FIGURE 6.3 FAR EAST RUSSIA - Stocked forest land 124
FIGURE 6.4 FAR EAST RUSSIA - Growing stock 124
FIGURE 6.5 FAR EAST RUSSIA - Estimated annual growth of forest resources 125
FIGURE 6.6 FAR EAST RUSSIA - Estimated maximum annual accessible fiber 125
FIGURE 6.7 FAR EAST RUSSIA - Estimated fiber supply in wood chip equivalents 126
FIGURE 6.8 FAR EAST RUSSIA - Estimated total harvest from forest resource 126

Number	Title	Page

FIGURE 6.9 FAR EAST RUSSIA - Estimated by-product chip supply and share utilized 127
FIGURE 6.10 FAR EAST RUSSIA - Estimated waste paper supply and share utilized 127
FIGURE 6.11 FAR EAST RUSSIA - Estimated distribution of fibre supply among uses in roundwood equivalents 128
FIGURE 6.12 FAR EAST RUSSIA - Estimated contribution to fibre supply by the components in roundwood equivalents 128
FIGURE 6.13 FAR EAST RUSSIA - Estimated distribution of commercial log supply among uses in roundwood equivalents 129
FIGURE 6.14 FAR EAST RUSSIA - Estimated distribution of residual wood fibre supply among uses in fibre equivalents 129
FIGURE 6.15 FAR EAST RUSSIA - Consumption of paper and paperboard, share available to be recycled, and share recycled 130
FIGURE 6.16 FAR EAST RUSSIA - Estimated raw material supply in the production of paper and paperboard 130
FIGURE 6.17 FAR EAST RUSSIA - Estimated commercial roundwood supply, share consumed domestically, and share exported 131
FIGURE 6.18 FAR EAST RUSSIA - Estimated lumber supply, share consumed domestically, and share exported 131
FIGURE 6.19 FAR EAST RUSSIA - Estimated reconstituted panel supply, share consumed domestically, and share exported 132
FIGURE 6.20 FAR EAST RUSSIA - Estimated pulp supply, share consumed domestically, and share exported 132
FIGURE 6.21 FAR EAST RUSSIA - Estimated paper & paperboard supply, share consumed domestically, and share exported 133
FIGURE 6.22 FAR EAST RUSSIA - Estimated fibre supply, share consumed domestically, and share exported according to product in fibre equivalents 133
FIGURE 7.1 RUSSIAN FAR EAST - Realized price and cost of production of delivered roundwood 141
FIGURE 7.2 RUSSIAN FAR EAST - Realized price and cost of production of lumber 141
FIGURE 7.3 RUSSIAN FAR EAST - Realized price and cost of production of plywood 142
FIGURE 7.4 RUSSIAN FAR EAST - Realized price and cost of production of sulfite pulp 142
FIGURE 7.5 RUSSIA - Average exchange rate of rubles per US dollar 143
FIGURE 7.6 RUSSIAN FAR EAST - Realized price and cost of production of delivered roundwood 143
FIGURE 7.7 RUSSIAN FAR EAST - Realized price and cost of production of lumber 144
FIGURE 7.8 RUSSIAN FAR EAST - Realized price and cost of production of plywood 144
FIGURE 7.9 RUSSIAN FAR EAST - Realized price and cost of production of sulfite pulp 145
FIGURE 7.10 RUSSIA - Estimated transportation tariff on railway system - 900 km 145
FIGURE 7.11 RUSSIA - The Economist risk rating of selected countries 146
FIGURE 7.12 RUSSIA and CANADA - Per capita consumption of lumber 146
FIGURE 7.13 RUSSIA and CANADA - Per capita consumption of reconstituted panel products 147
FIGURE 7.14 RUSSIA and CANADA - Per capita consumption of paper and paperboard products products 147
FIGURE 7.15 RUSSIA and REGIONS - BASE CASE - Actual and projected commercial harvest and export of fibre 148
FIGURE 7.16 RUSSIA and REGIONS - SCENARIO 1 - Actual and projected commercial harvest and export of fibre 148
FIGURE 7.17 RUSSIA and REGIONS - SCENARIO 2. - Actual and projected commercial harvest and export of fibre 149
FIGURE 7.18 RUSSIA and REGIONS - SCENARIO 3. - Actual and projected commercial harvest and export of fibre 149

LIST OF MAPS

MAP A Regions of Russia 64

1.0 INTRODUCTION

The forest sector of the then Soviet Union, and now Russia, has long fascinated timber interests from around the world. While regionally an important trader, it is the stock of forest resource which has captured the imagination, ever more so now in light of drastically reduced harvest potentials taking place in many parts of the world.[1]

Collapsing industrial activity inside Russia and other republics of the former USSR has revealed an apparent surplus between what the forest resources can sustain and what the present harvest supporting both domestic consumption and current export levels would suggest. However, the painful transition which Russia is presently passing through as its internal economic system adjusts away from the centrally planned to the market oriented is introducing the rigors of prices and costs which perform allocating roles rather than the monitoring roles under the centrally planned system. Consequently, economic criteria are becoming more important in assessing the future role played in, and opportunities provided by the Russian forest sector for, the global community.

During the challenging times brought on by the re-appraisal of the forest resource and the roles it plays in society, much uncertainty remains concerning the potential role to be played by the forest sector in Russia. As part of its ongoing program to provide timely information on emerging topics, the Canadian Department of Industry commissioned a series of reports to reveal in a more structured way the opportunities and pitfalls which *perestroika*, *glasnost'*, and *uskorenie* in Russia are creating for the Canadian forest sector.[2] This report focuses on the domestic forest sector of Russia, providing an assessment of the current fiber balances and possible surpluses available for export. It provides a window to the future offering four views for domestic consumption and foreign export of the fibre resource.

Footnotes

[1] See for example (Apsey *et alia* 1994) and (Sutton 1993).

[2] *Perestroika*, *glasnost'*, and *uskorenie* are three terms which appeared during the tenure of Gorbachev (1985-1991) to capture the essence of the attempted re-birth of the then Soviet Union. *Perestroika* was meant to capture the structural change to be introduced to the centrally planned system believed necessary to achieve the re-invigoration of the Soviet state. *Glasnost'* represented the opportunity to openly criticize the manner by which the Soviet system was being managed. *Uskorenie* represented the hoped for improvement in efficiency of the economy to be brought on by both *perestroika* and *glasnost'*.

The report is divided into 8 chapters beginning with chapter **1. INTRODUCTION**. Chapter **2. RUSSIA** provides an examination of the Russian forest sector from an aggregated point of view. It is in this chapter that many of the concepts, employed in future chapters, are revealed in greater detail. Chapter **3. EUROPEAN RUSSIA**, chapter **4. WEST SIBERIA**, chapter **5. EAST SIBERIA**, and chapter **6. THE FAR EAST**, focus on regional details. Chapter **7. PROGNOSIS** provides four scenarios through which to appreciate long-term outlook for both exports and domestic consumption of wood fibre. The concluding chapter, chapter **8. WRAP-UP** provides a look back at the path covered in the report and offers some topics for future examination.

2.0 RUSSIA

Examination of the Russian forest sector is made easier by dividing it into four components. Thus, section **2.1 FOREST RESOURCES** affords an appreciation of the total resource, and the degree to which that resource can support a flow of fiber. Section **2.2 FIBRE SUPPLY** reveals the extent to which the fiber flow potential of the forest resources has been utilized, and the degree to which fiber supply has been augmented by utilization of by-product wood chips and consumption of waste paper. Section **2.3 FOREST SECTOR ACTIVITY** provides an indication of the end uses for the fiber supply and general industrial activity in the forest sector. Section **2.4 TRADE FLOWS** illuminates the degree to which markets external to Russia have influenced production possibilities domestically.

2.1 Forest Resources

The Russian forest resources are placed in a global perspective followed by a description of the existing inventory. The ability of the forest resource to support a flow of fiber is then examined. The investigation offers an estimate of the degree to which the potential of the resource to support harvest must be modified to reveal the share which is realistically available in the short to medium term and the medium to long term.[3]

2.1.1 The Global Perspective

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, evident from **Figures 2.1** and **2.2**, 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.[4]

Footnotes

[3]The short to medium term is viewed within the context of two decades. The medium to longer term is viewed as commencing from the end of the short to medium term.

[4](Backman 1994c, p. 63)

2.1.2 The Wood Basket

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 (**Figures 2.3** and **2.4**). The deciduous resource amounts to 157 million hectares of forested land 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 in a significant way to the aggregated inventory.[5]

While the forests of Russia can be credited with annual growth of more than one billion cubic meters, much of this potential is not realizable by the forest industry.[6] Due to uses of the forest which, *inter alia*, conflict with timber extraction, absence of a transportation network supportable solely by the forest sector, or limitations imposed by harvesting technology, the overall potential of the Russian forest resource is reduced by almost 50 percent to some 600 million cubic meters.[7]

Footnotes

[5]A detailed description of the forest resources of Russia is presented in (Backman 1994b). Other background information is available from (Backman and Waggener 1991).

[6]The fiber flow figures are inclusive of a firewood component which varies from 24 percent for coniferous forest to 42 percent for deciduous forest according to (*Goskomles SSSR* 1991a), as well as a loss factor connected with harvesting and transportation of the unmanufactured wood fibre (*circa* 9 percent). According to (FAO 1994), however, the commercial component in coniferous harvest has been as high as 0.84, while that in the deciduous harvest has been as high as 0.55.

[7]The annual growth potential of the Russian forest is a derived figure based on the sum of a number of composite figures.

First, the forest growth potential is divided into 5 categories. The categories are: (1) low site; (2) reserve; (3) multiple use; (4) transportation & technology; and (5) current. The low site category identifies the share of the growth which is contributed by forested lands in the two lowest site classes of the Russian forest inventory, site class V^a and V^b. These two site classes do not support sufficiently high enough stocking to have been considered economically viable, even under the former regime. Throughout Russia, 100 million cubic meters of growth potential have been credited to these forests.

Reserve forests reflect the share of the forest inventory which is not available for use by the forest sector due to either uses which directly conflict with harvesting or access limitations which cannot be addressed during the next two decades. In total, 264 million cubic meters of the "growth potential" falls in this category.

Multiple use factors are a derived value based on the different roles which the forest resources are placed. Thus, for forests dedicated to protection, harvesting may be permitted but only if the protection role is not endangered. The difference between the permitted harvest and what the forest possibly could support is the share of the growth potential allocated to this category. Throughout Russia, an estimated 156 million cubic meters falls in this category.

***footnotes** continued on next page*

2.1.2.1 Growth Potential

Figure 2.5 shows the distribution of the growth potential among the different categories. Almost 10 percent of the forest growth potential, or 100 million cubic meters, is supported by extremely low site forest unlikely to ever have utility for the forest sector.[8] Another one-quarter (264 million cubic meters) is not realizable during the next two decades even with the infrastructure developmental priorities in the late 1980s under the former regime.[9] Some 15 percent, or an estimated 156 million cubic meters, are not presently available due to restrictions on harvest to accommodate protection values.[10] Almost one-fifth (200 million cubic meters) while potentially available in the medium to longer term depends on either additions of technology or infrastructural development to be realizable.[11] Of the more than one billion cubic meters, less than 40 percent (417 million cubic

Footnotes *continuing from previous page*

The category of transportation and technology encompasses the growth potential which cannot be presently realized due to either inappropriate harvesting technology or absence of infrastructure which cannot be supported solely by the forest sector. Subject to these two limitations, the volume is potentially available to the forest sector though. Throughout Russia, some 200 million cubic meters falls into this category.

The final category, current, represents the growth potential which is realistically available for use in the short to medium term. The volume is a maximum value, the share of which actually being utilized depending on economic criteria. Thus, the current growth potential is in terms of a "physical accessible" connotation. Throughout Russia, an estimated 417 million cubic meters falls under this category.

[8](Backman 1994b, p. 75-76) identified a level of growth potential connected with the low site forest of some 100 million cubic meters. Referring to the original source identified in (Backman 1994b), it is also possible to derive a figure of about 140 million cubic meters. The choice of which figure does not materially affect the analysis presented. Selecting 140 million cubic meters would simply increase the estimate of the growth potential of the total Russian forest resource by 40 million cubic meters on top of a figure already estimated to be in excess of one billion cubic meters. Furthermore, it is not the total growth potential which is important to the analysis, but the share which is considered available to the forest sector in the short to medium and medium to longer terms. Both of these figures are taken from (Backman 1994b), and have been used as building blocks for the total estimated growth potential of the forest.

[9](Backman 1994b) developed an argument to increase the size of the forest resource allocated to the reserve category. The size of the resource allocated to reserve in the late 1970s and early 1980s amounted to 201 million cubic meters. Reassessment of the ability of the forest resource to support harvest subsequently has in all probability increased this volume. Backman (1994b) estimated that the increase should be in the vacinity of 63 million cubic meters.

[10]This figure is approximate, and was developed to provide some indication of the overall growth capability of the forest resource. The rough nature of the calculation does not impact on the rest of the analysis since it is the forest resource available for use by the industry which is important.

[11]The volume dependent on the additions of technology and/or infrastructure is drawn from (Backman 1994b). The figure has not been modified.

meters) remains which can be considered realistically accessible in the short to medium term.[12]

Shown in **Figure 2.6**, the coniferous resource supports only 57 percent of the current to medium term fiber potential, or some 236 million cubic meters with the deciduous forest resource supporting the remaining 43 percent of the fiber flow (182 million cubic meters).[13] The coniferous resource supports a somewhat higher share of the growth potential in the medium to longer term, amounting to 65 percent of the 200 million cubic meters, or 130 million cubic meters. The deciduous forest resource supports the remaining 70 million cubic meters.

2.2 Forest Supply

The potential of the forest resource, identified in **Section 2.1**, is realized through processing activities which start with the harvesting component. **Section 2.2** explores the recent experience of the Russian forest sector from the perspective of the fiber supply and manufacturing capability. It provides an indication of consumption of not only the fiber supply, but consumption of different forest products, and the degree to which trade contributed to both consumption and production of forest products within Russia. Commenting on the experience of 1989 provides an indication of the structure of the forest sector just before the collapse of the centrally planned economy. It is this structure which helps to define the initial potential of the forest sector on which policy acts. Adding a comparison to 1992 illuminates the degree to which the forest sector has been affected by the decline in

Footnotes

[12]The aggregate volume, consisting of a coniferous component and a deciduous component, which is currently available for the use by the forest sector, is drawn from (Backman 1994b), and has not been modified.

[13]While the aggregated volume considered accessible in the short and medium term by the forest sector has not been modified, the coniferous and deciduous components have. (Backman 1994b) developed an estimate of the coniferous and deciduous contributions to the fibre potential by considering four individual contributions. These contributions were that of the allowable annual cut from forest land under the jurisdiction of the forest agencies through utilization as the principal harvest (*glavnoe pol'zovanie*), wood fibre flowing from the forest lands not under the jurisdiction of the forest agencies, intermediate harvesting (*promezhutochnoe pol'zovanie*) of the forest resource not specifically considered as part of the principal harvest, and finally, other harvest (*prochie pol'zovanie*) not linked to either of the previous three, one component of which is thought to be connected with industrial development. While (Backman 1994b) employed a ratio of the total harvest in the intermediate and other categories based on the experience identified for the mid 1970s for European Russia (Vorob'ev 1979, p. 59), the values presented in the text are based on shares for these two components evident for the principal utilization. Thus, the coniferous portion is higher by 11 million cubic meters and the deciduous portion lower by 11 million cubic meters.

economic activity. Commenting on behaviour in 1993 reveals in greater detail the continuing malaise in which the Russian forest sector has continued to operate.

2.2.1 Introduction

Through the harvesting activity, solid wood raw material is generated which can be utilized to support the manufacture of more value added products, such as lumber, pulp, or reconstituted panel products, or utilized in unmanufactured form for a variety of uses which include pilings, dwellings and heating.

The fiber produced by the harvesting activity, however, is not the only source of raw material. In addition, wood raw material (wood chips) is generated *via* manufacturing processes supported by the roundwood raw material supply. It is also possible to supplement the total wood fiber supply through importing roundwood or chip material. Together, roundwood and by-product chips constitute the solid wood fiber supply available for various uses within the forest sector. Beyond the solid wood fiber raw material, the forest sector utilizes recycled paper (waste paper) in addition to chemical and mechanical wood pulp to manufacture paper and paperboard.[14,15,16] Utilizing waste paper helps to ease the burden placed on the forest resource, extending the manufacturing potential beyond that which could

Footnotes

[14]Chemical and mechanical wood pulp are products which depend on the solid wood fiber supply.

[15]The former USSR produced a small quantity of pulp based not on wood fiber but on fibrous vegetable materials other than wood. This variety of pulp, identified as "other fiber pulp" in FAO Forest Products Yearbook, is used in the manufacture of paper, paperboard, and fiberboard.

The source material on which the manufacture of other fibrous pulp rests is believed to be textile wastes such as cotton linters, flax, hemp, or rags, rather than material such as straw, bamboo, or other grasses. The volume of this type of pulp, forecasted by (FAO 1994, p. 219) to be 355 thousand tons in 1989, is not distributed within the republics belonging to the former Soviet Union. It is believed that most if not all of the capacity to produced such pulp would be located in republics belonging to the former USSR other than Russia. The source material employed in the manufacture of this pulp pre-dates wood and most likely would be employed in regions chronically short of wood fiber and in those lacking modern large scale manufacturing complexes. For the purposes of this analyses, it has been assumed that all of this pulp has been produced in the republics other than Russia.

[16]In addition to that used in the manufacture of paper and paperboard, chemical pulp, identified as "dissolving wood pulp" in FAO literature, is produced from wood based raw material. This pulp has uses other than in the manufacture of paper and paperboard. While not explicitly identified, consumption of fiber in this use is accounted for through the category of "other commercial uses" in the text. In 1989, (FAO 1994, p. 214) reported that 668 thousand tons of pulp of this variety were produced, accounting for more than 3 million cubic meters of wood fiber consumption. While accounted for in FAO statistical system, dissolving pulp does not appear to be included in the definition of chemical pulp produced either in the USSR or Russia.

normally be expected given the solid wood fiber supply. The fiber supply can also be extended by importing pulp material which substitutes for that produced domestically with the available wood resource.

2.2.2 Components of Fibre Supply

Evident from **Figure 2.7**, the fiber supply of Russia consists of five components, the largest of which being the wood fiber produced through the harvesting activity. Supplementing the wood material from harvesting is the by-product wood chip material generated during the manufacture of products such as lumber and plywood. While regionally important, import of wood fiber has played a negligible role when examining the make up of fiber supply of Russia as a whole. Supplementing the fiber supply dedicated for the production of paper and paperboard through the intermediate product of pulp, are contributions of domestically collected and utilized waste paper, and imports of waste paper and pulp. While very little trade of waste paper seems to have taken place, Russia has imported small quantities of pulp material to complement the domestic supply.

In 1989, the fiber generated through harvesting amounted to an estimated 439 million cubic meters.[17] By-product chip material added another 54 million cubic meters.[18] Collected waste paper provided almost 2 million tons of raw material while pulp imports amounted to at most only 237 thousand tons.[19,20] The contribution of imported roundwood, which did not exceed 272

Footnotes

[17]The harvest volume presented here is a composite figure, and while being related to both the harvest data routinely presented in *Goskomstat* data sources as *vyvozka drevesiny* (delivered harvest) and that presented in *Goskomles* data sources as *glavnoe pol'zovanie* (principal harvest), has been modified to account for losses in transportation of the harvested wood, sources of harvest other than *glavnoe pol'zovanie* identified within *Goskomles* data sources, and harvest not identifiable with either *Goskomles* data sources, or with the forest resource lying outside of that under the jurisdiction of the forest agencies. In 1989, delivered harvest amounted to 338 million cubic meters (*Goskomstat SSSR* 1990b, p. 396) while principal utilization amounted to 312 million cubic meters (*Goskomstat SSSR* 1990a, p. 58).

[18](*VNIPIEllesprom* 1991a, p. 182-183) shows approximately 51 million cubic meters of by-product wood chip material linked to manufacturing activities. The number presented in the text is a derived number based on the production of lumber, plywood, and furniture. Data of the detail presented in (*VNIPIEllesprom* 1991a and *VNIPIEllesprom* 1991b) were unavailable for 1992 and 1993. Consequently, in order to provide some consistency among the three years constantly referred to in the text, namely 1989, 1992, and 1993, all by-product chip volumes were based on the same methodology.

[19]In 1989, the volume of pulp imports from beyond the borders of the former USSR (237 thousand metric tons) is available for only the geographic aggregation of the former Soviet Union (FAO 1994, p. 179). While Russia has been a net exporter of pulp to the other republics belonging to the former USSR, it is not clear the degree to which two way trade occurred, although imports in 1991 amounted to 4.4 thousand tons (*Goskomstat Rossii* 1992a, p. 73) and in 1993 to only 5 thousand tons (*Goskomstat*

***footnotes** continued on next page*

thousand cubic meters, was dwarfed by the other components.[21] Translating each of the components into chip fiber equivalents shows that some 437 million cubic meters were available in 1989 for distribution among the different consuming activities.[22]

By 1992, fiber supply had fallen off dramatically. Fiber from harvesting amounted to an estimated 327 million cubic meters, or slightly less than three-quarters the level for 1989.[23] The supply of by-product chip material due to manufacturing activity fell off marginally faster, to an estimated 34 million cubic meters in 1992, lower by 35 percent from the 1989 level.[24] Waste paper supply fell off as well, to slightly more than 0.9 million tons, 55

Footnotes *continuing from previous page*

SNG 1994, p. 11). For the purposes of this discussion, it has been assumed that the other republics did not export pulp material to Russia in 1989. Consequently, depending on the degree to which Soviet imports were destined to Russia, the total Russian imports could not have exceeded the volume identified for the former USSR.

[20](*VNIPIEllesprom* 1991a p. 187) identifies 3.8 million tons of waste paper collected for all of the former Soviet Union, of which 2.9 million tons were actually consumed. Both of these figures are allocated among the different republics belonging to the USSR in the first part and in the second part among the different economic regions of the Russian republic. Summing the figures linked to each of the economic regions within Russia shows a total of 1.9 million tons. Summing of the figures linked to each of the non Russian republics and subtracting from the total reveals a residual of 2.1 million cubic meters. The average of 1.9 million and 2.1 million tons was selected to represent the waste paper collected in 1989 for Russia.

[21]Depending on the source examined, the volume of roundwood imports in 1989 by the former USSR varied between 195 thousand cubic meters (FAO 1994, p. 41) and 229 thousand cubic meters (*Goskomstat SSSR* 1990c, p. unknown). In addition to the imports from outside of the former Soviet Union, another 43 thousand cubic meters of roundwood were imported from the other republics (*VNIPIEllesprom* 1991a, p. 176). Thus, the maximum volume of imports, according to these data sources, could not have exceeded 272 thousand cubic meters.

[22]One cubic meter of imported roundwood is assumed to be the equivalent of 0.9 cubic meters of wood chips. One metric ton of pulp, all of which are assumed to be chemical pulp, is the equivalent of 4.85 cubic meters of wood chips. One metric ton of waste paper is the equivalent of 0.75 tons of chemical pulp. The weighted average co-efficient of mechanical pulp (2.58 cubic meters per metric ton) and chemical pulp (4.85 cubic meters per metric ton), based on production of each category of pulp in 1989, was applied to the waste paper volume expressed in pulp equivalents (4.58 cubic meters per metric ton). Approximately 70 percent of the roundwood supply is assumed to be commercial logs, one cubic meters of which is the equivalent of 0.9 cubic meters of wood chips. The remaining 30 percent of the roundwood supply, assumed to be essentially lower grade material, has been translated into wood chip material using the derived factor of 0.75 cubic meters of wood chips from one cubic meter of lower grade wood material.

[23]*Vyvozka drevesiny* (delivered harvest) in 1992 amounted to 238 million cubic meters (*Goskomstat Rossii* 1993d, p. 400) while *glavnoe pol'zovanie* (principal harvest) amounted to 228 million cubic meters (*Goskomstat Rossii* 1993a, p. 19). Harvest not identifiable with the *Goskomles* data collection network, or flowing from forest land lying outside of the jurisdiction of the forest agencies amounted to an estimated 43 million cubic meters.

[24]The level of by-product chip supply in 1992 is based on the 1989 level primarily through changes in the output of plywood and lumber taking place between 1989 and 1992.

percent of the 1989 figure.[25,26,27] Imports of roundwood and pulp collapsed, however, falling to only 71 thousand cubic meters of roundwood and to only 9 thousand tons of pulp.[28,29] Accordingly, the total fiber supply, available for distribution in 1992, amounted to only 315 million cubic meters, or slightly more than 70 percent the level evident for 1989.

The decline in fibre supply, evident between 1989 and 1992, continued into 1993. Harvested wood fiber amounted to some 251 million cubic meters, three-fifths the level apparently harvested in 1989.[30] The supply of by-product wood chip material also fell to an estimated 26 million cubic meters, slightly less than one-half the level experienced in 1989 as well.[31] Waste paper collected and available for use amounted to almost 900 thousand

Footnotes

[25]In 1989, both the supply (2.0 million tons) and share of the supply of waste paper actually consumed (1.6 million tons) are specifically identified (*VNIPIEllesprom* 1991a p. 187). In 1992, however, only the quantity actually consumed (886 thousand tons) is identified directly (*Goskomstat Rossii* 1994a, p. 142). Applying the share of the total waste paper resource actually consumed (0.96) to the volume consumed provides the volume of waste paper actually collected, or 902 thousand tons.

[26]Along with the supply of collected waste paper, (*VNIPIEllesprom* 1991a p. 187) identifies the share consumed. For all of the former USSR, the volume of waste paper utilized amounted to 2.9 million tons. Summing the figures linked to the economic regions of Russia reveals that 1.55 million tons were apparently utilized. Summing the figures identifying the consumption of waste paper in each of the republics except for Russia and subtracting from the total for the USSR leaves a balance of 1.625 million tons. The average of these two figures, 1.55 and 1.625, was utilized as the volume of waste paper consumed in Russia in 1989 (1.6 million tons). The figure so derived is essentially no different from the volume of waste paper consumed in Russia in 1989 as identified in (*Goskomstat Rossii* 1991b, p. 318).

[27]Not seemingly included with the overall supply of waste paper available for consumption is the volume identified with exports. In 1992, Russia exported 83 thousand tons to countries not having been part of the former Soviet Union (*Goskomstat Rossii* 1993e, p. 16). The volume exported is greater than the pool of unutilized waste paper for 1992, which amounted to 36 thousand tons.

[28](FAO 1994, p. 41) identifies Russian imports of industrial roundwood of 22 thousand cubic meters while (*Goskomstat Rossii* 1993e) fails to specifically identify roundwood imports. According to (*Goskomstat Rossii* 1992a, p. 73), Russia imported 90 thousand cubic meters of roundwood from the other republics in 1991, while (*Goskomstat SNG* 1994, p. 12) shows imports of nearly 7 thousand cubic meters. Assuming that 1992 imports are an arithmetic average of 1991 imports and 1993 imports shows that imports could not have exceeded 71 thousand cubic meters. Against a total fibre supply estimated to be in the vacinity of 315 million cubic meters, the degree to which Russian imports of roundwood varied about the assumed value is not expected to have a material affect.

[29](FAO 1994, p. 180) identifies 7 thousand tons of pulp imports by Russia while (*Goskomstat Rossii* 1993e, p. 30) identifies 5 thousand tons. Pulp imports from the other republics belonging to the former USSR are assumed to be the average of 1991 imports of 4 thousand tons (*Goskomstat Rossii* 1992a, p.73), and 50 tons identified for 1993 (*Goskomstat SNG* 1994, p. 11). Thus, the contribution of imported pulp to the overall fibre supply could not have exceeded 9 thousand tons. The assumption that the other republics have not contributed pulp in a meaningful way to Russia does not materially affect the analysis. Against a total fibre supply in 1992, estimated to have been 315 million cubic meters on a fibre equivalent basis, four thousand tons of pulp, or some 20 thousand cubic meters of fibre, is lost.

[30]*Vyvozka drevesiny* (delivered harvest) in 1993 amounted to 177 million cubic meters (*Goskomstat Rossii* 1994b, p. 159) while the *glavnoe pol'zovanie* (principal utilization) amounted to 174 million cubic meters (*Federal'naya Sluzhba lesnogo khozaystva Rossiyskoy Federatsii* 1994, p. 1) Harvest not directly linked to the *Goskomles* data collection system, or flowing from the forest resource lying outside of the jurisdiction of the forest agencies, amounted to 27 million cubic meters.

[31]The level of by-product wood chip supply in 1993 is based on the level evident in 1992 adjusted for the decline in production of lumber taking place between 1992 and 1993.

tons while imports of roundwood and pulp were insignificant.[32] Total fiber available for distribution among the different uses amounted to 244 million cubic meters, a decline of more than 20 percent on 1992 levels and less than three-fifths of the volume of fiber equivalents available in 1989.

2.2.2.1 ROUNDWOOD FIBER SUPPLY

The roundwood fiber supply consists of two components, the principal one being the harvest which can be identified with the system monitored by the Russian Federal Forest Service.[33] The second contributor to the roundwood supply consists of harvest taking place outside of the monitored system.[34] Together these two sources accounted for the 439 million cubic meters of harvest in 1989, and the 325 million cubic meters in 1992. By 1993, the composite harvest had fallen to 251 million cubic meters (**Figure 2.8**).[35]

2.2.2.1.1 Monitored harvest

The maximum fiber supply possible from the forest resources of Russia, sustainable in the medium to long-term, amounts to 617 million cubic meters, 59 percent of which flows from coniferous forests.[36] The balance,

Footnotes

[32]The volume of waste paper consumed is available for 1993 from (*Goskomstat Rossii* 1994b, p. 142). Applying the share of the collected waste paper consumed (0.93) to the figure linked with consumption reveals 860 thousand tons of collected waste paper.

[33]There are three categories of harvest for which information has been collected by *Goskomles*, and now its successor organization, the Forest Service of the Russian Federation. They are *glavnoe pol'zovanie* (principal harvest), *promezhutochnoe pol'zovanie* (intermediate utilization), and *prochie pol'zovanie* (other utilization). While not specifically identified, (Backman 1993) provided a fourth component of harvest linked to the forest land not part of the land base under the jurisdiction of the forest agencies. The size of the harvest was estimated based on the degree to which the allowable annual cut (AAC) on forest sector lands was in fact utilized. The degree to which the AAC was in fact utilized is provided by comparing the level of the principal utilization with the AAC. Together, these four categories account for the harvest captured by the Forest Service monitoring system.

[34]The harvest taking place outside of the Forest Service monitoring system is a derived figure based on a comparison of harvest volumes derivable from the Forest Service data and from the *Goskomstat* data. While believed to provide a reasonable estimate of the extra system harvest in 1989, increasing porousness of the *Goskomstat* data collection system relative to that of the Federal Forest Service subsequent to the demise of the centrally planned system has increased the "unmonitored harvest" in 1992 and 1993 beyond the values which would be suggested if just employing the data published for these two years.

[35]Backman (1994b) provided composite harvest figures for 1992 and 1993 based on the harvest data published by both *Goskomstat* and the Forest Service. As a result, the composite harvest figures presented in Backman (1994b) are lower than those appearing in this report by 22 million cubic meters in 1992 and by 26 million cubic meters in 1993.

[36]Backman (1994b) and Backman (1994c) identified a total of 354 million cubic meters of coniferous supported and 263 million cubic meters of deciduous supported harvest potential. Using these figures would suggest that 57 percent and not 59 percent flows from the coniferous forests. The figures presented in the text were derived by modifying slightly the harvest potential generated by the

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amounting to 252 million cubic meters, is contributed by deciduous forests. However, of this volume, only 417 million cubic meters, or 68 percent should be considered accessible with the current technology and infrastructure.[37] The share of the coniferous component is lower (57 percent) due to the accessibility of a larger share of the deciduous resource by-passed in the drive to develop the coniferous forests.

In 1989, the forest sector produced 383 million cubic meters within the monitored system through activities such as principal harvest, intermediate harvesting, and other harvest.[38] This level of harvest amounted to 92 percent of the estimated short to medium term potential of the Russian forest resource. While seemingly lying within the boundaries imposed by the potential of the forest, the harvest in the coniferous stands was in all probability exceeded. An estimated 268 million cubic meters were produced from coniferous forests, exceeding the sustainable volume by some 32 million cubic meters.[39] The deciduous resource was not nearly so overextended, accounting for 115 million cubic meters of the harvest. The deciduous harvest amounted to only two-thirds of what is believed to have been the accessible potential of the deciduous forest in the short to medium term.

The harvest is inclusive of a firewood component which accounted for 119 million cubic meters, or 31 percent of the total. Deciduous species, due to their lower commercial utility, accounted for nearly three-fifths of the firewood produced in 1989.[40]

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intermediate component of harvest and the other component of harvest to show a higher contribution from the coniferous forests and a lower contribution from the deciduous forests.

[37]Accessibility in the context employed does not refer to economic accessibility. The volumes presented here are in terms of the maximum which can be considered accessible independent of an economic system in which prices play an allocative rather than monitoring role.

[38]For a description of the components of harvest, refer to (Backman 1993)

[39]The short to medium term sustainable harvest excludes harvest from cedar stands which in 1989 accounted for some 3 million m^3 of harvest. The balance, amounting to 29 million cubic meters arises due to the reclassification of the AAC which took place between 1989 and 1992. Thus, the 1989 harvest, if compared to the potential determined for 1989, would not have been over the ability of the forest's ability to support short to medium term harvest, although regionally, imbalances most likely occurred.

[40]The commercial utility of wood flowing from forests within each of the coniferous and deciduous groupings varies due to different physical, chemical, and form characteristics. In 1990, commercial wood flowing (due to the principal harvest) from coniferous forests amounted to 76 percent. Comparable figures specific to deciduous forests amounted to 58 percent respectively (*Goskomles SSSR* 1991a).

The commercial harvest amounted to an estimated 264 million cubic meters, or some 69 percent of the overall harvest within the monitored system. Unlike firewood, coniferous forests contributed three-quarters of this volume, or 200 million cubic meters. Hardwood deciduous forests contributed a minor share of the remainder with the bulk flowing from softwood deciduous forests.

By 1992, harvest within the monitored system dropped by some 100 million cubic meters, falling to an estimated 285 million cubic meters, nearly three-quarters the level evident in 1989.[41] The commercial harvest fell a similar percentage, decreasing from 264 million cubic meters to only 193 million cubic meters in 1992.[42]

The decline evident between 1989 and 1992 continued into 1993 as the monitored harvest fell to an estimated 224 million cubic meters, almost three-fifths the level evident in 1989.[43] The commercial share of the harvest amounted to an estimated 154 million cubic meters.[44]

2.2.2.1.2 Unmonitored Harvest

While the harvest identifiable through the Forest Service monitoring system accounts for a large share of the estimated potential solid wood fiber flow in the short to medium term, an additional harvest seems to be contributed

Footnotes

[41] In 1992, only the principal harvest and the intermediate harvest figures are available (*Goskomstat Rossii* 1993a, p. 19-24). While the commercial share of the principal harvest was not presented, it was for intermediate utilization. In order to calculate the harvest linked to the AAC in the non forest sector forests, the figure derived for 1989 was reduced by the ratio experienced in the principal harvest for 1989 and 1992. The volume linked to industrial development (other harvest) was derived in a similar fashion, except that it was the ratio experienced in intermediate utilization which was employed as the ratio.

[42] In deriving the commercial harvest within the monitored system, the commercial ratios evident for 1989 were applied to all components except for the harvest contributed through intermediate utilization. The share of the harvest from this activity was available from the above mentioned statistical source. Interestingly, the difference between the commercial share in 1989 (0.484) (*Goskomstat SSSR* 1990a, p. 37) and 1992 (0.478) (*Goskomstat Rossii* 1993, p. 22) of the intermediate harvest is minor suggesting that applying the ratios for 1989 to the other components should not have a material impact.

[43] The volumes of harvest for principal utilization and intermediate utilization, inclusive of the commercial and firewood components, are available for 1993. The commercial component alone is not available.

The total harvest volume in 1993 is estimated assuming that the ratio of the principal utilization recorded in 1993 to that in 1989 can be applied to the non forest sector AAC while the ration of the 1993 intermediate utilization to the 1989 intermediate utilization can be applied to the other utilization.

[44] The commercial share in 1993 is based on the commercial share derived for 1992.

outside of the ability of the Forest Service to capture. Although difficult to determine, Backman (1995d) showed that some 56 million cubic meters of addition harvest seemed to have been made available for use by the forest sector. Indeed, when examining the contribution of the unmonitored harvest to the harvested wood supply, this component would have accounted for 13 percent of the roundwood fibre in 1989.[45]

By 1992, the unmonitored harvest seems to have dropped, amounting to 43 million cubic meters, some 12 percent of the roundwood believed to have been harvested. The decline continued into 1993 for which year unmonitored harvest seemed to amount to 26 million cubic meters, or 10 percent of the harvested volume thought to have taken place in Russia.

2.2.2.2 SECONDARY WOOD FIBER

During the course of producing solid wood products such as lumber and plywood, a portion of the roundwood is turned into wood waste material. A small share is also lost due to the activity of the saw itself on the raw material (log).[46] In addition to the waste material generated by primary processing of the roundwood resource, a supply of waste material is also produced by the selected industries which consume wood products. The largest of these is the furniture industry.[47] In addition to the byproduct waste material linked to

Footnotes

[45]While difficult to judge, assuming that the unidentified harvest was distributed among the forest types in a similar fashion as that occurring in the monitored system suggests that the coniferous resource during the last few years of the old regime may have been over subscribed, thus compromising its ability to support continued use in the future.

[46]Soviet literature (Ekonomika 1983, p. 57-59) shows the degree to which raw material from which lumber is produced is distributed among four categories of products. The four categories of products were lumber (*pilomaterialov*), chip waste (*kuskovykh otkhodov*), sawdust (*opilok*), and loss due to the saw width (kerf) and drying (*poter' na usushku i raspyl*). For the mills within the *Minlesprom* system in the early 1980s, 61.2 percent of the incoming log was turned into lumber, 21.1 percent were turned into wood chips, 11.7 percent were turned into sawdust, and 6.0 percent were lost due to the saw kerf and shrinkage.

In the case of plywood (Ekonomika 1983, p. 89-90), the categories number five, which are output (*poleznyy vykhod*), peeling core (*obrezki shpona*), plywood ends (*obrezki fahery*), sawdust (*opylki*), and compression loss (*upressovka*). In 1980, output accounted for 38.5 percent, waste of the peeling core amounted to 16 percent, waste from plywood amounted to 30 percent, sawdust accounted for 7 percent, while compression losses accounted for 47 percent.

[47]While difficult to account for the waste contributed by the furniture industry, some measure can be developed by examining the total ruble production of furniture, and then applying waste factors which have been developed based on three sizes of furniture plants (Ekonomika 1983, p. 81). For illustrative purposes, plants producing 5 million rubles annually are presented.

Normative data are presented for three categories of items, the third of which, waste (*otkhody*), is divided into six categories. The three major categories are raw material (*syr'e*), output (*produktsiya*),

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the manufacturing activity, a small volume of waste is generated through the harvesting process.[48]

In total, some 64 million cubic meters of waste material were believed available in 1989, 10 million of which were connected with the harvesting process.[49] By 1992, the volume of wood waste had fallen to only 42 million cubic meters, 7 million of which are believed to be linked to the harvesting operation. While the decline in waste due to harvesting amounted to almost one-third, the fall in the manufacturing sector was close to 40 percent, in part due to the decline in industrial activity. During 1993, wood waste fell even further to an estimated 32 million cubic meters, 6 million of which were believed linked to the harvesting operation.[50] Most of this material is thought to consist of coniferous material, since more than 90 percent of the lumber production flowed from coniferous species.[51]

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and waste (*otkhody*). The six sub-categories of waste are chunks of lumber (*obrezki pilomaterialov*), chunks of panels (*obrezki plit*), chunks of plywood (*obrezki fanery*), shavings (*struzhka*), sawdust (*opilki*), and dust (*pyl'*). In the early 1980s, with raw material accounting for 100 percent, output consumed 56.7 percent while waste consumed 43.3 percent, of which lumber chunks were 14.1 percent, panel chunks were 6.2 percent, plywood chunks were 2.8 percent, shavings were 12.2 percent, sawdust was 7.2 percent, and dust was 0.8 percent.

[48]The wood waste from the harvesting process is included with the overall roundwood harvest. Consequently, when calculating the total fibre supply in any one year, only the wood waste generated by the manufacturing processes are included.

[49]Data describing wood waste is available for 1989 segregated into waste from harvesting and waste from manufacturing activities (*VNIPIEllesprom* 1991a p. 180-183). The total volume, credited to Russia, appears in the vicinity of 60-65 million cubic meters, 10 million of which were linked to the harvesting function. While difficult to determine, the share of the waste which has commercial uses seems to vary between 49 million cubic meters and 54 million cubic meters according to (*VNIPIEllesprom* 1991a, p. 182-183), while according to (*Goskomstat Rossii* 1991b, p. 318), the volume of wood waste consumed amounted to 50 million cubic meters.

These numbers have not been employed in the text because they either represent only the volume which has been identified within the former system, or have been presented for later years at an aggregated level of detail. Additionally, the lack of comparable data for 1992 and 1993 make a comparison to 1989 difficult. Thus, in order to capture the total wood waste resource generated by the forest sector, the waste generated through manufacturing was based on actual manufacturing activity of lumber and plywood. Added to this sum was the waste generated through the manufacture of furniture. Together, these three processing activities generated an estimated 54 million cubic meters of waste in 1989. An estimate independently derived of the usable waste from harvesting was not attempted. Accordingly, the estimate of 10 million cubic meters was employed within the discussion in the text. Figures derived for manufactured chips in 1992 and 1993 are based on production activity in the lumber and plywood producing sectors, while the volume credited to harvesting is related to the harvesting activity.

[50]The decline in wood waste material is linked to the decline in lumber manufacturing activity observable from the published data sources. Because of the increasing porousness of the *Goskomstat* data collection system subsequent to the collapse of the Soviet Union, the production levels recorded in all probability are lower that they really are. No attempt has been made to adjust the recorded production levels since the share of total fibre supply contributed by secondary wood waste is minor.

[51]The production of deciduous lumber is not available disaggregated below the former USSR level of analysis. In 1989, of the 105 million cubic meters of lumber produced, only 13 million were of deciduous species (FAO 1994, p. 90, p. 100). Since the fiber supply of the republics other than Russia consists

footnotes *continued on next page*

While representing a pool of wood fiber available for use, not all has been utilized in the past. Evident from **Figure 2.9**, in 1989, only some 90 percent of the available fiber was utilized in one form or another. By 1992, utilization rates had decreased to 80 percent with a sharp drop off to 68 percent evident for 1993.[52]

2.2.2.3 WASTE PAPER PRODUCTION

Evident from **Figure 2.10**, while Russia has a system to collect waste paper, not all has in fact been utilized. The degree to which the waste paper supply has in fact been utilized has improved considerably since 1989 when only 80 percent of the supply in fact was seemingly consumed. By 1993, utilization rate had increased to the mid 90 percent level where it remained for 1993.

In 1989, the supply of waste paper amounted to 2.0 million tons, of which 1.6 million tons were actually consumed. By 1992, while the supply of waste paper had plummeted to slightly more than 900 thousand tons, less than one-half the level evident in 1989, consumption apparently fell less measurably so. Consumption amounted to 866 thousand tons, a level approaching 55 percent of that existing in 1989. The decline continued into 1993, although both consumption and supply were only marginally less than those in 1992. Waste paper consumed amounted to 800 thousand tons while the supply amounted to 860 thousand tons.

Footnotes *continuing from previous page*

primarily of deciduous species, most of the deciduous lumber is believed produced there, and not in Russia. Accordingly, by-product chip supply is believed dominated by coniferous species.

[52](*Goskomstat Rossii* 1994b, p. 142) provides for the years 1990 through 1993 inclusive the volume of wood waste utilized for all of Russia, while (*Goskomstat Rossii* 1991b, p. 318) provides the number for 1989. The utilization rate of the total resource represented by the figures for 1992 and 1993 are also presented. It is these utilization rates for 1992 and 1993 which have been presented in the text. Interestingly, when the estimated volume of wood waste utilized in 1992 (28 million cubic meters) and 1993 (18 million cubic meters) are compared to the volume identified in (*Goskomstat Rossii* 1994b, p. 142), the differences amounted to 3 million cubic meters and 6 million cubic meters respectively. The values identified in (*Goskomstat Rossii* 1994b, p. 142), amounted to 31 million cubic meters in 1992 and 24 million cubic meters in 1993.

2.2.2.4 ROUNDWOOD AND WOOD WASTE IMPORTS

While a potential source of wood fiber, in the past roundwood has played a small role, amounting to less than 272 thousand cubic meters in 1989. By 1992, imports from abroad had collapsed while imports from the other republics continued at extremely low levels. The collapse in roundwood imports, evident in 1992, continued into 1993. Against an overall fibre supply of 437 million cubic meters in 1989, 315 million cubic meters in 1992, and 244 million cubic meters in 1993, wood raw material imports would not seem to be a large factor to be considered when examining fiber balance of Russia.

2.2.2.5 WOOD PULP AND WASTE PAPER IMPORTS

Specialty pulp has in the past been imported to balance the distribution of pulp obtainable from domestic sources. Since 1965, import levels have seldom exceeded 300 thousand cubic meters, and in 1989, did not exceed 237 thousand tons. By 1992, pulp imports had collapsed, and amounted to only 24 thousand tons. The low level of pulp imports, evident in 1992, continued into 1993. Against a domestic pulp supply of 10 million tons in 1989, almost 7 million tons in 1992, and 5.5 million tons in 1993, wood pulp and waste paper imports would seem not to be a serious factor to consider when developing an assessment of overall fibre supply.

2.3 FOREST SECTOR ACTIVITY

Supported by the fiber potential, the forest sector has produced a number of products which have been available for export and domestic consumption. While domestic consumption relies primarily on local supply, imports of selected products, primarily of pulp, paper and paperboard, have fulfilled marginal roles when required. Focusing first on the distribution of the fiber supply among the different uses, the activity within the manufacturing sector is discussed.

2.3.1 Fiber Allocation

The fiber supply is dominated by the roundwood component. However, a large share of the roundwood supply is not commercial and is presently consumed as firewood. Another share is seemingly lost between the time it

is harvested and its delivery to the point of first processing. Of the commercial wood supply, roundwood is the sole provider of raw material for the production of lumber and plywood. Lower quality harvested material and wood waste find uses along with solid wood in the manufacture of panel products and pulp material, as well as being consumed in unmanufactured form. Paper and paperboard secure the necessary fiber to sustain their production either from domestically produced pulp, imported pulp, or from a supply of imported and domestically collected waste paper. **Figure 2.11**, providing an indication of the distribution of the available fiber among the different uses for 1989, 1992 and 1993, shows that lumber and plywood manufacture have been the major consumer of the fibre resource followed by other unidentified commercial uses and consumption as firewood.

Evident from **Figure 2.12**, nearly 10 percent of the roundwood supply of 439 million cubic meters, or 40 million cubic meters, were believed lost in the harvest process and in transit during 1989. After accounting for the 109 million cubic meters of firewood, only 290 million cubic meters of commercial wood were available for distribution among the different uses.

The largest component of the commercial volume was commercial logs, which accounted for 85 percent of the total, or 247 million cubic meters. Low grade wood, which has a commercial use due to manufacturing facilities able to consume it, contributed another 23 million cubic meters. Chips produced for the pulp and paper industry using lower quality wood not hitherto accounted for contributed another 17 million cubic meters while various other uses consuming roundwood in whole tree form contributed only 3 million cubic meters.[53] On top of the fibre from the forest resources, another 60 million cubic meters of wood waste material were available in 1989, of which only 49 million were successfully consumed.[54] Almost 8

Footnotes

[53]Commercial wood produced in 1989 amounted to 286 million cubic meters including the four categories of commercial logs, commercial firewood, chips for the pulp and paper sector, and roundwood consumed in tree length form (*Goskomstat Rossii* 1993c, p. 239). The difference between 286 million and the 290 million presented in the text is due to the translation of the chip component into log form. Since it is believed that this chip material is produced from lower grade material, the 12.6 million cubic meters of chips were inflated using the factor of 0.75 cubic meters of chips per one cubic meter of roundwood.

[54]The wood waste figures are presented in solid wood equivalents. Thus, 54 million cubic meters chips turns into nearly 60 million cubic meters using the conversion factor of 0.9. Of the 54 million cubic meters of chip material, some 44 million cubic meters were estimated to have been consumed. Translating the 44 million cubic meters into roundwood equivalents using the 0.9 factor yields 49 million cubic meters.

million cubic meters of roundwood equivalents from waste paper (of which almost 6 million cubic meters were actually consumed) round out the fiber supply of 508 million cubic meters on a roundwood equivalent basis available in 1989.

Evident from **Figure 2.13**, nearly three-fifths of the commercial log supply, or 141 million cubic meters in 1989, were consumed directly by the lumber and plywood producing sectors, leaving 106 million cubic meters. Another 39 million cubic meters were exported either to other republics belonging to or countries located beyond the borders of the former Soviet Union, leaving 68 million cubic meters of commercial roundwood logs available for other uses.

Considering the by-product chip material (60 million cubic meters), lower grade wood (43 million cubic meters), and the residual pool of commercial logs, the remaining wood fibre available for distribution amounted to 171 million cubic meters on a roundwood equivalent basis, 11 million of which were not consumed. Transforming the residual pool of wood into fibre equivalents, and excluding the volume which was not utilized, shows a supply of 137 million cubic meters allocated to uses other than lumber and plywood production and the export in unmanufactured form.

Shown in **Figure 2.14**, consumption in unmanufactured form and unidentified commercial uses accounted for some 55 percent of the allocated volume, or 79 million cubic meters, while the pulp sector accounted for most of the remainder (one-third or 45 million cubic meters).[55] Minor volumes were consumed by the fibreboard and particleboard producing sectors (14 million cubic meters).

Footnotes

[55]While the distribution of the wood material (commercial logs, commercial firewood material and by-product chips) to the pulp, reconstituted panel , and unidentified use sectors is difficult, some indication of the distribution can be derived based on information available for 1985 for the former USSR.

Of a total wood supply, pulp logs accounted for 57 percent of the supply, low grade wood for 20 percent and chip material for 23 percent of the supply. In the production of particleboard, chips accounted for 39 percent of the fiber while roundwood accounted for 61 percent. A similar experience is encountered with fiberboard where chip material contributed 46 percent of the supply in 1985 with roundwood accounting for the balance of 54 percent.

Evident from **Figure 2.15**, some one-third of the paper and paperboard consumed in Russia in 1989 was available for recycling, although the actual consumption was much less. While one-quarter of the paper and paperboard consumed in Russia seems to have been actually recycled, the contribution of waste paper to the fiber supply was much less.[56] Thus, although almost 1.6 million tons of waste paper were recycled in 1989, the fiber replaced was only the equivalent of 1.1 million tons of pulp. While 6.5 million tons of paper and paperboard were consumed in 1989, actual production amounted to 8.5 million tons, thus showing waste paper contributing some 12 percent of the raw material supply.[57] While accounting for a small share of the overall fiber supply, waste paper did account for almost 15 percent of the fiber consumed in the paper and paperboard manufacture.

By 1992, the fiber supply had declined in parallel with the decline in general economic activity, amounting in total to 368 million cubic meters of roundwood equivalents (**Figure 2.12**). Roundwood accounted for almost 90 percent of the total, or 327 million cubic meters, while by-product wood chips accounted for 39 million cubic meters (31 million of which were consumed), and waste paper for between three million and four million cubic meters on a roundwood equivalent basis. The contribution by imported fibre was negligible.

After accounting for the losses in harvesting and transit losses, only two-thirds of the roundwood harvested, or 213 million cubic meters were available for distribution to commercial uses.[58] Commercial logs continued to dominate the supply of commercial wood fibre, accounting for almost 85

Footnotes

[56]This is due to two factors. First, the actual output of paper products is greater than that consumed since Russia has been a net exporter of paper products. Consequently, the denominator over which the waste paper supply is compared is higher. Second, (Kasparov, R.R. 1979, p. 20) suggests that one ton of utilized waste paper provides only 750 kg. of paper product. Accordingly, the contribution to the raw material supply, when translated into pulp equivalents is less.

[57]As a conservative position, each ton of paper is assumed to require 1.1 tons of pulp.

[58]Commercial roundwood, excluding chips manufactured for the pulp and paper sector and roundwood consumed in whole tree length form, amounted to 183 million cubic meters (*Goskomstat Rossii* 1993c, p. 238). Factoring in the whole tree length consumption and the chips for the pulp and paper sector translated into roundwood equivalents produces 194 million cubic meters of commercial wood fibre from the forest resource (*Goskomstat Rossii* 1993c, p. 239). An additional 19 million cubic meters of commercial wood fibre is believed to have been actually generated, but not recorded by the *Goskomstat* data collection system. Together, the 194 million cubic meters of commercial wood and the 19 million cubic meters of unrecorded but estimated to have been produced commercial wood make up the 213 million cubic meters of commercial wood fibre generated from the forest resource.

percent of the total, or an estimated 178 million cubic meters.[59] The balance of some 35 million cubic meters consists of lower grade wood material suitable for consumption primarily in the reconstituted wood product manufacturing industries.

Lumber and plywood production continued to dominate the consumption of the commercial log supply accounting for one-half, or some 90 million cubic meters (**Figure 2.13**).[60] After factoring out the 17 million cubic meters of commercial logs exported, some 70 million cubic meters remained for use along with the 35 million cubic meters of lower grade wood fibre and 39 million cubic meters of by-product wood chips in the other wood demanding sectors.[61]

Of the residual wood fibre pool of 144 million cubic meters in roundwood equivalents, some 8 million were not consumed. Translating the pool into fibre equivalents and subtracting out the unused by-product chip supply shows a balance of 117 million cubic meters available for uses other than the output of lumber and plywood and exportable in the unmanufactured form.

Evident from **Figure 2.14**, the consumption in other uses climbed from 55 percent of the residual pool in 1989 to 65 percent in 1992, or 75 million cubic meters, largely due to the allocation of the unrecorded commercial harvest to these uses. Consumption in the production of pulp and paper products accounted for about one-quarter of the pool, or 31 million cubic meters, while the production of reconstituted panel products consumed the balance of 11 million cubic meters, or slightly less than 10 percent.

Footnotes

[59]The volume of commercial logs included in with the commercial wood fibre generated from the forest resource according to published *Goskomstat* sources amounts to 164 million cubic meters (*Goskomstat Rossii* 1993c, p. 239). Applying the 85 percent ratio to the 19 million cubic meters of unrecorded commercial wood generates an additional 16 million cubic meters to yield the 183 million number. However, due to changing contribution shares from each of the four regions identified in this report, the actual adjustment figure employed was slightly smaller, estimated to have been 14 million cubic meters.

[60]The share of the commercial log supply based on published *Goskomstat* data sources amounts to 55 percent, or 90 million cubic meters of 164 million cubic meters. While the lumber output probably was higher than the recorded amount of 53 million cubic meters, reflecting the increasing porousness of the *Goskomstat* data collection system, no attempt was made to adjust the consumption of wood material for each manufacturing sector.

[61]The export of unprocessed logs, due to the sharp declines in exports to republics other than Russia, accounted for a smaller share of the commercial log supply than in 1989 (9 percent versus 16 percent).

Evident from **Figure 2.15**, only one-quarter of the paper and paperboard consumed in Russia was available for recycling, down from the one-third evident in 1989. While the share of paper products consumed available for re-cycling declined, the share actually consumed was only marginally less due to the higher utilization rate of the available waste paper supply. While the share of consumed paper products actually recycled remained marginally lower, the contribution to the raw material supply consumed in the manufacture of paper products declined to less than 10 percent (**Figure 2.16**).

The decline evident between 1989 and 1992 continued into 1993, with total fibre supply amounting to some 283 million cubic meters in roundwood equivalents (**Figure 2.12**). Roundwood generated through the harvesting process amounted to 251 million cubic meters, while by-product wood chips represented 29 million cubic meters, and waste paper to some 3 million cubic meters. Contributions by imported fibre were negligible.

After accounting for losses in transit and the firewood component, only 166 million cubic meters of commercial wood fibre directly from the forest resource were believed available for distribution to the competing uses. Commercial logs accounted for the largest share, representing 138 million cubic meters with the balance of 28 million cubic meters accounted for by lower grade roundwood and roundwood consumed in whole tree length form.

Shown in **Figure 2.13**, lumber and plywood production accounted for the largest share of the commercial log supply, consuming an estimated 67 million cubic meters, or 48 percent of the available supply, while export of unmanufactured logs amounted to 14 million cubic meters, or 10 percent of the supply. Some 58 million cubic meters of commercial logs along with 29 million cubic meters of by-product wood chips (20 million of which were consumed) and 24 million cubic meters of lower grade fibre remained for distribution to the other uses. In total, the residual pool of wood fibre amounted to 111 million cubic meters in roundwood equivalents.

Translating the residual pool into fibre equivalents and removing the volume of unutilized material shows a balance of 88 million cubic meters available for distribution to uses other than lumber and plywood manufacture and the

export in unmanufactured form (**Figure 2.14**). Smaller declines in the production of panel products relative to other uses resulted in a higher share of the remaining fibre being consumed in the production of reconstituted panels, 11 percent or 10 million cubic meters. While pulp manufacture still accounted for a similar share of the remaining fibre (one-quarter or 24 million cubic meters), consumption by other commercial uses accounted for a slightly smaller share, three-fifths, or 54 million cubic meters.

During 1993, waste paper available for use rose from one-quarter to almost 30 percent of the consumed paper and paperboard (**Figure 2.15**). Although actual consumption declined marginally to 800 thousand tons, some 10 percent less than in 1992, due to more rapid decline in paper and paperboard consumption, recycled waste paper represented 25 percent of the estimated paper and paperboard consumed and 12 percent of the fibre supply (**Figure 2.16**).

2.3.2 Forest product utilization

Russia has been a major producer of forest products. While also a major consumer of its own production, it has exported a significant share to the other republics of the former USSR, and to markets beyond the borders of the former USSR. Since 1989, the production of forest products has fallen steadily, and in many cases by factors of up to 40 percent. However, domestic consumption has fallen less measurably as exports of products to foreign markets plummeted in response to rising transportation costs and fragmented economies.

Shown in **Figures 2.17** through **Figures 2.21**, Russia has accounted for 82 million cubic meters of lumber, 8.8 million cubic meter of reconstituted panel products, 10 million tons of pulp, and 8.5 million tons of paper and paperboard. Almost one-quarter of the lumber (18 million cubic meters) and paper and paperboard production (2 million tons) were exported. Almost 20 percent of the pulp (1.9 million tons) and 20 percent of the panel production (2 million cubic meters) were consumed outside the boundaries of Russia.

Translating the exported products into the roundwood fiber consumed and adding to the unmanufactured roundwood exported underscores the degree to which harvesting sector relied on export markets (**Figure 2.22**). While direct log exports accounted for 12 percent of commercial fibre production,

log exports in manufactured form represented another 15 percent. Thus, of the nearly 300 million cubic meters of commercial fiber, some 80 million were exported.[62,63]

By 1992, output of manufactured products had fallen. Lumber output amounted to 53 million cubic meters, 65 percent of the level in 1989, while pulp output had declined by only 30 percent from 10.2 million tons to 7.1 million tons. Paper and paperboard production declined by a similar ratio as that experienced by lumber, collectively falling from 8.5 million tons in 1989 to 5.8 million tons by 1992. Panel production, interestingly, declined by a smaller share than the other manufactured products, falling by only 18 percent from 8.8 million cubic meters to 7.2 million cubic meters.

While output declined in 1992, exports to the other republics and beyond borders of the former USSR plummeted. It was not only the export of roundwood which showed steep declines (39 million to 17 million), but lumber exports also collapsed to levels only 40 percent of those present in 1989 (7.9 million cubic meters in 1992 versus almost 18 million cubic meters in 1989).[64] Export of panel products fell marginally less to levels almost 50 percent of the 1989 volume (880 thousand cubic meters versus 1.9 million cubic meters in 1989), accounting for 12 percent of output. Exports of pulp and paper products declined much less representing 60 percent and 85 percent of those attained in 1989. By 1992, export of wood fiber amounted to 41 million cubic meters, or only one-fifth of the commercial wood fiber supply versus the more than 25 percent evident in 1989.[65] Roundwood exports, while declining in importance, still accounted for 37 percent of the total exported volume, down from 43 percent evident in 1989.

Footnotes

[62]Summed together nearly 82 million cubic meters of chip equivalents were exported.

[63]Roundwood exports amounted to 39 million cubic meters which when translated into chip equivalents amounted to nearly 36 million cubic meters. Lumber exports of 18 million cubic meters represented 28 million cubic meters of logs or almost 26 million cubic meters on a chip equivalent bases. Panel products accounted for 3 million cubic meters on a fibre equivalent basis (1.9 million cubic meter panel exports). While pulp exports of 1.9 million tons represented 9 million cubic meters. The two million tons of paper and paper board exports, after accounting for the consumption of waste paper, represented nearly 8 million cubic meters of chip material.

[64]Total exports of lumber in 1989 are taken from (*VNIPIEllesprom* 1991a p. 177). Exports for 1992 are a composite figure based on (*Goskomstat Rossii* 1993d, p. 46-47) and unpublished data from *Roslesprom.*

[65]A total of 16.85 million cubic meters of logs were exported representing 15.3 million cubic meters of wood fiber. Lumber exports accounted for 11.4 million cubic meters of wood fiber while panel exports amounted to 1.4 million cubic meters on a fiber equivalent basis. The pulp exports represented 7.1 million cubic meters while paper and paperboard experts accounted for 6.6 million cubic meters.

The decline in output of forest products continued into 1993 as lumber production fell another 25 percent to 40 million cubic meters. Pulp output continued to decline, falling by 23 percent from 7.1 million tons to 5.5 million tons. Paper and paperboard output fell by a similar ratio from 5.7 million tons to 4.5 million tons. Production of reconstituted panel products continued to fall at a slower rate than other products, declining by only 13 percent from 7.2 million cubic meters to 6.3 million cubic meters.

Trade in forest products continued the decline, although at a slower rate than evident up to 1992. While log exports fell marginally from 17 million cubic meters to 14 million cubic meters (9 percent of output in 1992 versus 10 percent in 1993), lumber exports fell from 7.9 million cubic meters to 5.1 million cubic meters (15 percent of output in 1992 versus 13 percent in 1993). While difficult to estimate, exports of paper and paperboard also declined from 1.8 million tons to 1.4 million tons though the share exported seemed to have remained the same at almost one-third. Similarly, exports of pulp declined from 1.5 million tons to 1.1 million tons in 1993. Despite the overall decline in physical volumes, exports still accounted for almost 20 percent of the commercial fibre supply, with roundwood exports accounting for two-fifths of the total exported volume.

2.4 Forest Product Trade

Russia has relied on trade with other republics of the former USSR, considered the near abroad, and countries beyond the borders of the former Soviet Union (the far abroad) to augment domestic demand for products generated by the forest sector. However **Figure 2.23** suggests that although increasing in importance as an export market between 1989 and 1992, between 1992 and 1993 the importance of markets in the other republics was starting to ebb.[66] Restructuring of the centrally planned system was having a telling effect on the degree to which markets in the other republics contribute to exports.

Footnotes

[66]The increasing relative importance of the markets in the other republics between 1989 and 1992 was driven by the collapse of the trading regime between countries in East Europe and the former Soviet Union.

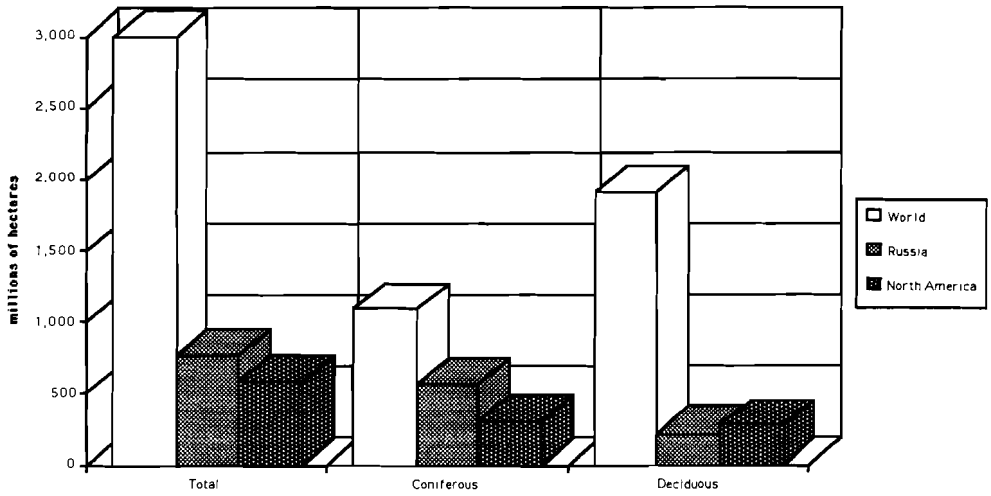
Almost 30 percent of domestic output in the forest sector relied to one degree or another on export markets in 1989.[67] By 1992, however, while still accounting for a significant share of forest sector activity, export markets were responsible for only 20 percent of forest sector activity. Exports to the non-Russian republics of the former Soviet Union, while decreasing in physical terms, maintained their relative importance in 1992, accounting for almost 60 percent of the trade on a fibre equivalent basis. By 1993, however, sharp declines in the export volumes to the near abroad contributed to their eroding importance as their imports represented only one-third of total volume of wood fibre exported by Russia.

Figure 2.24 through **Figure 2.28** provide an appreciation of the changing volumes of exports by individual product, confirming the falling contribution which the near abroad is making to the prosperity of the Russian forest sector. In 1993, shipments of commercial roundwood amounted to only 2.9 million cubic meters versus 6.4 million cubic meters in 1992, lumber to less than 1.9 million cubic meters versus 4.4 million cubic meters in 1992, pulp exports to 231 thousand tons versus an estimated 1.1 million tons in 1992, and paper product exports to an estimated 660 thousand tons, down from 1.3 million tons in 1992. Such steep declines have not been matched by decreases in exports to foreign markets not belonging to the former Soviet Union.

Footnotes

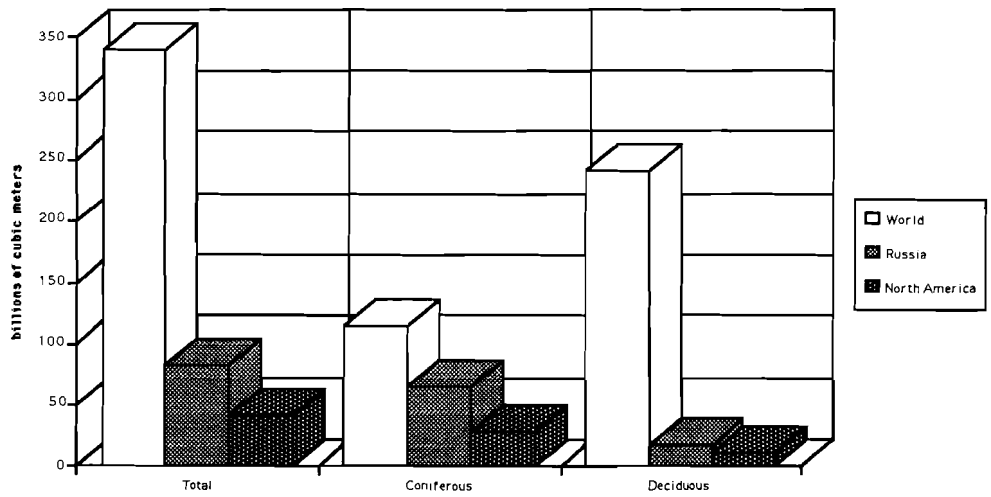
[67] A measure of the industrial activity in the forest sector is the total fiber consumed during the process of producing domestic output plus the volume of the imported forest products translated into fiber equivalents. For Russia, since it has been an importer of limited significance, total activity has been defined by the domestic fiber supply. In 1989, the total fiber consumed by the forest sector, including net imports, amounted to an estimated 308 million cubic meters on a fiber equivalent basis. The total fiber exported consisted of the sum of each of the products exported translated into their fiber equivalents. In the case of commercial roundwood, the translation factor employed is 0.9 cubic meters of wood fiber material per one cubic meter of commercial roundwood. Lumber exports were translated into fiber equivalents assuming that one cubic meter of lumber is produced from 1.6 cubic meters of roundwood. The roundwood in turn is translated into fiber equivalents using the of 0.9 factor. The panel exports are translated into fiber equivalents assuming that the average wood fiber requirements for fiberboard (7.9 cubic meters per 1,000 square meters) and particleboard (1.75 cubic meters per one cubic meter of output), weighted by their production, can be applied to the exported volume. The export of pulp products are translated into fiber equivalents assuming that only chemical pulp has been exported. The fiber equivalent of one ton of chemical pulp is 4.85 cubic meters of wood fiber. The export of paper and paperboard products have been translated into fiber equivalents based on the fiber requirements of mechanical pulp (2.58 cubic meters of wood fiber per one ton of pulp) and chemical pulp (4.85 cubic meters of wood fiber per one ton of pulp) weighted by production of each type of pulp. The weighted average figure so derived has been adjusted to reflect the conversion ratio of 1.1 tons of pulp per one ton of paper products produced. The waste paper component has been assumed equivalent to the weighted average wood fiber requirements of pulp reduced to reflect the equivalence of one ton of waste paper to only 0.75 tons of pulp.

FIGURE 2.1: WORLD and REGIONS - Stocked forest land



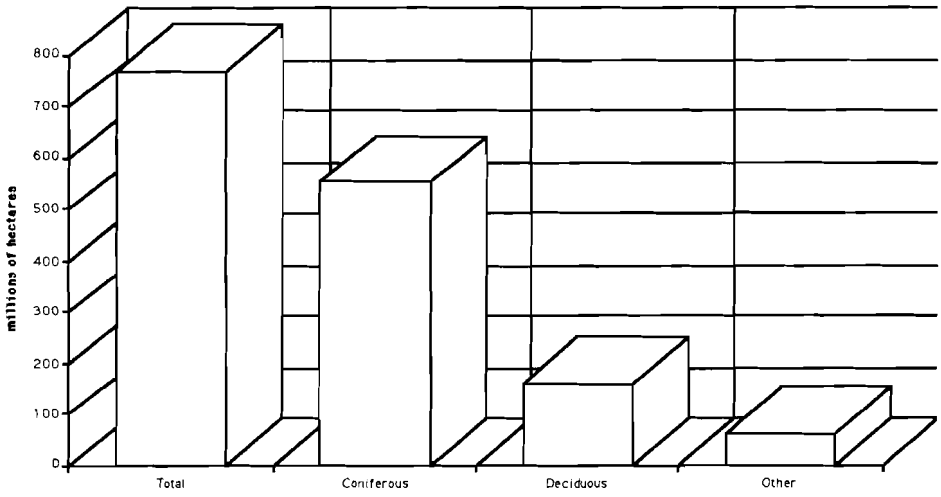
Source: Backman (1994b)

FIGURE 2.2: WORLD and REGIONS - Growing stock



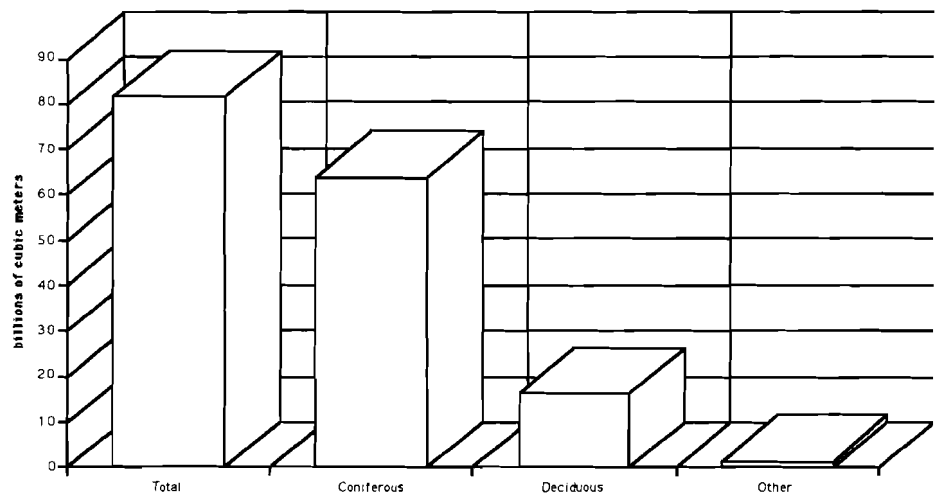
Source: Backman (1994b)

FIGURE 2.3: RUSSIA - Stocked forest land



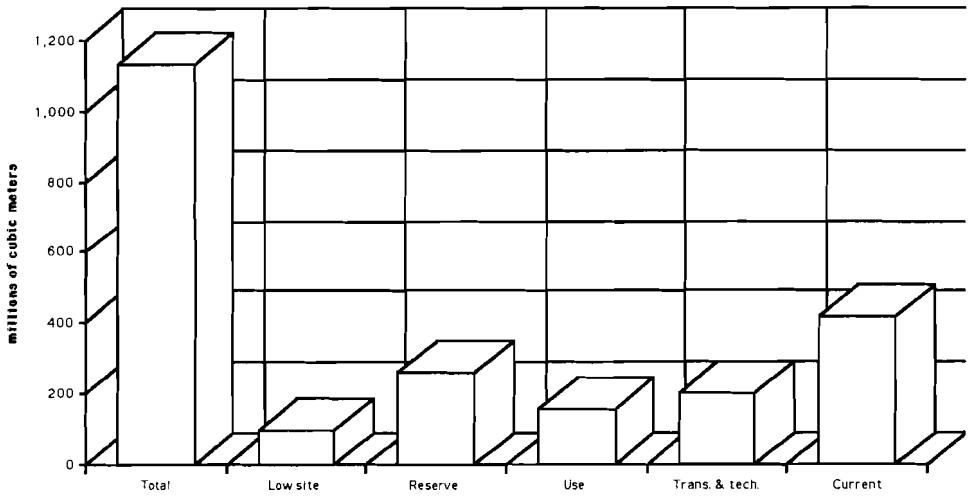
Source: Backman (1994b)

FIGURE 2.4: RUSSIA - Growing stock



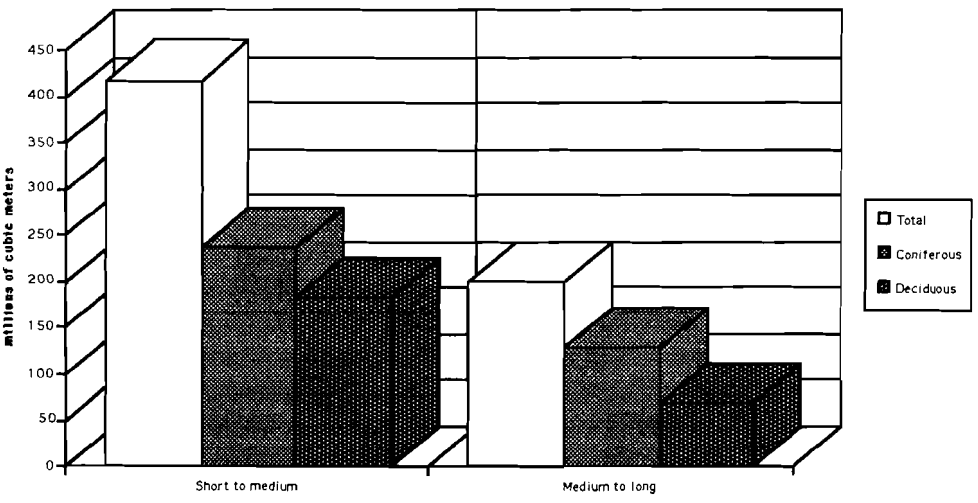
Source: Backman (1994b)

FIGURE 2.5: RUSSIA - Estimated annual growth of forest resources



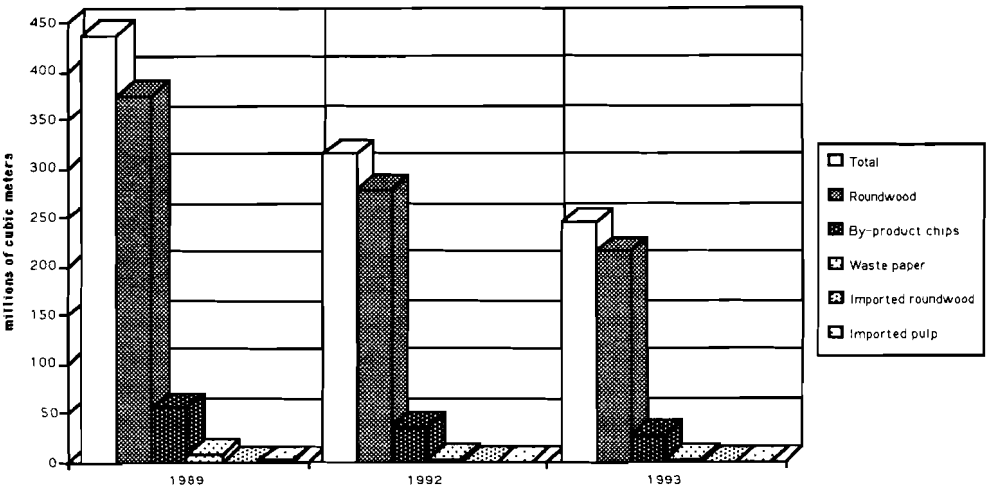
Source: C.A. Backman, Backman (1994b)

FIGURE 2.6: RUSSIA - Estimated maximum annual accessible fiber



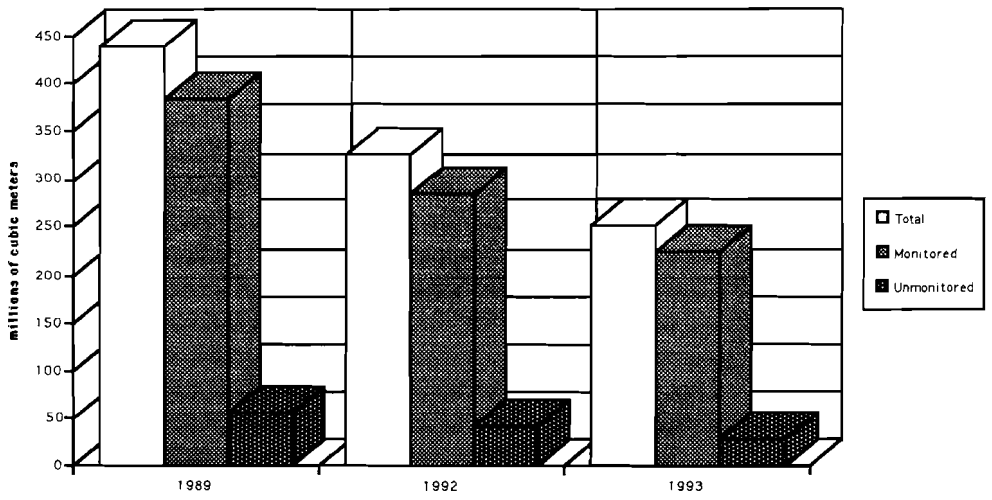
Source: Backman (1994b), C.A. Backman

FIGURE 2.7: RUSSIA - Estimated fiber supply in wood chip equivalents



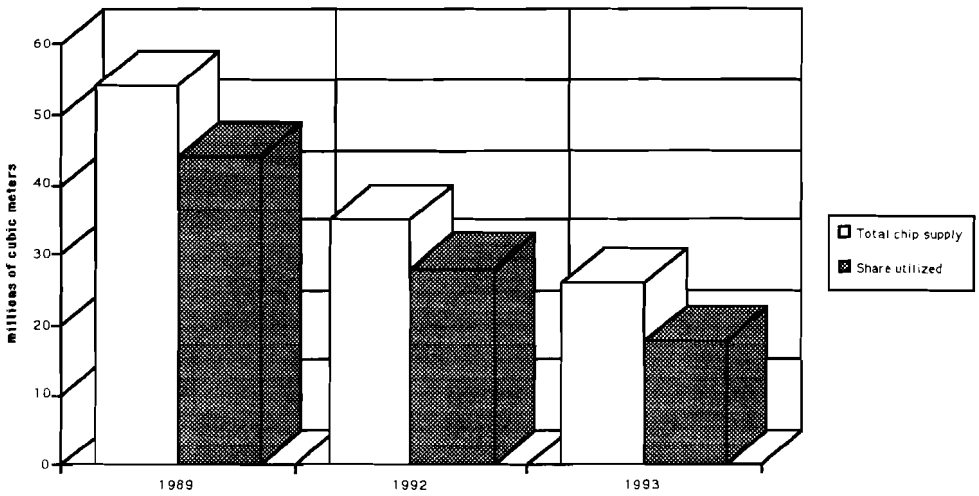
Source: C. A. Backman

FIGURE 2.8: RUSSIA - Estimated total harvest from forest resource



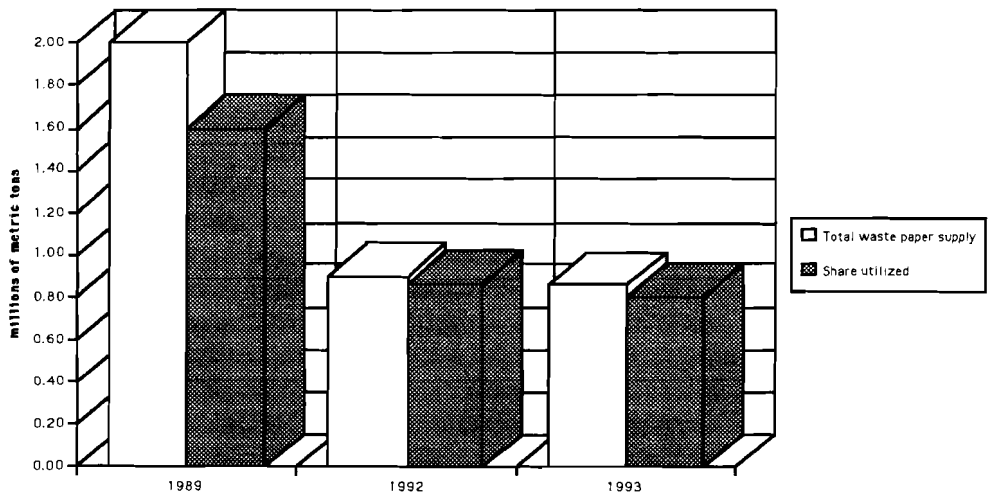
Source: C.A. Backman

FIGURE 2.9: RUSSIA - Estimated by-product chip supply and share utilized



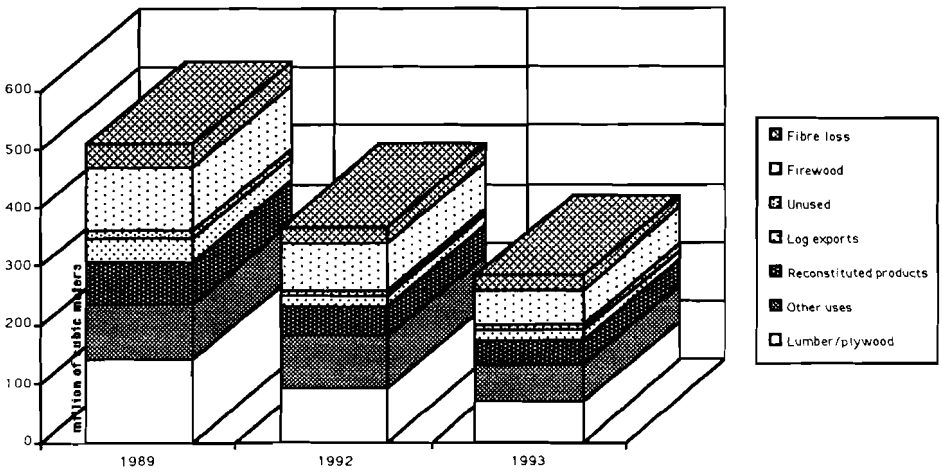
Source: C.A. Backman, Goskomstat (1994a)

FIGURE 2.10: RUSSIA - Estimated waste paper supply and share utilized



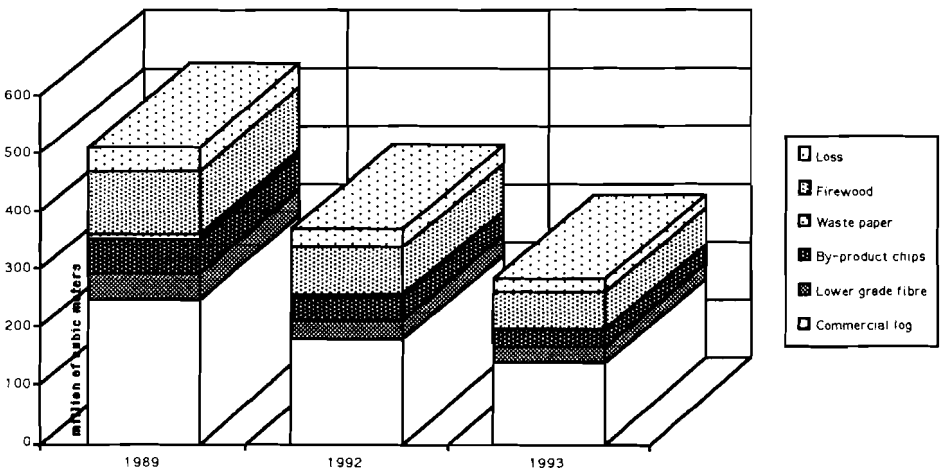
Source: VNIPIEillesprom (1991), Goskomstat (1994a)

FIGURE 2.11: RUSSIA - Estimated distribution of fibre supply among uses in roundwood equivalents



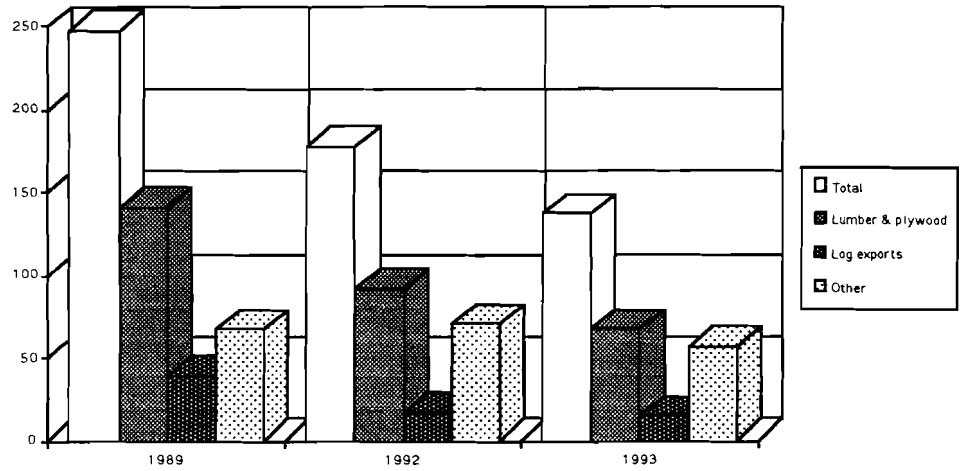
Source: C.A. Backman

FIGURE 2.12: RUSSIA - Estimated contribution to fibre supply by the components in roundwood equivalents



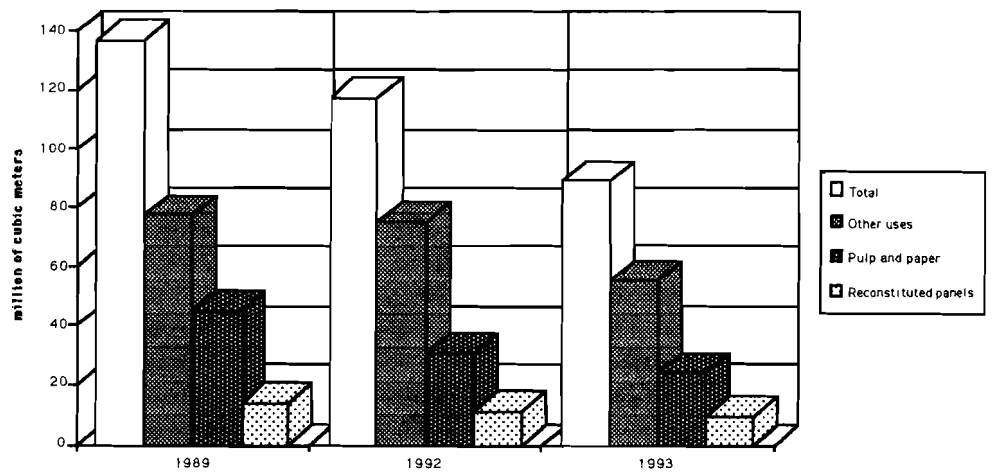
Source: C.A. Backman

FIGURE 2.13: RUSSIA - Estimated distribution of commercial log supply among uses in roundwood equivalents



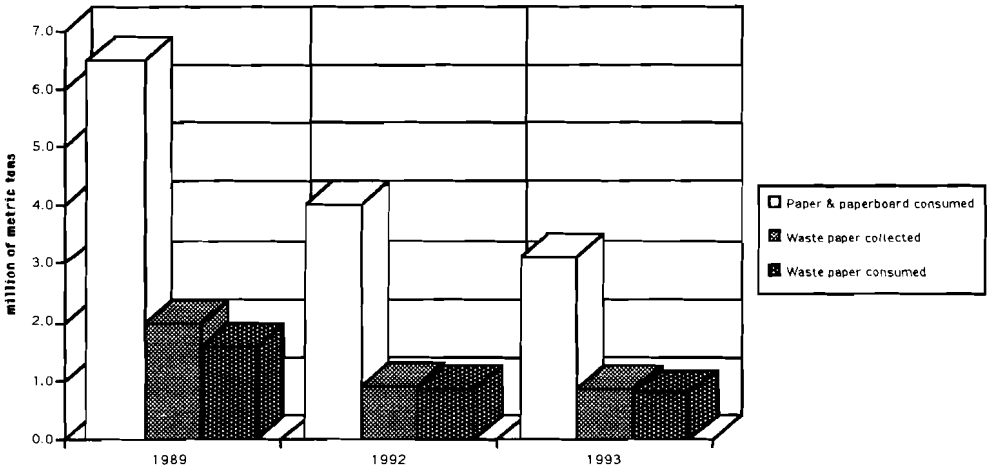
Source: C.A. Backman

FIGURE 2.14: RUSSIA - Estimated distribution of residual wood fibre supply among uses in fibre equivalents



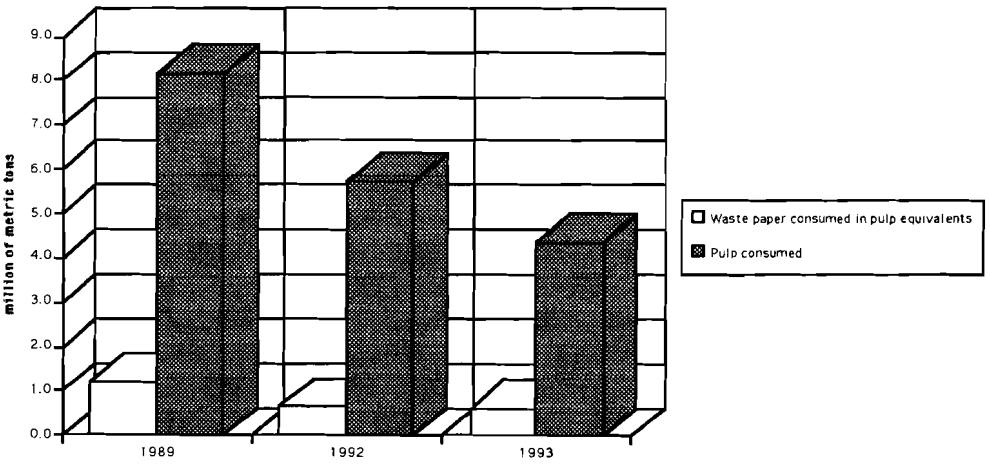
Source: C.A. Backman

FIGURE 2.15: RUSSIA - Consumption of paper and paperboard, share available to be recycled, and share recycled



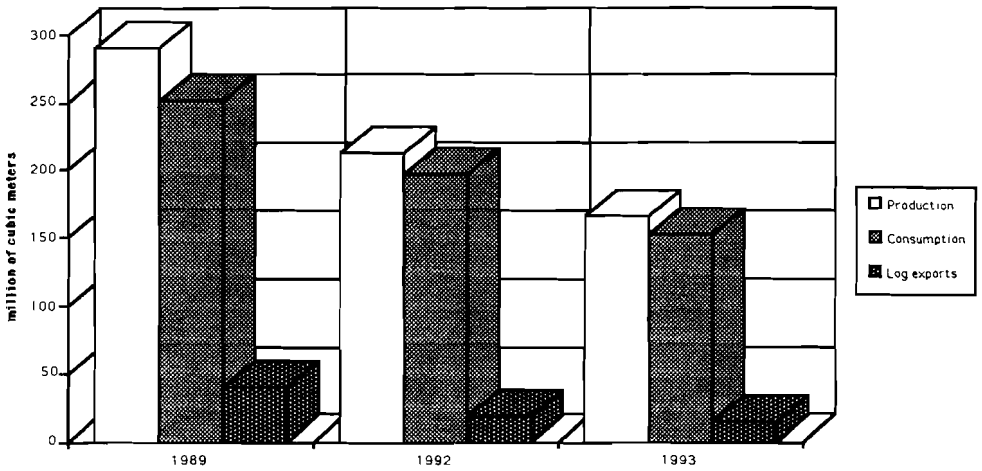
Source: C.A. Backman, Goskomstat (1994a), VNIPIEltlesprom (1991)

FIGURE 2.16: RUSSIA - Estimated raw material supply in the production of paper and paperboard



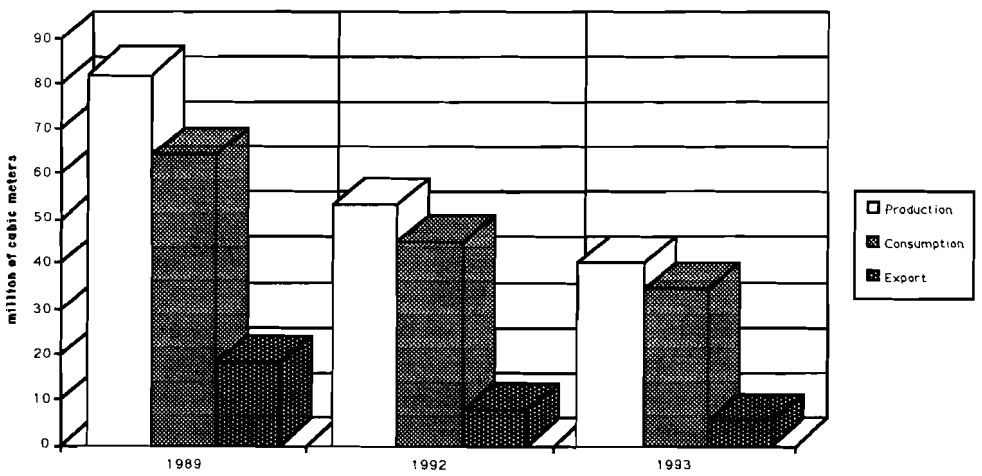
Source: C.A. Backman

FIGURE 2.17: RUSSIA - Estimated commercial roundwood supply, share consumed domestically, and share exported



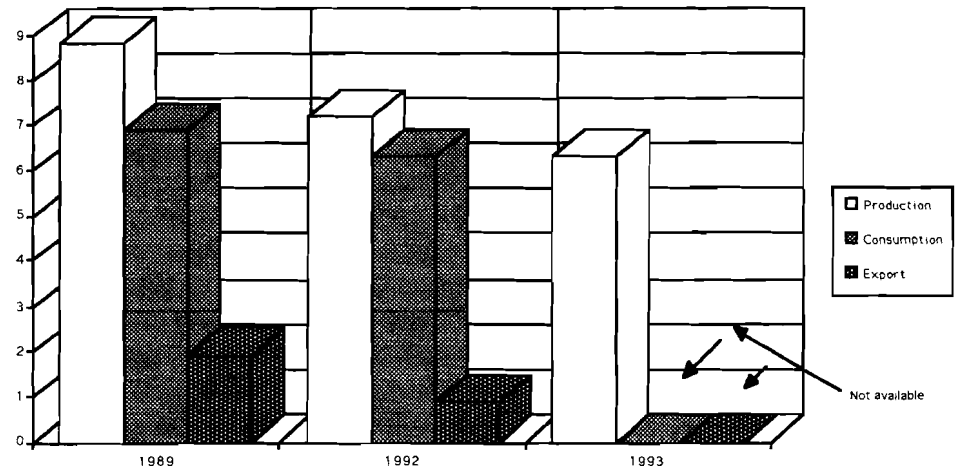
Source: C.A. Backman, VNIPIEIllesprom (1991)

FIGURE 2.18: RUSSIA - Estimated lumber supply, share consumed domestically, and share exported



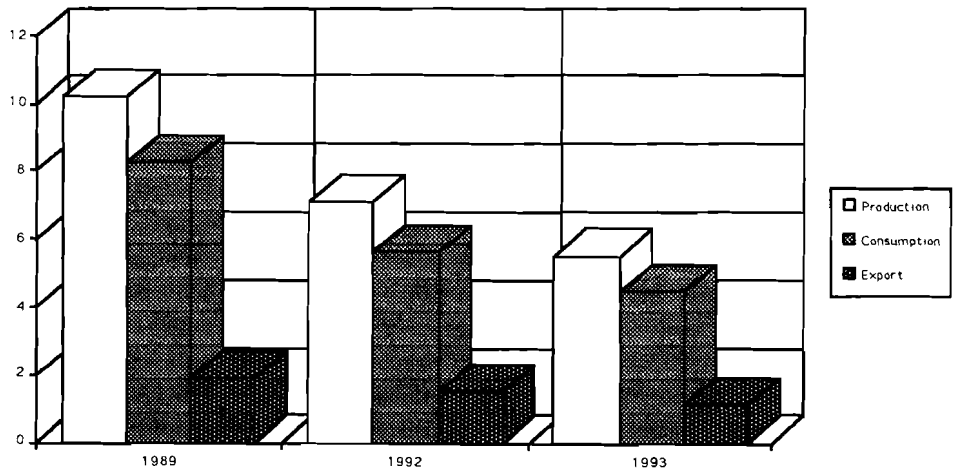
Source: C.A. Backman, VNIPIEIllesprom (1991), Goskomstat (1994a)

FIGURE 2.19: RUSSIA - Estimated reconstituted panel supply, share consumed domestically, and share exported



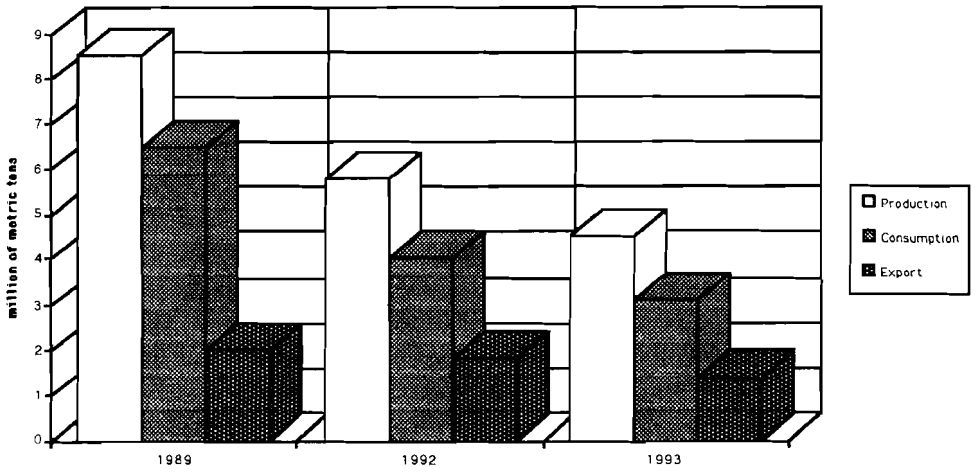
Source: C.A. Backman

FIGURE 2.20: RUSSIA - Estimated pulp supply, share consumed domestically, and share exported



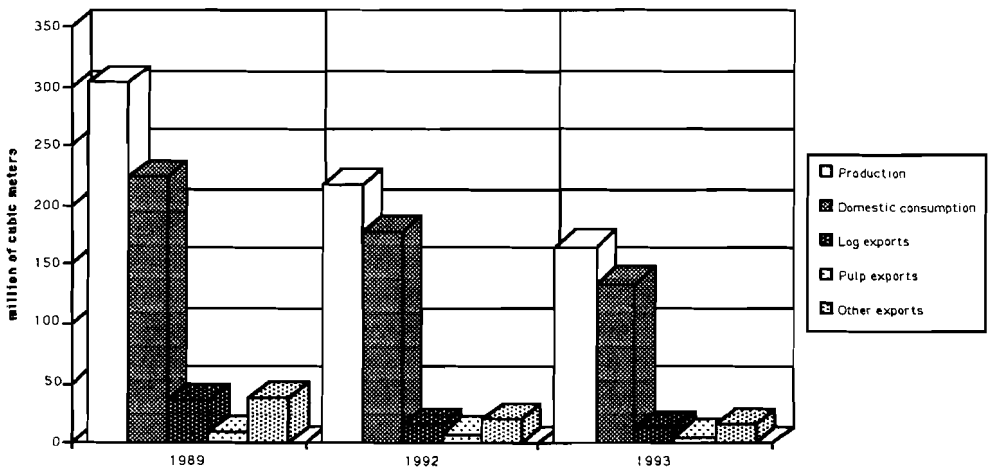
Source: C.A. Backman, VNIPIEIllesprom (1991)

FIGURE 2.21: RUSSIA - Estimated paper & paperboard supply, share consumed domestically, and share exported



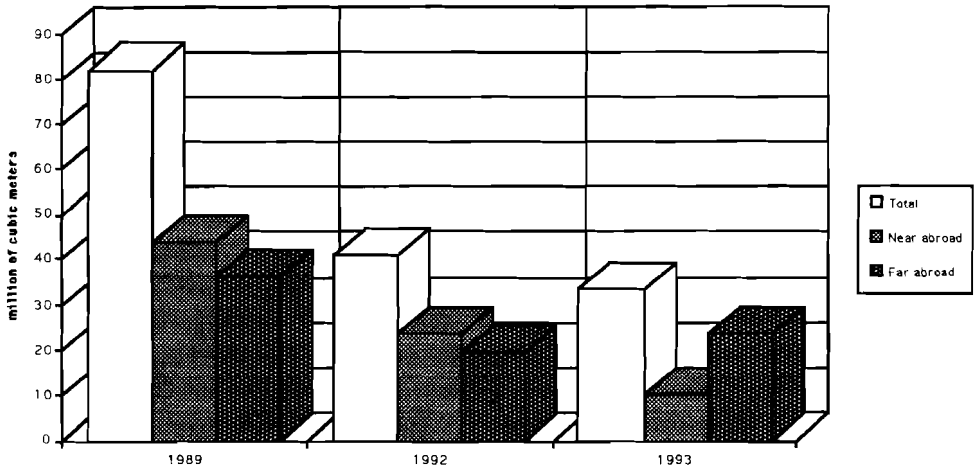
Source: C.A. Backman, Goskomstat (1994a), VNIPIEllesprom (1991)

FIGURE 2.22: RUSSIA - Estimated fibre supply, share consumed domestically, and share exported according to product in fibre equivalents



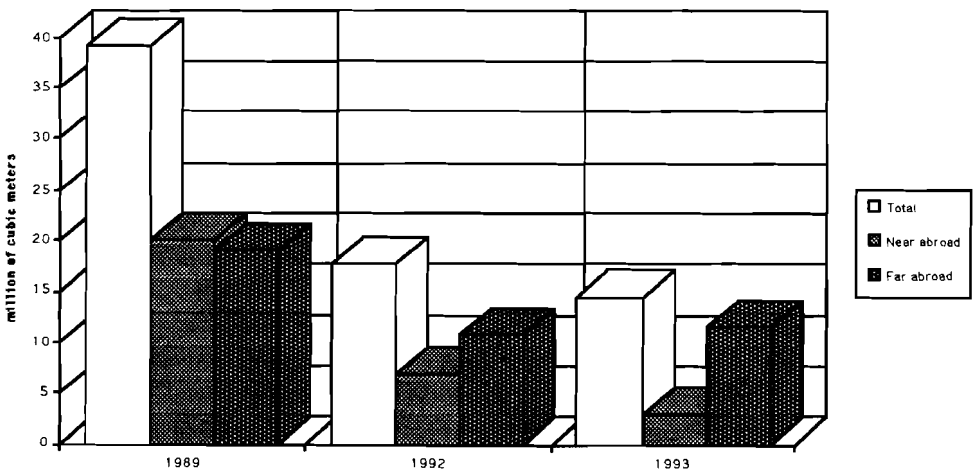
Source: C.A. Backman

FIGURE 2.23: RUSSIA - Estimated total fibre export, share consumed domestically, and share exported according to destination in fibre equivalents



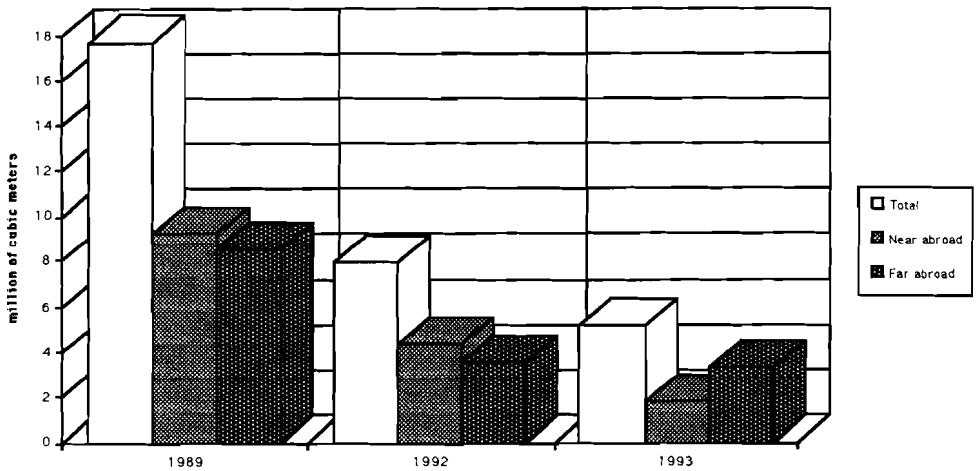
Source: C.A. Backman

FIGURE 2.24: RUSSIA - Estimated commercial roundwood export, share consumed domestically, and share exported according to destination



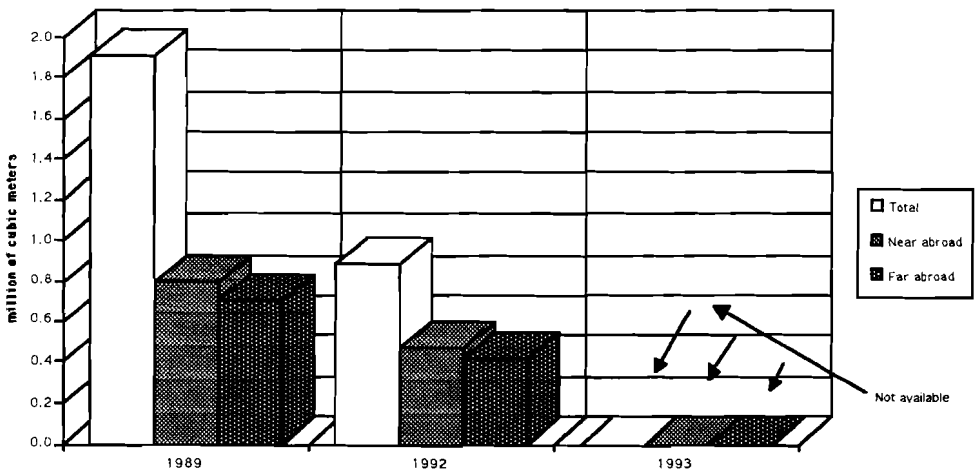
Source: C.A. Backman, Goskomstat (1993e, 1994b), VNIPIEllesprom (1991), Zausaev (1994), Goskomstat SNG (1994)

FIGURE 2.25: RUSSIA - Estimated lumber export, share consumed domestically, and share exported according to destination



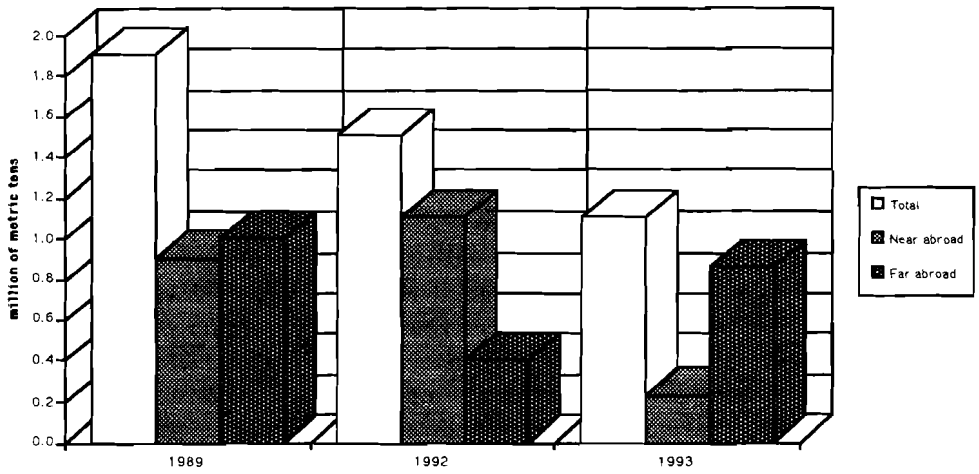
Source: C.A. Backman, Goskomstat (1993e, 1994b), VNIPIEillesprom (1991), Zausaev (1994), Goskomstat SNG (1994)

FIGURE 2.26: RUSSIA - Estimated reconstituted panel export, and share exported according to destination



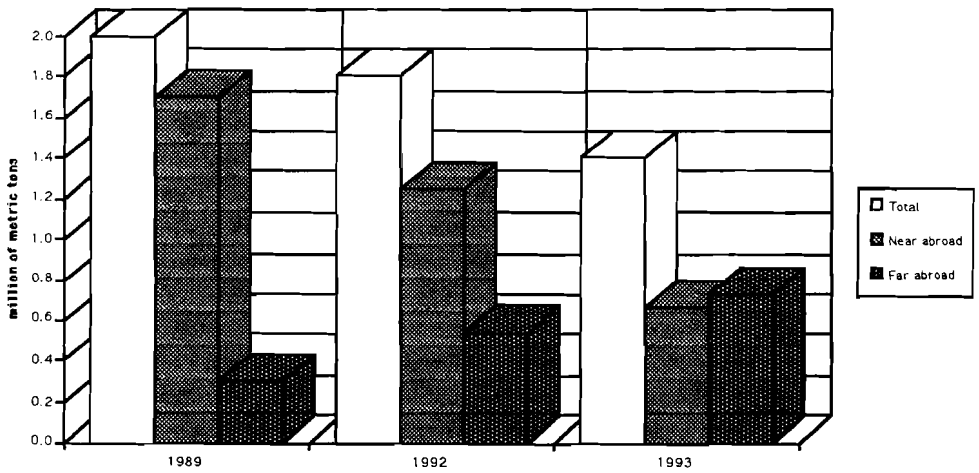
Source: C.A. Backman

FIGURE 2.27: RUSSIA - Estimated pulp export, share consumed domestically, and share exported according to destination



Source: C.A. Backman, Goskomstat (1993e,1994b), VNIPIEIllesprom (1991), Goskomstat SNG (1994)

FIGURE 2.28: RUSSIA - Estimated paper and paper board export, share consumed domestically, and share exported according to destination



Source: C.A. Backman, Goskomstat (1990c)

3.0 EUROPEAN RUSSIA

Section **3.1 FOREST RESOURCES**, affords an appreciation of the total resource, and the degree to which that resource can support a flow of fiber. Section **3.2 FIBRE SUPPLY** provides an indication of the extent to which the forest resources have been utilized. It also reveals the degree to which the fiber supply has been augmented by utilization of by-product wood chips and consumption of waste paper. Section **3.3 FOREST SECTOR ACTIVITY** illuminates manufacturing and consumption activities providing an indication of the degree to which markets external to European Russia have influenced production possibilities domestically.

3.1 Forest Resources

The forest resources in European Russia are placed in a Russian perspective followed by a description of the existing inventory and the extent to which it supports annual growth. An estimate of the degree to which the potential of the resource to support harvest must be modified is then presented.

3.1.1 The Russian Perspective

The European Russian Region (**Map A**) 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 (**Figure 3.1** and **Figure 3.2**).

3.1.2 The Wood Basket

Shown in **Figure 3.3** and **Figure 3.4**, the coniferous resource, accounting for more than 60 percent of the forested land and two-thirds of volume in European Russia, amounted to 103 million hectares of stocked forest land and 13.9 billion cubic meters of growing stock. The deciduous resource of 7.2 billion cubic meters is supported on 62 million hectares. The balance of less than 300 thousand hectares (negligible percent) and 21 million cubic

meters (negligible percent) consists of species which do not contribute a significant share of the aggregated inventory.

Although the forests of European Russia can be credited with annual growth of almost 350 million cubic meters, only two-thirds is considered accessible in the short to medium and medium to long terms. Low site, reserve forest, multiple-use and access problems all conspire to limit the potential by thirty percent to 225 million cubic meters in the short to medium term. Adding the 21 million cubic meters of annual harvest possibly available in the medium to long term provides some 246 million cubic meters potentially available.

3.1.2.1 Growth Potential

Shown in **Figure 3.5**, the currently accessible forest amounts to 225 million cubic meters, two-thirds of the estimated total potential of 352 million cubic meters. When the 21 million cubic meters which depends on additions of technology or infrastructural development is considered, nearly 70 percent of the estimated growth of the European forests appears to be available to the forest sector.[68] Low site forests and reserve forests account for 16 million cubic meters and 23 million cubic meters respectively, while the largest withdrawal is linked to multiple use factors.[69] This category accounts for 67 million cubic meters, or almost one-fifth of the total estimated growth potential of the European forest.[70]

Thus, in the short to medium term, the maximum fiber available to the forest sector amounts to some 225 million cubic meters. The concentration of net downs in the coniferous resource helps to explain the relatively lower share

Footnotes

[68]The quantity linked to additions of technology or infrastructural development comes from (Backman 1994b, p. 60).

[69]The quantity linked to low site forest is based on the total volume previous identified for Russia. The share allocated to European Russia was based on the ratio of low site lands resident in European Russia to the total low site lands for all of Russia.

The quantity located in the reserve category comes from (Backman 1994b, p. 152)

[70]This figure is derived based solely on the imputed per hectare contribution to AAC derivable for Group I forests (protection forests), Group II forests (modified industrial forests), and Group III forests (industrial forests). It was assumed that the contribution from Group III forests represented the most unrestricted of the three. Ignoring differences linked to, *inter alia*, site quality and stocking density, the difference between a contribution of the total forested land in European Russia linked to application of the Group III per hectare figure and that derived by applying the per hectare figure for each group of forest to the forested land located in each group represents the loss due to multiple use factors.

of the currently accessible resource supported by it, evident from **Figure 3.6**. Of the 225 million cubic meters, one-half, or 112 million cubic meters, flows from the coniferous forest.[71] The balance of 113 million cubic meters (50 percent) is supported by the deciduous forest.

The coniferous forest supports a slightly higher share of the resource accessible in the medium to long term, amounting to almost 55 percent of the 21 million cubic meters, or 11 million cubic meters (**Figure 3.6**). The deciduous resource supports the balance of 10 million cubic meters.

3.2 Fibre Supply

The fiber supply is composed of contributions from roundwood, wood chips and waste paper (**Figure 3.7**).[72] Translating each of these components into chip equivalents shows that nearly 260 million cubic meters were available for distribution in 1989. By 1992, the fiber supply had decreased by one-quarter to 190 million cubic meters as both domestic and foreign opportunities tumbled. By 1993, fiber supply had declined a further 21 percent to an estimated 151 million cubic meters.

Footnotes

[71]The figures presented in the text to describe the distribution of the maximum accessible fibre in the short to medium term into its coniferous and its deciduous components are slightly different from those presented in (Backman 1994b). (Backman 1994b, p. 51) shows coniferous stands contributing 109 million cubic meters while the deciduous forest contribute 116 million cubic meters. The difference between the numbers in the text and those presented in (Backman 1994b) are linked to a different paradigm applied to the contributions of the intermediate utilization and the other utilization. The contributions by each specie association in each of the two utilizations was based on the ratio evident in the principal utilization. The figures in (Backman 1994b) were based on a distribution within intermediate utilization presented in (Voreb'ev 1979, p.59).

[72]Destination of the commercial roundwood exported from Siberian and Far Eastern Russia is not precisely known. Although total exports from these regions exceeds the volume which can be linked to Pacific Rim exports from Russia, the balance could be exported to near abroad republics as well as to other regions of Russia. Additionally, a part of the log imports by the near abroad republics may and does originate from European Russia. Consequently, substitution by European Russia of imported wood from Siberia and the Far East for exported wood by it most likely has taken and does take place, thus complicating the development of the pool of fibre available for distribution within European Russia.

However, European Russia seems to have been a net exporter of roundwood in 1989 and 1992, and most likely in 1993. On account of the difficulty in determining the imports of roundwood, it is net imports or exports which are considered when developing an estimate of the fibre supply available for distribution. The introduction of this ripple to the calculation does not however compromise the overall analysis.

A similar logic is applied to the category of imported pulp.

3.2.1 Roundwood Harvest

Roundwood is the dominant component of the fiber supply accounting for more than 80 percent of the fiber in both 1989 and 1992. Consisting of contributions from the monitored system and the unmonitored system, together these sources provided 257 million cubic meters in 1989, 193 million cubic meters in 1992, and 152 million cubic meters in 1993. Nearly three-fifths of the harvest is contributed from coniferous forests with the balance flowing from the deciduous forests.[73]

The European Russian region is the major roundwood producing region of Russia, accounting for almost 60 percent of the Russian total in 1989, 1992, and 1993. In 1989, harvested wood within the monitored system accounted for 216 million cubic meters, amounting to virtually all of the sustainable levels in the short to medium term. Some 41 million cubic meters of additional harvested material appears to have contributed to the significant overharvest which is believed to have taken place in 1989. **Figure 3.8** shows the distribution of roundwood supply divided into monitored and unmonitored components.

Although harvest levels had dropped off by nearly 25 percent in 1992 to 193 million cubic meters (16 percent are estimated to be due to unmonitored harvest), and by a further 20 percent in 1993 to 152 million cubic meters (16 percent of which are credited to unmonitored harvest), pressures on the forest resource may not have necessarily eased, even though the combined harvests were less than the capacity of the forest to sustain them. While the absolute limits imposed by the resource may not have been encroached upon, there may well be regional imbalances taking place as harvesting spatially becomes more concentrated in response to increasing economic pressures.

Footnotes

[73]The share of the harvest supported by coniferous and by deciduous forests is based on the experienced derived for 1989.

3.2.2 Secondary wood fiber

Supplementing the fiber generated through the harvesting process are wood waste produced by the manufacture of wood products and waste generated in the harvested setting (**Figure 3.9**).[74] In 1989, secondary wood fibre accounted for nearly 40 million cubic meters of wood waste, 6 million of which are believed located in the harvesting settings. By 1992, the volume of waste material had declined substantially to only 26 million cubic meters, 4 million cubic meters of which is credited to the harvested areas. By 1993, wood waste declined even further to 21 million cubic meters, 3 million of which are believed located in the harvesting setting. Most of the material is thought to be coniferous material.[75]

3.2.3 Waste Paper Production

A large resident population, accounting for 78 percent of the Russian total (116 million of 148 million people), produced a sizable supply of waste paper available as a raw material in the manufacture of paper and paperboard.[76] Approximately 1.8 million metric tons of waste paper was collected in 1989, of which only 1.35 million tons, or three-quarters, were actually consumed (**Figure 3.10**).[77] By 1992, the supply had collapsed to 810 thousand tons, less than one-half of the level evident in 1989, while consumption fell marginally less so to 780 thousand tons.[78] Waste paper

Footnotes

[74]The waste linked to the harvesting process is not included when calculating the total fibre supply. It is only the by-product chip material from the manufacturing processes which has been included. The harvest waste is included in with the overall harvest figures, comprising part of the loss taking place while the roundwood is processed from the forest to the manufacturing site.

[75]Distribution of the lumber production below the USSR level of aggregation is not available. However, it was assumed for this analysis that most of the deciduous lumber credited to the USSR in 1989 (13 million cubic meters) and in 1992 (13 million cubic meters) by (FAO 1994, p.110) took place in republics other than Russia. Since European Russia accounted for 48 million cubic meters of lumber output in 1989 (*VNIPIElllesprom 1991a*, p. 131-134) and 32 million cubic meters in 1992 (*Goskomstat Rossii*, 1993c, p. 251-252) even if all of the deciduous lumber were produced in Russia, the coniferous would still be in the majority.

[76](*Goskomstat Rossii* 1993d, p. 89-93)

[77](*VNIPIElllesprom 1991a*, p. 187) identifies both supply and demand of waste paper in 1989 according to economic region within Russia, and by republic of the former USSR for the non Russia republics.

[78](*Goskomstat Rossii* 1993c, p. 195-196) provides a detailed distribution of waste paper consumed according to economic region, and then according to *oblast'*, *kray*, and other smaller administrative units. The consumption figure of 780 thousand metric tons is derived by summing of the values identified for each of the economic regions comprising European Russia.

While the total supply of waste paper is only derivable for Russia as a whole (*Goskomstat Rossii* 1994a, p. 142), the supply available for European Russia was estimated by applying the utilization factor for

footnotes *continued on next page*

supply and consumption fell marginally between 1992 and 1993 as supply amounted to an estimated 770 thousand tons and consumption to 720 thousand tons.[79]

3.2.4 Imported Roundwood

European Russia was a net exporter of roundwood in both 1989 (19 million cubic meters) and 1992 (6 million cubic meters).[80] While data is not yet available describing 1993, declining export opportunities to republics other than Russia which belonged to the USSR may well have conspired to eliminate European Russia from net exporter status.[81]

3.2.5 Imported Pulp

European Russia was a net exporter of pulp in 1989 and 1992, amounting to an estimated 400 thousand tons in each of these years.[82] Although incomplete data makes a prediction for 1993 difficult, preliminary data suggests that European Russia remained marginally a net exporter of pulp material.[83]

Footnotes *continuing from previous page*

Russia as a whole in 1992 (0.96) to the quantity consumed in 1992 (780 thousand tons) to give the 810 thousand tons presented in the text.

[79]A detailed distribution of waste paper consumption available for 1992 is not available for 1993. The level of consumption in 1993 was based on the ratio of consumption in 1992 and 1993 at a Russia level of detail multiplied by the volume consumed in 1992. The resulting figure was inflated by the utilization rate evident for all of Russia in 1993 (0.93) to determine the supply in 1993.

[80]Net flows of commercial roundwood in 1992 are based upon official *Goskomstat* data sources providing both the total commercial harvest (*vyvoz delovoy drevesiny*) and the volume actually delivered (*zavoz/postavka delovoy drevesiny*) according to one statistical source (*Goskomstat Rossii* 1993b, p. 18-19, p. 28-29). The difference between these two numbers provides a first approximation of the imports and exports by geographic unit. This figure, however, is in need of modification since the *vyvoz delovoy drevesiny* presented in (*Goskomstat Rossii* 1993b) is lower than the quantities presented in (*Goskomstat Rossii* 1993c, p. 244-250). The net flows in 1989 are based on (*VNIPIEIllesprom 1991a*, p. 173, and p. 126-130)

[81]Even should European Russia have become a net importer of wood fibre, against a fibre supply of 150 million cubic meters, imports are unlikely to have contributed a significant share, and to materially affect the analysis.

[82]Net pulp flows are determined based on the estimated raw material balance required to support the regional production of paper and paperboard. The raw material supply consists of waste paper and pulp. Since it is assumed that trade of waste paper does not occur, the difference between the estimated demand for paper and paperboard raw material less share contributed by waste paper is the quantity provided by pulp. If the production of pulp in the geographic region exceeds the pulp required, then trade outflows are assumed to have taken place. If the production of pulp is less than the quantity required, then net inflows are assumed to have taken place.

[83]Even should European Russia have become a net importer of pulp, against a fibre supply of 150 million cubic meters, imports of pulp are unlikely to have contributed a significant share, and to materially affect the analysis.

3.3 FOREST SECTOR ACTIVITY

Supported by the fiber potential, the forest sector has produced a number of products which have been available for export and domestic consumption. Focusing first on the distribution of the fiber supply among the different uses, the activity within the manufacturing sector is discussed.

3.3.1 Fiber Allocation

Fibre supply, dominated by the roundwood component, has declined since 1989 when it amounted to 302 million cubic meters on a roundwood equivalent basis. By 1992, supply had declined to 221 million cubic meters, three-quarters the level evident in 1989, before falling again, by one -fifth, to 175 million cubic meters. Evident from **Figure 3.11**, lumber and plywood are the principal consumers followed by other uses, and then manufacture of pulp and reconstituted panel products.

The roundwood component, consisting of commercial logs, lower grade fibre, firewood, and loss components, dominates fiber supply accounting for five-sixths of the total (**Figure 3.12**). However, a large part of the roundwood supply consists of non-commercial firewood and another small share is lost in transit between the harvesting site and the first point of processing. After factoring out the firewood component and the share of fiber lost in transit, which accounts for approximately one-third of the volume, the contribution by roundwood to the commercial fiber supply amounted to about 80 percent. By-product wood chips and waste paper amounted for the remainder.

Nearly 7 percent of the roundwood resource of 257 million cubic meters was lost in transit in 1989. After accounting for the firewood component, only 170 million cubic meters of commercial fibre remained for distribution to the competing uses.[84]

Footnotes

[84]The figure presented in the text is slightly higher than the number derivable from (*VNIPIEIllesprom* 1991a, p. 126-130). Included in with the category of commercial roundwood is the share contributed by the wood chips produced for the pulp and paper sector (*VNIPIEIllesprom* 1991a, p. 156-158). In order to place the wood chips on a roundwood equivalent basis, the quantity of wood chips was inflated using the factor of 0.75.

The largest share of the roundwood commercial fibre was contributed by commercial logs, which accounted for 86 percent, or 143 million cubic meters.[85] Lower grade commercial firewood amounted to 17 million cubic meters while fibre consumed in the production of chips for the pulp and paper industry accounted for 8 million cubic meters.[86]

Lumber and plywood consumed nearly 60 percent of the commercial log supply, or 83 million cubic meters (**Figure 3.13**). After considering the 20 million cubic meters of log exports (14 percent) of the commercial log supply, some 40 million cubic meters remained along with 25 million cubic meters of low grade wood material and 38 million cubic meters of wood chips.[87] Out of the total 103 million cubic meters of roundwood equivalent fibre remaining, 8 million were not consumed. Translating the residual pool of fibre, expressed in roundwood equivalents, into fibre equivalents and excluding the unutilized wood chips shows a balance of 83 million cubic meters.

Consumption in unmanufactured form and in other commercial uses accounted for one-half of the remainder (41 million cubic meters) while the pulp and paper sector accounted for more than one-third, or 30 million cubic meters. Reconstituted panel products consumed the balance of 11 million cubic meters, or 13 percent (**Figure 3.14**).

By 1992, total fibre supply had declined to 221 million cubic meters, the contribution of roundwood being 193 million cubic meters. The commercial component of roundwood amounted to 125 million cubic meters (**Figure 3.12**).[88] Commercial logs accounted for four-fifths of the commercial roundwood total (101 million cubic meters) with lower grade wood

Footnotes

[85](*VNIPIElllesprom* 1991a, p. 122-125)

[86]The quantity of lower grade wood fibre is a derived figure based on the residual after subtracting from the total commercial wood fibre the commercial log component and the wood chips produced for the pulp and paper sector adjusted for roundwood equivalency. The lower grade wood fibre includes not only the share linked to firewood grade material having a commercial use, but also the wood material consumed in tree length form by, *inter alia*, the oil and gas industries.

[87]The quantity of wood chips is expressed in terms of roundwood equivalents.

[88]Commercial fibre according to (*Goskomstat Rossii,* 1993c, p. 244-247) amounted to 116 million cubic meters including commercial logs, commercial firewood, lower grade fibre consumed in the production of chips for the pulp and paper sector, and roundwood consumed in whole tree length form. However, an additional 10 million cubic meters of commercial fibre is believed to have been made available to the forest sector, unrecorded due the increasing porousness of the data collection mechanism of *Goskomstat.*

accounting for the remaining 24 million cubic meters, or approximately one-fifth.[89,90]

Lumber and plywood production continued to dominate the consumption of the commercial log supply, accounting for 56 percent, or 56 million cubic meters (**Figure 3.13**). After factoring out the 6 million cubic meters of log exports (6 percent), some 40 million cubic meters remained along with the 24 million cubic meters of lower grade wood and 24 million cubic meters of wood chips for distribution to uses other than lumber and plywood production and export in the unmanufactured form. Out of a total remaining fibre supply of 88 million cubic meters (roundwood equivalent basis), 4 million were not utilized. Translating the remaining fibre into fibre equivalents shows a total 72 million cubic meters available for distribution to uses other than solid wood manufacture and unmanufactured export.

Shown in **Figure 3.14**, consumption in unmanufactured form and in other commercial uses accounted for almost three-fifths of the remaining fibre pool, or 41 million cubic meters. Consumption in the pulp and paper sectors accounted for the largest share of the remainder, 22 million cubic meters or 31 percent. Reconstituted panel product manufacture consumed the remainder of 9 million cubic meters, or almost 13 percent.[91]

In 1993, of a total fibre supply of 175 million cubic meters, roundwood accounted for 152 million cubic meters (**Figure 3.12**). After accounting for losses in transit and the firewood component, the commercial roundwood

Footnotes

[89]While commercial logs derivable from the (*Goskomstat Rossii,* 1993c, p. 244-247) amounted to 93 million cubic meters of 116 million cubic meters, a similar share of the unrecorded commercial volume was assumed to be of commercial log form, or 8 million cubic meters. Thus, the total estimated commercial log volume in 1992 amounted to 101 million cubic meters.

[90] The commercial log share in 1992 is based on the ratio evident in 1989, derivable from (*VNIPIEIllesprom* 1991a, p. 126-130, 122-125).

[91]Included in with the total fibre resource allocated to consumption in unmanufactured form and other commercial uses are the 10 million cubic meters (in roundwood equivalents) of commercial harvest believed available for use but not recorded by *Goskomstat.* While it is likely that the allocation of this fibre to the different commercial uses other than that category in which it has been put did in fact occur, adjustment of the production of lumber and plywood, panel products and pulp, paper and paperboard has not been done when developing the share of residual fibre allocated to the competing uses. If it had been so allocated, lumber and plywood production would have still accounted for about three-fifths of the commercial log supply while export of unmanufactured logs would have accounted for 7 percent. Consumption of the remaining fibre supply would show that one-half of the remaining fibre would have been consumed in unaltered form and in other commercial uses. The pulp and paper sector would have accounted for one-third of the supply while reconstituted panel products would have accounted for 14 percent of the residual fibre supply. These ratios are essentially unchanged from those evident in 1989.

resource available for distribution amounted to 98 million cubic meters.[92] Commercial logs accounted for the largest share of the roundwood resource (80 percent), representing almost 80 million cubic meters. Lower grade wood material accounted for the balance of 18 million cubic meters.

Lumber and plywood production continued to account for the largest share of the roundwood resource, consuming 44 million cubic meters or 55 percent of the commercial log supply (**Figure 3.13**). Assuming that exports at most amounted to 4 million cubic meters, some 32 million cubic meters of logs along with 18 million cubic meters of lower grade wood fibre and almost 20 million cubic meters of wood chips were available for consumption by uses other than solid wood manufacture and export in unmanufactured form. Out of total of 70 million cubic meters of residual fibre supply, expressed in roundwood equivalents, 7 million were not used. Translating into fibre equivalents shows a residual pool of only 55 million cubic meters actually being consumed.

Consumption in unmanufactured form and in other commercial uses accounted for one-half of the residual fibre, or 28 million cubic meters (**Figure 3.14**). Pulp and paper sectors consumed most of the remainder, accounting for 36 percent, or an estimated 19 million cubic meters. Reconstituted panel products consumed the balance of 8 million cubic meters, or an estimated 15 percent of the residual supply.[93]

European Russia accounted for the largest share of both waste paper supply and consumption, representing almost 90 percent of the Russian totals. Although a major producer of pulp, the domestically produced paper and paperboard industry still relies on waste paper as a raw material. Shown in **Figure 3.15**, waste paper supply amounted to slightly less than 40 percent

Footnotes

[92]Commercial round wood according to *Goskomstat* sources amounted to an estimated 80 million cubic meters before allowances for chips produced for the pulp sector and consumption of roundwood in whole tree length form. An additional 13 million cubic meters of commercial wood is believed to have been produced but not recorded by the *Goskomstat* system, which when added to the estimated 4 million cubic meters of lower grade wood turned into chips yields the 98 million cubic meters.

[93]The 53 million cubic meters of residual wood supply in fibre equivalents includes 13 million cubic meters of commercial fibre unrecorded by *Goskomstat*. Comparing the shares allocated to each of the three uses of the modified residual fibre supply shows that other uses accounted for only 34 percent of the total while the pulp and paper sector accounted for 46 percent of the total. Reconstituted panel products accounted for almost 20 percent. Comparing these ratios to those evident in 1989 and 1992 suggests that pulp and paper uses and consumption in the production of reconstituted panel products were becoming more important in the overall fibre demand.

of the estimated consumption of paper products (1.8 million tons), while waste paper actually consumed amounted to 1.6 million tons (1.2 million tons on a pulp equivalent basis). While representing a larger share of the paper products consumed, waste paper only accounted for 15 percent of the raw material supply consumed in the production of paper and paperboard (**Figure 3.16**). By 1992, waste paper supply had declined sharply both in terms of quantity and in terms of share of the estimated paper products consumed (25 percent). Consumption had declined to less than 800 thousand tons (less than 600 thousand tons on a pulp equivalent basis) representing only 11 percent of the raw material supply. In 1993, the share of consumed paper products actually rose to almost one-third while the contribution of waste paper to the raw material supply increased slightly to 12 percent.

3.3.2 Forest Product Utilization

European Russia has been a major producer of forest products, accounting for three-fifths of the lumber output, three-quarters of the panel output, pulp output, and paperboard output, and virtually all of the paper production of Russia. Since 1989, physical output has fallen and by 1992 varied in size from two-thirds of 1989 levels in lumber to five-sixths in panel production (**Figures 3.17** through **3.21**).

Commercial roundwood output, amounting to 170 million cubic meters in 1989, fell by one-quarter to 126 million cubic meters in 1992 (**Figure 3.17**). By 1993, output had declined further, falling by 28 million cubic meters to 98 million cubic meters. Producing 48 million cubic meters of lumber in 1989, by 1992, output had declined to only 32 million cubic meters (**Figure 3.18**). In 1993, lumber output continued its decline to 26 million cubic meters. Panel output declined from 6.8 million cubic meters to 5.6 million cubic meters and then to 5.1 million cubic meters in 1993 (**Figure 3.19**). Paper production declined more steeply from 5 million tons to only 3.4 million tons in 1992 and 2.7 million tons in 1993 while production of paperboard also declined falling from 2.3 million tons in 1989 to 1.6 million tons by 1992, and 1.3 million tons in 1993 (**Figure 3.21**). Pulp output followed the decline evident for paper products, falling from 7.4 million tons to 5.3 million tons between 1989 and 1992, before dropping off to an estimated 4.4 million tons in 1993 (**Figure 3.20**).

Producing forest products surplus to its domestic needs, European Russia has been a net export of a wide range of products, though the degree of domestic production exported has been declining. When the share of roundwood exported is considered, one-quarter of the total fiber available depended in one form or another on markets external to European Russia in 1989. Roundwood accounted for almost two-fifths of the exported fibre underscoring the importance to which unmanufactured fibre contributes to the export potential of European Russia. While share declined between 1989 and 1992, to an estimated 13 percent, roundwood continued to account for a large though diminished proportion of the overall exports (**Figure 3.22**).[94]

Roundwood exports accounted for 12 percent of output, or 20 million cubic meters in 1989 before falling to 6 million cubic meters, or 5 percent of output by 1992 (**Figure 3.17**). In 1989, nearly one-fifth of the lumber produced was destined for markets outside of European Russia (**Figure 3.18**). However, by 1992, net exports accounted for only one percent of the production. Being a major producer of panel products, European Russia apparently exported 15 percent (1.1 million cubic meters) of the output in 1989, though by 1992, this had declined to just over 10 percent of production (0.65 million cubic meters) (**Figure 3.19**).[95] European Russia has exported small quantities of pulp which in 1992 amounted to an estimated 0.4 million tons, a similar level as exported in 1989 (**Figure 3.20**). European Russia seems to be a major exporter of paper products, which accounted for 30 percent of output in 1989 and almost 40 percent in 1992 (**Figure 3.21**).[96] Data is not available to support an estimate for 1993.

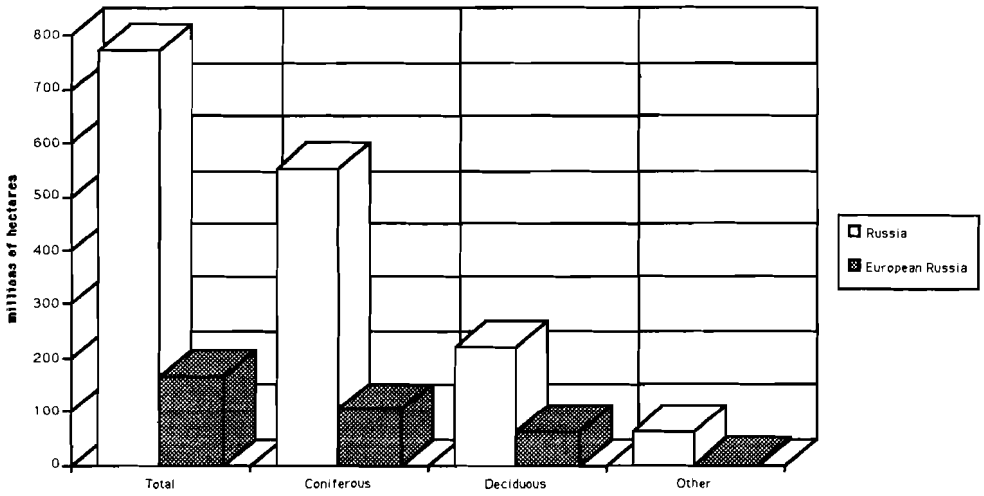
Footnotes

[94]Data is not yet available to construct trade flows of forest products at a regional level of aggregation for 1993.

[95]Data describing deliveries of panel products in a similar way as that for lumber and commercial roundwood is unavailable. The import and export of panel products was determined based on an estimated per capita consumption of panel products derived for Russia as a whole. The per capita consumption figure determined for Russia was then applied to the regions using the regional population figures.

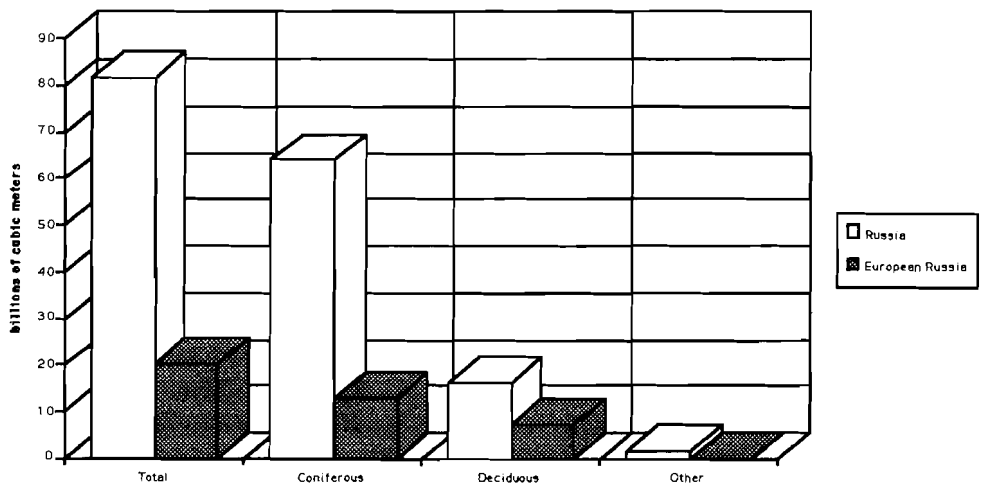
[96]Regional trade of paper products is based on estimated regional consumption and actual production. The estimated consumption is based on the average per capita consumption derivable at a national level and applied to each region through multiplying by the regional population.

FIGURE 3.1: RUSSIA and EUROPEAN RUSSIA - Stocked forest land



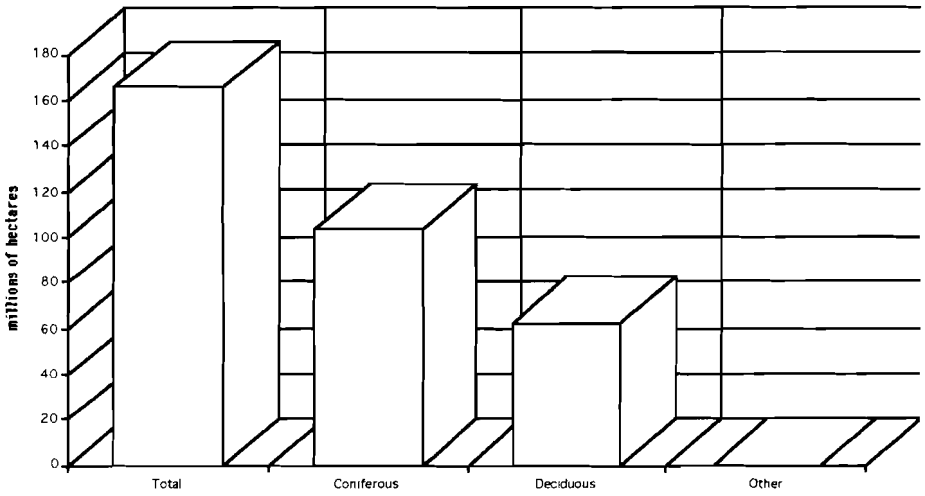
Source: Backman (1994b)

FIGURE 3.2: RUSSIA and EUROPEAN RUSSIA - Growing stock



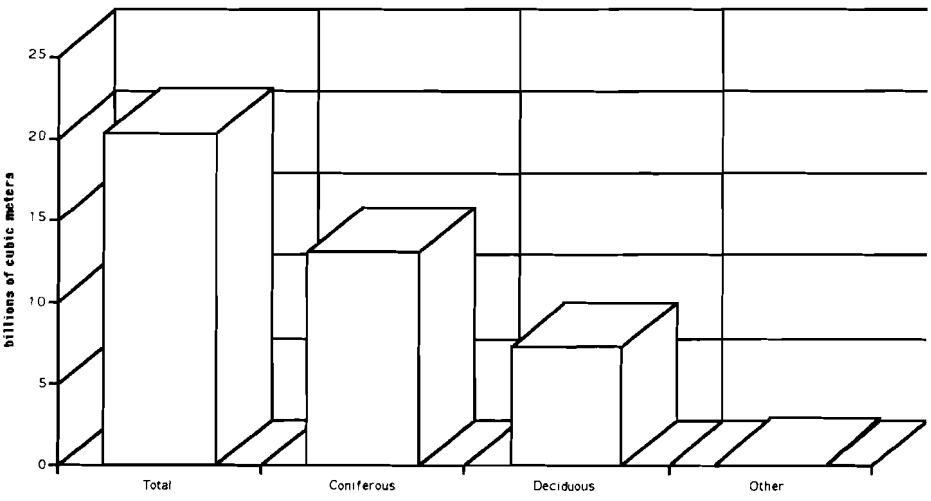
Source: Backman (1994b)

FIGURE 3.3: EUROPEAN RUSSIA - Stocked forest land



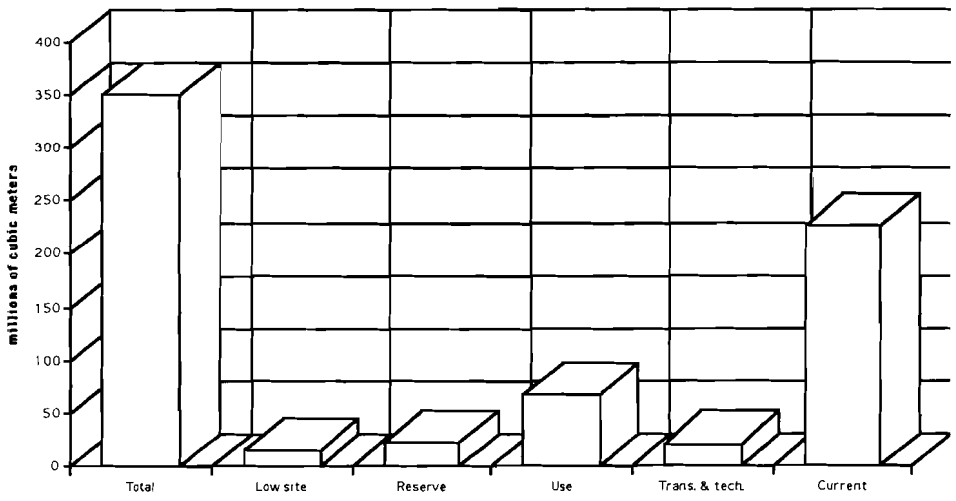
Source: Backman (1994b)

FIGURE 3.4: EUROPEAN RUSSIA - Growing stock



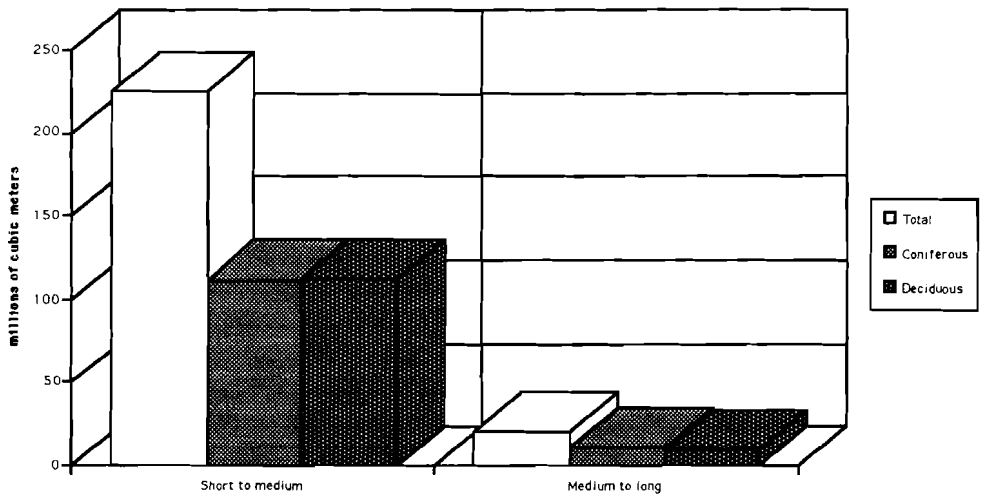
Source: Backman (1994b)

FIGURE 3.5: EUROPEAN RUSSIA - Estimated annual growth of forest resources



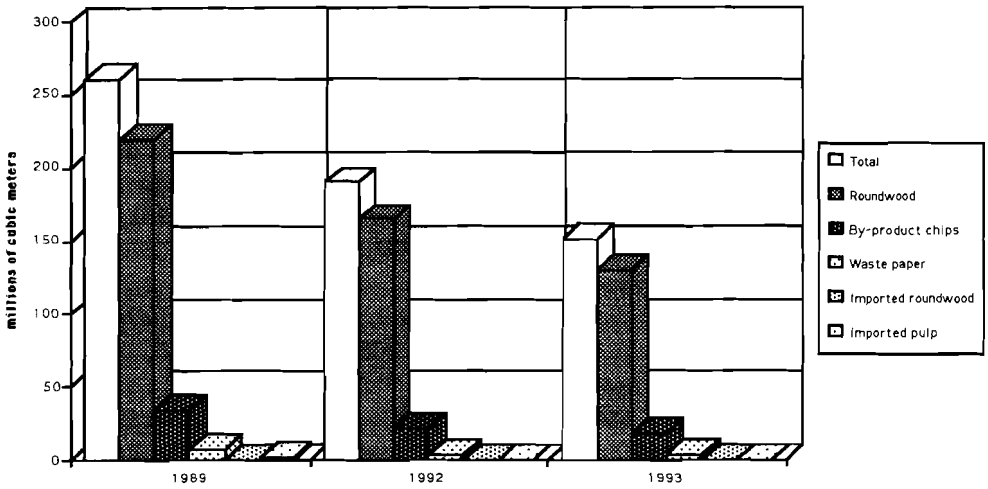
Source: C.A. Backman, Backman (1994b)

FIGURE 3.6: EUROPEAN RUSSIA - Estimated maximum annual accessible fiber



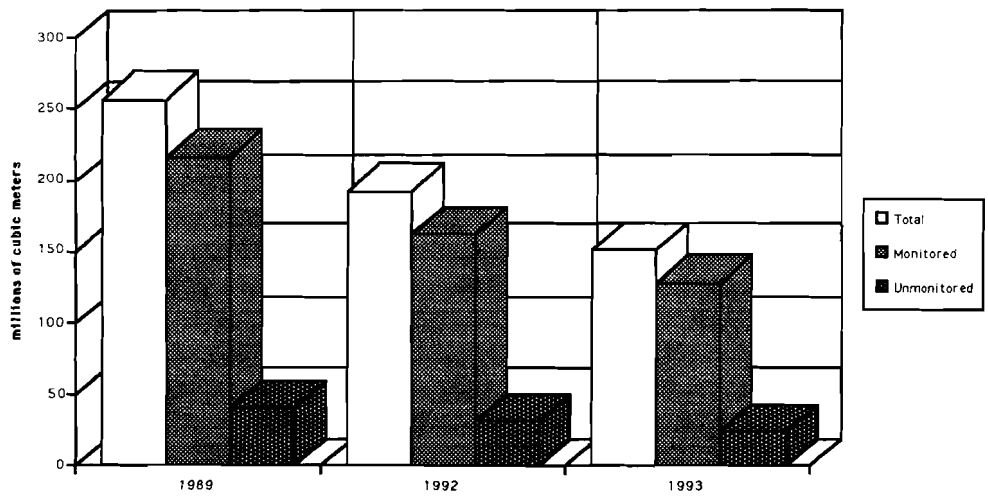
Source: Backman (1994b), C.A. Backman

FIGURE 3.7: EUROPEAN RUSSIA - Estimated fiber supply in wood chip equivalents



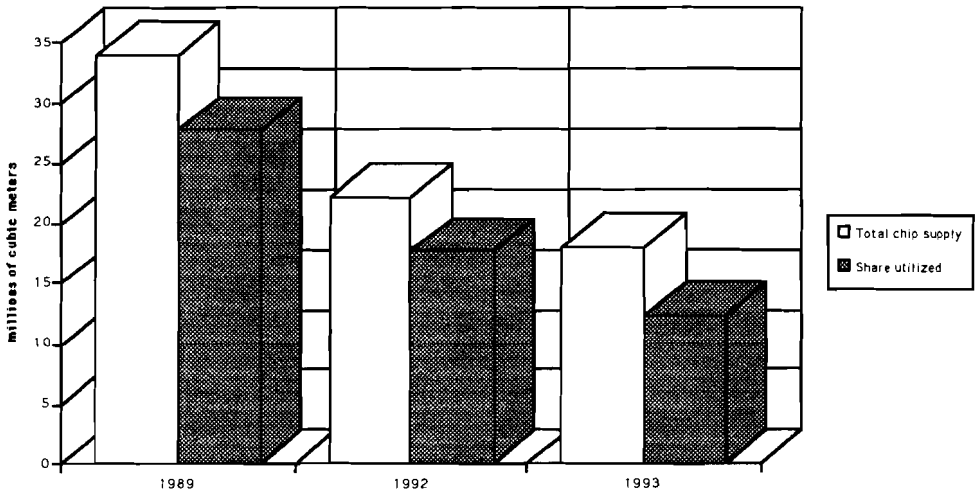
Source: C. A. Backman

FIGURE 3.8: EUROPEAN RUSSIA - Estimated total harvest from forest resource



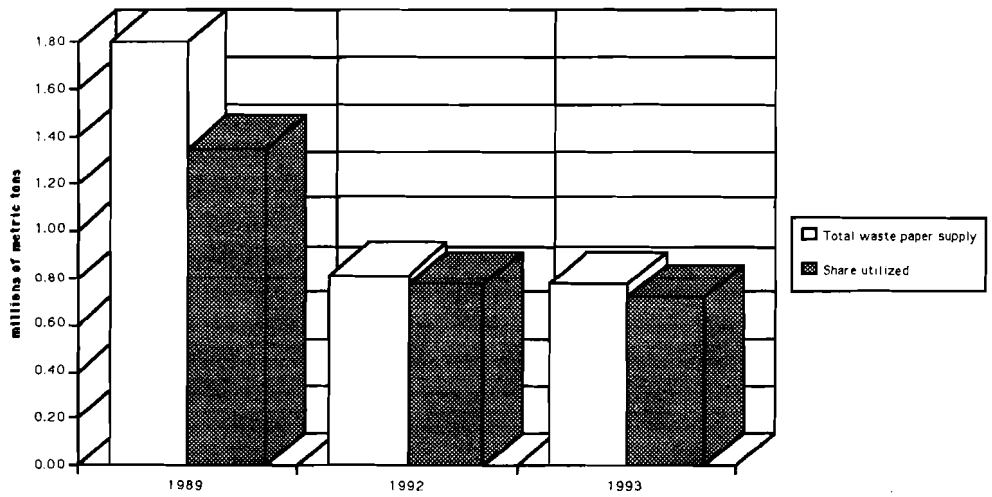
Source: C.A. Backman

FIGURE 3.9: EUROPEAN RUSSIA - Estimated by-product chip supply and share utilized



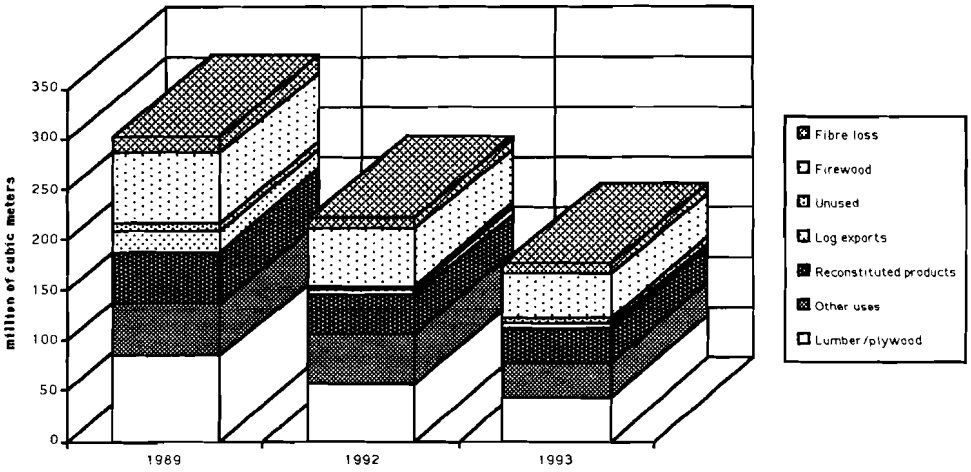
Source: C.A. Backman, Goskomstat (1994a)

FIGURE 3.10: EUROPEAN RUSSIA - Estimated waste paper supply and share utilized



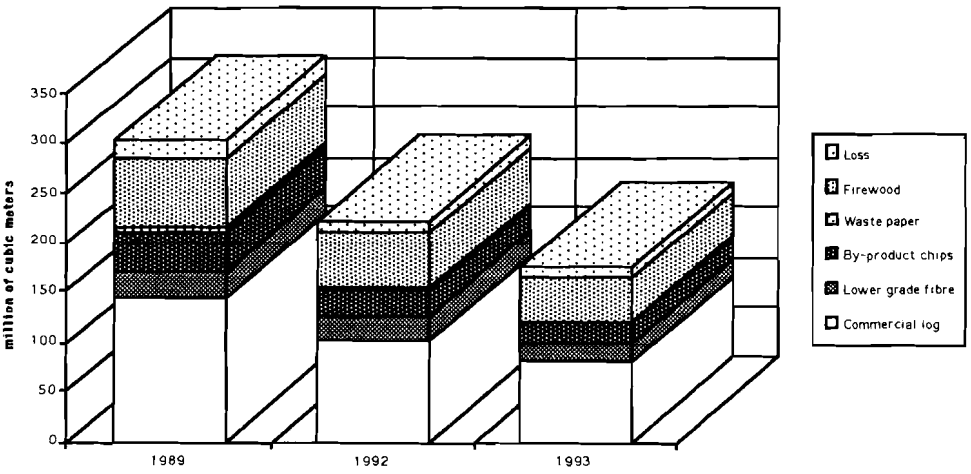
Source: VNIPIEllesprom (1991), Goskomstat (1994a)

FIGURE 3.11: EUROPEAN RUSSIA - Estimated distribution of fibre supply among uses in roundwood equivalents



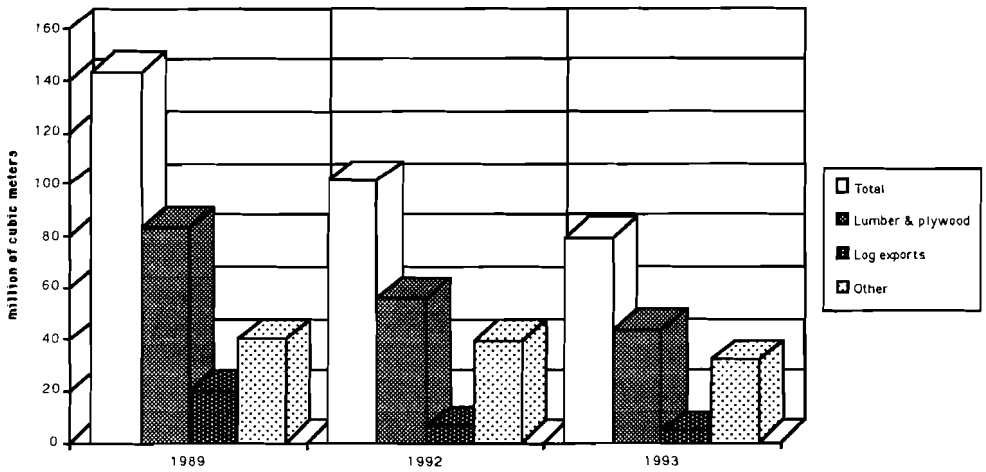
Source: C.A. Backman

FIGURE 3.12: EUROPEAN RUSSIA - Estimated contribution to fibre supply by the components in roundwood equivalents



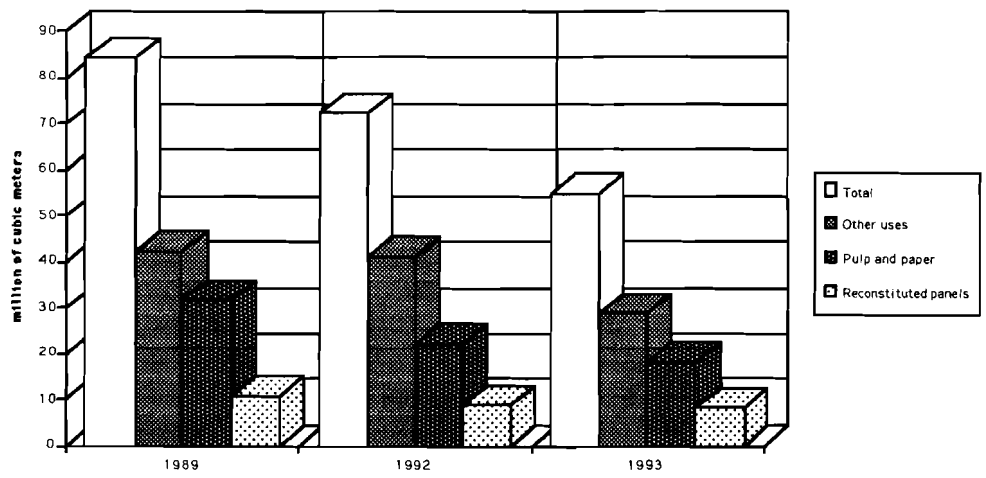
Source: C.A. Backman

FIGURE 3.13: EUROPEAN RUSSIA - Estimated distribution of commercial log supply among uses in roundwood equivalents



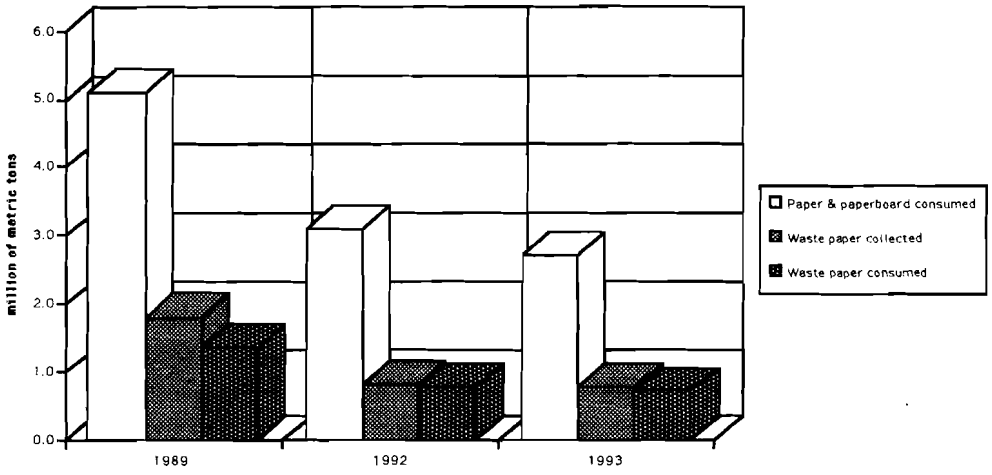
Source: C.A. Backman

FIGURE 3.14: EUROPEAN RUSSIA - Estimated distribution of residual wood fibre supply among uses in fibre equivalents



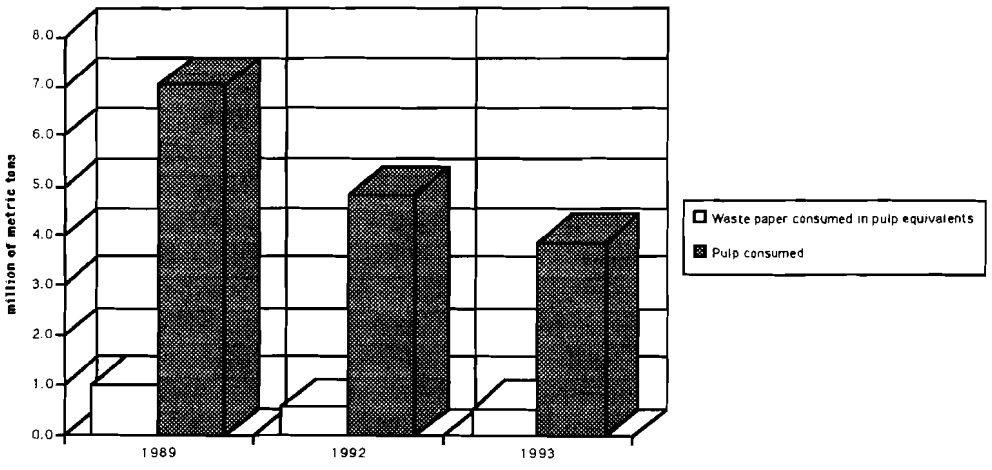
Source: C.A. Backman

FIGURE 3.15: EUROPEAN RUSSIA - Consumption of paper and paperboard, share available to be recycled, and share recycled



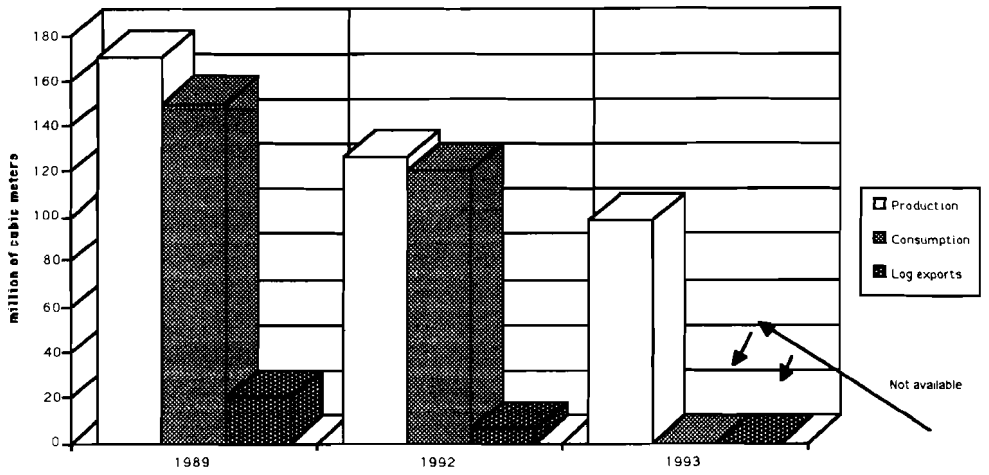
Source: C.A. Backman, Goskomstat (1994a), VNIPIEIlesprom (1991)

FIGURE 3.16: EUROPEAN RUSSIA - Estimated raw material supply in the production of paper and paperboard



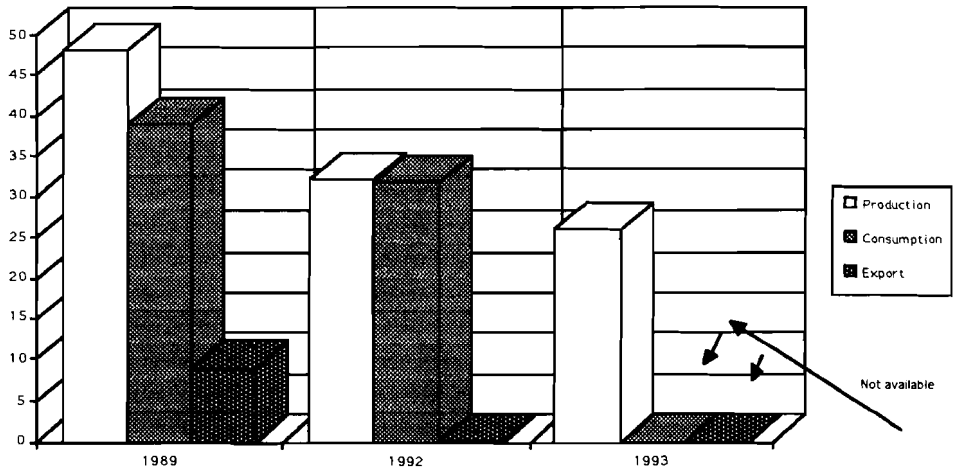
Source: C.A. Backman, Goskomstat (1994a), VNIPIEIlesprom (1991)

FIGURE 3.17: EUROPEAN RUSSIA - Estimated commercial roundwood supply, share consumed domestically, and share exported



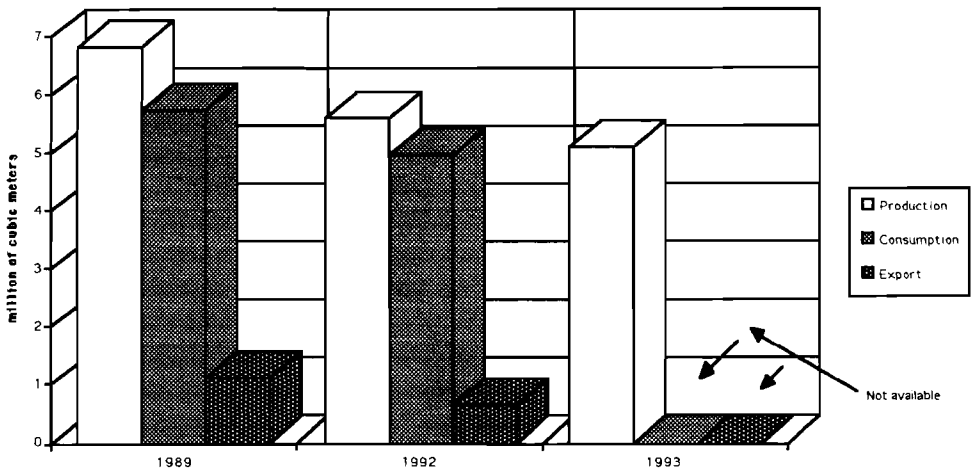
Source: C.A. Backman, VNIPIEllesprom (1991)

FIGURE 3.18: EUROPEAN RUSSIA - Estimated lumber supply, share consumed domestically, and share exported



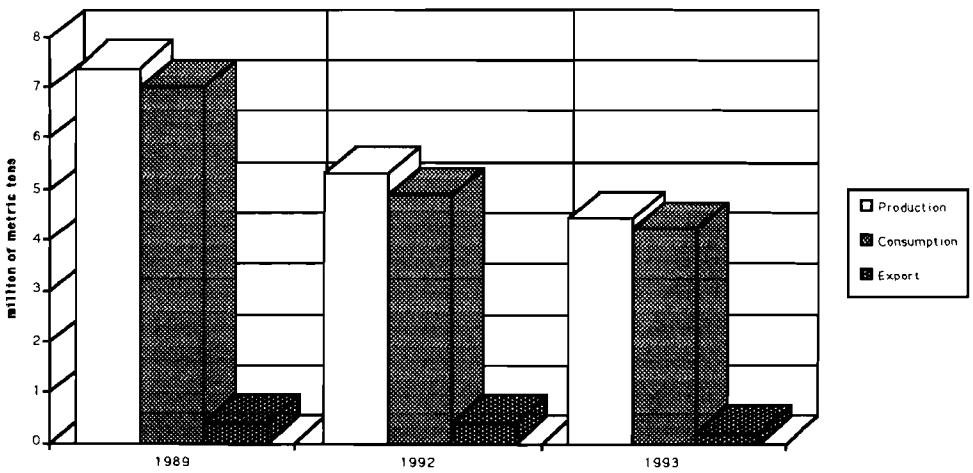
Source: C.A. Backman, VNIPIEllesprom (1991), Goskomstat (1993c, 1994c)

FIGURE 3.19: EUROPEAN RUSSIA - Estimated reconstituted panel supply, share consumed domestically, and share exported



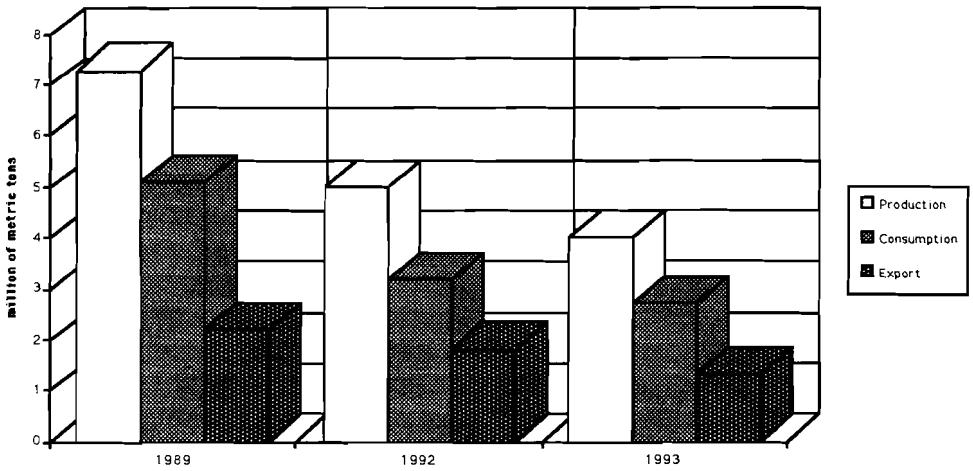
Source: C.A. Backman, VNIPIEllesprom (1991)

FIGURE 3.20: EUROPEAN RUSSIA - Estimated pulp supply, share consumed domestically, and share exported



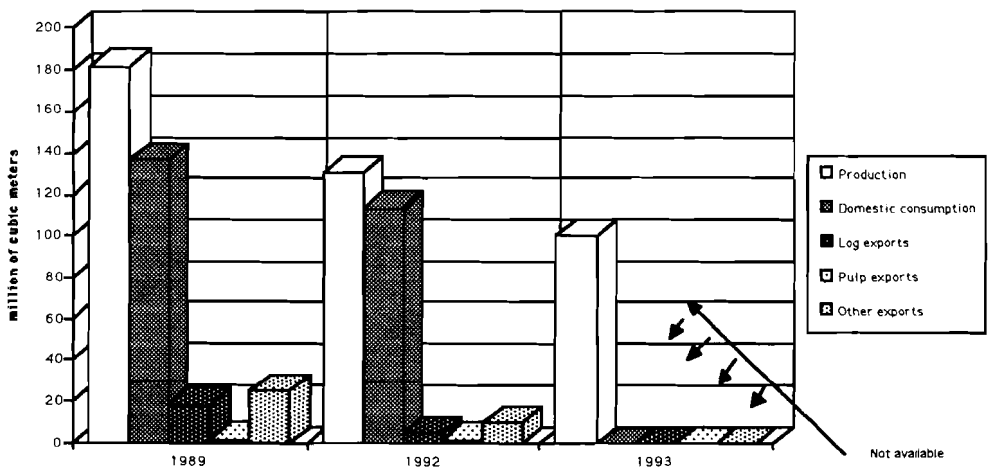
Source: C.A. Backman, VNIPIEllesprom (1991)

FIGURE 3.21: EUROPEAN RUSSIA - Estimated paper & paperboard supply, share consumed domestically, and share exported



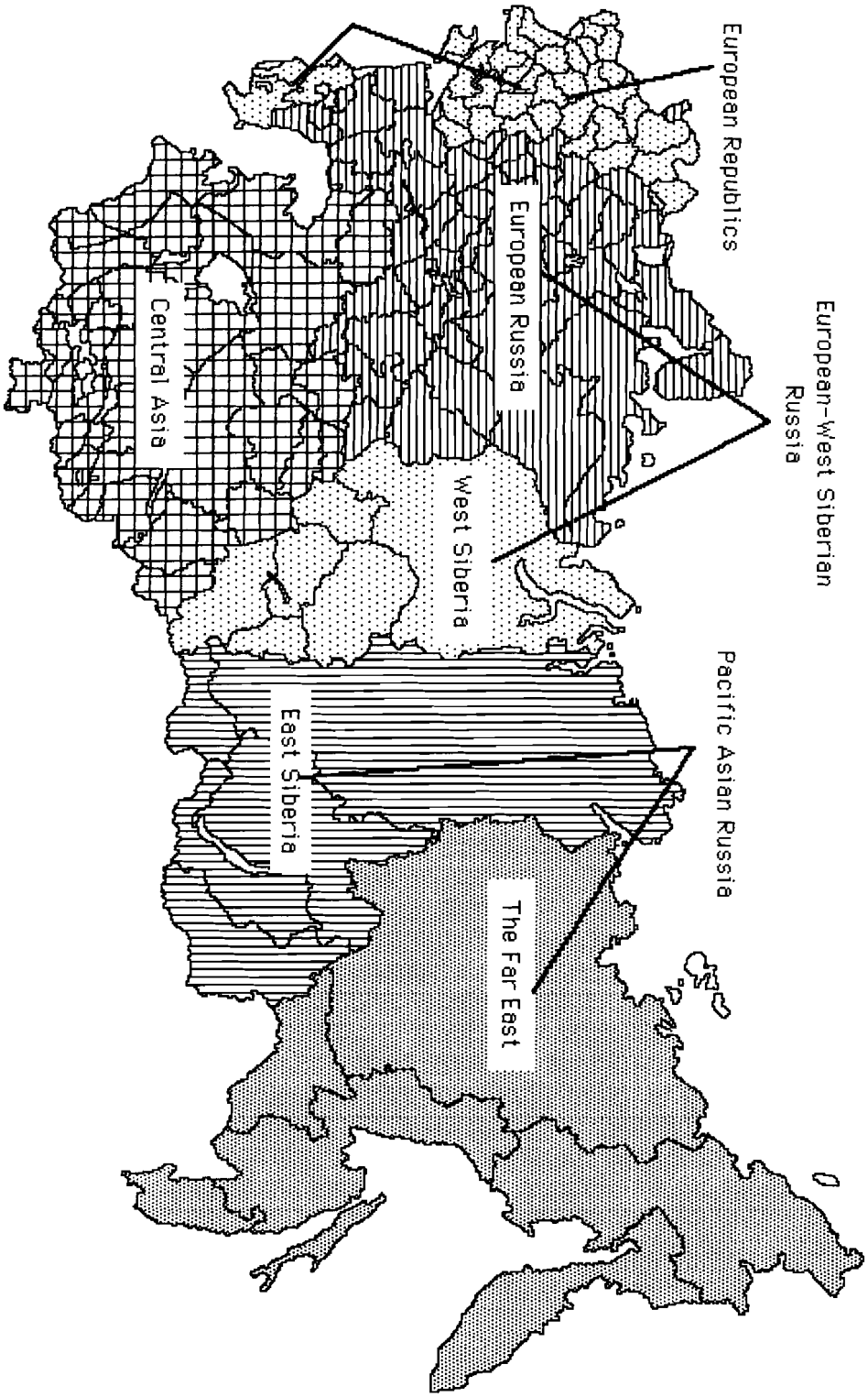
Source: C.A. Backman, Goskomstat (1993c, 1994c), VNIPIEllesprom (1991)

FIGURE 3.22: EUROPEAN RUSSIA - Estimated fibre supply supply, share consumed domestically, and share exported according to product



Source: C.A. Backman

Map A: Regions of Russia and the former USSR



Source: Backman (1993)

4.0 WEST SIBERIA

The forest resources of West Siberia are briefly examined in section **4.1 FOREST RESOURCES**. Section **4.2 FIBRE SUPPLY** examines the degree to which the forest resources have been utilized, also providing the extent to which the fiber supply has been augmented by utilization of by-product wood chips and consumption of waste paper. The manufacturing and consumption activities are illuminated in section **4.3 FOREST SECTOR ACTIVITY**, yielding an indication of the degree to which markets external to West Siberia have influenced production possibilities domestically.

4.1 Forest Resources

The forest resources in West Siberia are placed in a Russian perspective followed by a description of the existing inventory and the extent to which it supports annual growth. The ability of the forest sector to utilize the fibre potential is then touched upon.

4.1.1 The Russian Perspective

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. A more moderate climate and more favourable terrain than that existing in either East Siberia or the Far East favours a larger share of the Russian deciduous inventory located in West Siberia, amounting to 19 percent of the stocked forest area and 22 percent of the growing stock. Only 11 percent of the coniferous inventory is located in this economic region. **Figure 4.1** and **Figure 4.2** contrast for selected indicators the forest resources of West Siberia and Russia.

4.1.2 The Wood Basket

The West Siberian coniferous resource, accounting for more than 60 percent of the forested land and two-thirds of her volume, is contained on 59 million

hectares of stocked forest land and 7.2 billion cubic meters of growing stock (**Figure 4.3** and **Figure 4.4**). The deciduous resource of 3.6 billion cubic meters is supported on 30 million hectares. The balance of less than one million hectares (less than one percent) and 6 million cubic meters (negligible percent) consists of species which do not contribute a significant share of the aggregated inventory.

While the forests of West Siberia can be credited with annual growth of almost 175 million cubic meters, much of this potential is not realizable by the forest industry due to sparse stocking, uses of the forest which either preclude industrial activity or location well beyond the expected transportational network development in the next two decades, limitations caused by lack of transportational networks or inappropriate harvesting technology, and reduced exploitation from multiple uses considerations. It is these limitations, discussed below, which decrease the overall potential of the West Siberia forest resource by almost two-third to some 55 million cubic meters in the short to medium term and an overall estimated accessibility of nearly 100 million cubic meters in the short, medium, and long terms.

4.1.2.1 Growth Potential

The total growth potential of West Siberia is estimated to be in the vacinity of 176 million cubic meters (**Figure 4.5**). A moderate amount of the forest resource is low site accounting for 19 million cubic meters of the growth potential, and cannot be expected to contribute to industrial development.[97] Another 34 million cubic meters of the growth potential is located in forests which have uses which directly conflict with harvesting or which are located in the periphery areas, well beyond the projected transportation network thought to be realizable during the next twenty years.[98] Another 5 million cubic meters is lost due to modification of harvesting practices necessary to accommodate multiple use leaving almost 100 million cubic meters available in the short, medium and long terms. However, lack of major transportational arteries and inappropriate harvesting technology effective

Footnotes

[97]The size of the growth potential linked to low site lands is based on the estimate for all of Russia (Backman 1994b, p. 75). The total for Russia is then allocated to each of the four regions based on the share of the low site lands located in each region.

[98](Backman 1994b, p. 152)

eliminate 44 million cubic meters from the pool of resource usable in the short to medium terms.[99]

Of the 176 million cubic meters of potential growth in the West Siberian forests, only some 55 million cubic meters can be considered possibly realizable in the short to medium term.[100] The deciduous component, amounting to 34 million cubic meters, accounts for three-fifths of the total with the coniferous component accounting for the remaining two-fifths, or 21 million cubic meters (**Figure 4.6**).[101] The 44 million cubic meters available in the medium to long term consists of 28 million cubic meters supported by deciduous forests and 16 million cubic meters supported by coniferous forests (**Figure 4.6**).

4.2 Fibre Supply

The fiber supply consists of contributions from roundwood, wood chips and waste paper. Imported roundwood and imported pulp are absent or contribute a negligible share (**Figure 4.7**).[102] Roundwood is the dominant component of the fiber supply accounting for more than 85 percent of the fiber in 1989, 1992 and 1993, with contributions from by-product chips accounting for most of the remainder.

Translating each of these components into chip equivalents shows that nearly 46 million cubic meters were available for distribution in 1989 on a fibre equivalent basis. By 1992, the fiber supply had decreased by one-third to 34 million cubic meters as both domestic and foreign opportunities collapsed. Fiber supply continued to decrease into 1993, amounting to an

Footnotes

[99](Backman 1994b, p. 60)

[100](Backman 1994b, p. 51)

[101]The figures representing the coniferous and deciduous components of the short to medium considered possibly realizable by the forest sector identified in the test are different than those presented in (Backman 1994b, p. 51). In (Backman 1994b), the coniferous component amounted to 18 million cubic meters while the deciduous component amounted to 37 million cubic meters.

[102]Data is not available which presents the two way trade in either pulp or commercial roundwood. The data is, however, sufficiently robust to estimate net trade flows of pulp and commercial roundwood. Consequently, since West Siberia has apparently been a net exporter of commercial roundwood, the category of imported roundwood does not contribute to the overall fibre supply. Contrarily, West Siberia has seemingly been a net importer of pulp products, though its contribution to overall fibre balance of less than 200 thousand cubic meters on a fibre equivalent basis is lost against an overall fibre supply of measured in terms of tens of millions of cubic meters.

estimated 25 million cubic meters, slightly more than one-half the level evident in 1989.

4.2.1 Roundwood Harvest

Shown in **Figure 4.8**, roundwood harvest amounted to 46 million cubic meters in 1989 and 35 million cubic meters in 1992, both in terms of roundwood equivalents. In 1993, harvest levels continued to decline, amounting to only 26 million cubic meters. Very little harvest seems to take place outside of the forest sector system underscoring the degree to which the forest service net seems to reflect activity in the harvesting sector.

While the harvest levels in 1989 amounted to only four-fifths of the sustainable levels in the short to medium term, the coniferous resource was substantially over cut, as nearly two-thirds of the harvest is contributed from coniferous forests with the balance flowing from the deciduous forests.[103,104]

Although harvest levels had dropped off by nearly 25 percent in 1992 to 35 million cubic meters, and in 1992 to 26 million cubic meters, pressures on the forest resource may not have correspondingly eased. While the absolute limits imposed by the resource may not have been encroached upon, there may very well have been regional imbalances taking place as harvesting spatially becomes more concentrated in response to increasing economic pressures.

4.2.2 Secondary wood fiber

Supplementing the fiber generated through harvesting are wood chips produced by manufacture of wood products and waste left in the harvest settings (**Figure 4.9**).[105] In 1989, secondary wood fiber amounted to 7 million cubic meters, one million of which are located in the harvested

Footnotes

[103]The share of the harvest linked to the deciduous resource is based on experience in 1989.

[104]In 1989, the AAC in the coniferous forests was some 20 million cubic meters higher than evident from the AAC in 1991. Thus, the apparent over harvest should be taken only in context of the revised potential which occurred after 1989.

[105]Harvest waste is not included directly in the fibre balance of West Siberia. It is only the by-product waste material generated through the manufacturing process which is factored in. Harvest waste is included in with the roundwood supply, being subsequently removed when the loss in transit is considered.

settings. By 1992, the volume of waste material had declined substantially to only 4 million cubic meters, one million cubic meters of which is credited to the harvested areas. The decline continued into 1993 as industrial activity continued to fall. By 1993, wood chip supply amounted to an estimated three million cubic meters, less than one million of which were not utilized. Most of the material is believed to be coniferous material.[106]

4.2.3 Waste Paper Production

A marginal producer of pulp, West Siberia has found it necessary to combine imported pulp with waste paper re-cycling to meet the fiber needs of the local paper and paperboard sector (**Figure 4.10**). In 1989, nearly 160 thousand tons of waste paper were available to the forest sector, representing one-quarter of the estimated paper and paperboard consumed in West Siberia. However, only three-fifths were actually utilized. By 1992, the pool of waste paper had dropped by two-thirds to an estimated 50 thousand tons, of which only 49 thousand tons were actually consumed.[107] While waste paper collected and consumed in 1993 is not available, it has been estimated to be in the vacinity of figures presented for 1992.[108]

4.2.4 Imported Roundwood

West Siberia was a net exporter of roundwood in both 1989 and 1992, and is expected to have been one in 1993.

Footnotes

[106]In 1989 and 1992, deciduous lumber production for the former USSR amounted to 13 million cubic meters, representing 12 percent of the 1989 output and 20 percent of the 1992 output (FAO 1994, p. 90, 110). Most of the deciduous lumber output is thought to have taken place in the republics other than Russia belonging to the former USSR, and that taking place in Russia to have primarily been located in European Russia.

[107]The pool of waste paper available for consumption is not available for 1992, although the quantity actually consumed is (*Goskomstat Rossii* 1993b, p. 196). The pool available for use was estimated based on the share of the total supply actually consumed at a Russia level of aggregation (0.96) available from (*Goskomstat Rossii* 1994a, p. 142).

[108]The volume of waste paper consumed in 1993 is available for 1993 at a Russia level of aggregation (*Goskomstat Rossii* 1994a, p. 142). The estimate for West Siberia in 1993 was derived based on the decline in consumption apparent at the Russian level between 1992 and 1993. The decline ration so developed was applied to the volume of consumed waste paper evident for West Siberia in 1992 (*Goskomstat Rossii* 1993b, p. 196).

4.2.5 Imported Pulp

West Siberia was a net importer of pulp in 1989 and 1992, importing between 20 and 30 thousand tons in each of those years.[109] While providing a significant component of the fiber supply for the production of paper and paperboard (25 percent to 30 percent), the contribution of imported pulp to the overall fiber supply is lost among the other components. Data for 1993 is not sufficiently robust to provide an assessment.

4.3 FOREST SECTOR ACTIVITY

Supported by the fiber potential, the forest sector has produced a number of products which have been available for export and domestic consumption. Focusing first on the distribution of the fiber supply among the different uses, the activity within the manufacturing sector is discussed.

4.3.1 Fiber Allocation

The fibre supply, dominated by the roundwood component, has declined since 1989 when 53 million cubic meters were available for consumption. By 1992, the fibre supply had declined to 39 million cubic meters, and by 1993, to 29 million cubic meters. The level in 1992 represented almost three-quarters that in 1989, while the level in 1993 represented one only 55 percent of that seen in 1989. Shown in **Figure 4.11**, lumber was the dominant consumer in 1989, but was replaced in 1992 and 1993 by unspecified uses. The consumption by the pulp and paper sector and the reconstituted panel product sector was not a major consumer of the fibre pool.

Seen from **Figure 4.12**, roundwood fiber supply, consisting on commercial log, low grade fibre, loss, and firewood components, accounts for more than 85 percent of the total. As with European Russia, a large part of the

Footnotes

[109]The level of pulp imports is determined as a residual, after waste paper consumed and domestic pulp production has been subtracted from the total raw material necessary to support the output of paper and paperboard. Consequently, since the quantities of both domestic pulp products waste paper consumption are quite small, it is possible that the numbers presented in the text are not entirely accurate. However, against a total fibre supply measured in tens of millions of cubic meters, the uncertainty introduced by the methodology does not materially affect the analysis.

roundwood supply consists of non-commercial firewood and another small share is lost in transit between the harvesting site and the first point of processing. Waste paper is a marginal contributor to the fibre balance, accounting for less than two percent. By-product chip material accounts for more than one-tenth of the overall balance.

The roundwood harvest in 1989 amounted to an estimated 46 million cubic meters, more than 85 percent of the total fibre supply of 53 million cubic meters. After accounting for losses and a firewood component, commercial roundwood amounted to 28 million cubic meters. The commercial log component was the largest component of the roundwood fibre resource, accounting for 80 percent of the total. In 1989, commercial logs amounted to 22.4 million cubic meters. Lower grade firewood with a commercial use accounted for 8 percent of the total, or 1.9 million cubic meters. Consumption of fibre in whole tree length form accounted for another 3.3 million cubic meters while a small and inconsequential volume of lower grade wood was consumed to produce chips for the pulp and paper sector.

Lumber and plywood were the dominant consumer of the commercial wood resource, consuming almost two-thirds of the supply in 1989, or 15 million cubic meters (**Figure 4.13**). Export in the unmanufactured form accounted for more than one-fifth of the total, or 5 million cubic meters. The balance of almost three million cubic meters, 5 million cubic meters of lower grade wood material, and 6 million cubic meters of by-product wood chips were available for distribution to uses other than lumber and plywood output, and export in unmanufactured form.

Of the total of nearly 14 million cubic meters in a roundwood equivalent basis, two million cubic meters were not consumed. Translating the residual pool into a fibre equivalent basis reveals a residual pool of 10.7 million cubic meters allocated for use. The absence of a pulping sector helps to explain the large share of the fibre resource allocated to meeting uses in the unmanufactured form and in other unidentified manufacturing processes. In 1989, evident from **Figure 4.14**, these uses accounted for seven-eighths of the remaining balance, or 9.4 million cubic meters. Reconstituted panel production accounted for virtually all of the balance of 1.3 million cubic meters.

By 1992, the fibre supply had decreased to 39 million cubic meters, of which the roundwood fibre supply comprised 31 million cubic meters. The commercial component of the roundwood supply accounted for 22.3 million.[110] Commercial logs accounted for 80 percent of the commercial roundwood total, or 17.9 million cubic meters. Lower grade wood fibre accounted for the remainder of 4.4 million cubic meters. Loss in transit and firewood accounted for 5 million and 8 million cubic meters respectively of the roundwood supply (**Figure 4.12**).

The lumber and plywood producing sectors continued to account for the largest share of the commercial log supply consuming almost 55 percent, or 9.6 million cubic meters (**Figure 4.13**). Log exports of 1.6 million cubic meters accounted for a smaller share than in 1989, amounting to less than 10 percent. The remaining 6.7 million cubic meters of commercial logs, 4.4 million cubic meters of lower grade wood fibre, and the 4 million cubic meters of wood chips provides a pool of raw material for the remaining uses.

Of the total residual pool of 15 million cubic meters on a roundwood equivalent basis, one million was not consumed. Translating the residual pool of fibre into fibre equivalents shows nearly 12 million cubic meters which were allocated to uses other than solid wood manufacture and export in unmanufactured form. Evident from **Figure 4.14**, consumption in umanufactured form and in unidentified manufacturing processes continued to dominate the consumption of the residual pool of fibre, accounting for more than 90 percent, or 11 million cubic meters. Reconstituted panel products accounted for virtually all of the remainder of 0.8 million cubic meters.[111]

By 1993, fibre supply amounted to only 29 million cubic meters, of which roundwood contributed 26 million cubic meters. The commercial roundwwod

Footnotes

[110]Commercial roundwood delivered according to (*Goskomstat Rossii* 1993c, p. 248) amounted to 19.4 million cubic meters in 1992. However, due the declining efficiency of the *Goskomstat* data collection system, another 3.1 million cubic meters of commercial wood are believed to have been available for use by the forest sector, though never recorded. Adding the recorded and unrecorded commercial wood volumes yields the 22.4 million cubic meters identified in the text.

[111]The share of the residual pool of wood fibre consumed by other commercial uses is higher due to the inclusion of the "unrecorded commercial wood fibre supply" of 3.1 million cubic meters. Excluding this fibre from the pool and then comparing the shares consumed by reconstituted panel output shows nearly 13 percent versus 8 percent. Following from this, the share consumed by other uses accounted for some 87 percent of the revised total. These ratios are not different from those identified for 1989.

component declined, falling to 17.1 million cubic meters.[112] Commercial logs accounted for 80 percent of the commercial roundwood total, or 13.6 million cubic meters, while lower commercial wood accounted for 3.4 million cubic meters. Losses in transit and firewood accounted for 3 million and 6 million cubic meters respectively (**Figure 4.12**).

Lumber and plywood production consumed some 55 percent of the commercial log supply, or 7 million cubic meters (**Figure 4.13**). Assuming that exports of commercial logs declined marginally from 1992 levels (1.0 million cubic meters) suggests that 5.6 million cubic meters of logs along with 3.2 million cubic meters of lower grade material and 3 million cubic meters of by-product chip material were available for allocation to uses other than export and lumber and plywood manufacture. Of the 12 million cubic meters of residual wood fibre supply in roundwood equivalent basis, approximately one million was not consumed.

Translating the residual pool into fibre equivalents shows that 10 million cubic meters were allocated for uses other than lumber and plywood production and export in unprocessed form. Consumption in unmanufactured form and in other unidentified uses continued to account for more than 90 percent of the residual balance, or some 9 million cubic meters (**Figure 4.14**). Reconstituted panel products accounted for virtually all of the balance of 0.9 million cubic meters.[113]

A minor producer of pulp, the small domestic paper and paperboard sector relies on waste paper and imported pulp as a raw material. Evident from **Figure 4.15**, up to one-quarter of the paper and paperboard consumed in West Siberia appears to have been available to the forest sector for re-cycling, although the share actually consumed is less. In 1989, some 160 thousand tons of waste paper (25 percent of estimated paper and paperboard consumed) were collected while that consumed amounted to

Footnotes

[112]The commercial harvest, excluding fibre consumed in whole tree length form and chips produced from lower grade wood fibre for the pulp and paper sector according to *Goskomstat* data sources amounts to an estimated 11.2 million cubic meters. After considering the 3.3 million cubic meters of unrecorded commercial fibre plus the 2.6 million cubic meters of fibre consumed in whole tree length form, total commercial wood from the harvesting process amounts to the figure presented in the text.

[113]Subtracting the unrecorded commercial wood fibre supply from the residual pool and then comparing the shares consumed by each of reconstituted panel output and other commercial uses reveals shares not significantly different from those evident in 1989.

100 thousand tons (**Figure 4.16**). The consumed waste paper represented some 14 percent of the raw material supply consumed in the production of paper and paperboard. By 1992, the pool of waste paper had declined to 50 thousand tons, only one-eighth of the estimated paper and paperboard consumed. Consumption of waste paper had declined to some 50 thousand tons representing only 11 percent of the raw material supply. While difficult to estimate, waste paper consumption is believed to differ only in a small way from the levels evident in 1992.

4.3.2 Forest Product Utilization

West Siberia has been a minor producer of forest products when compared to European Russia, East Siberia, and the Far East, accounting for some 10 percent of the commercial roundwood and lumber output, some 5 percent of the panel production, and some 3 percent of the paperboard output. Paper production does not seemingly take place in West Siberia. **Figure 4.17** through **Figure 4.21** show production levels for West Siberia of different products.

Since 1989, physical output has fallen and by 1992 varied in size from two-thirds of 1989 levels in lumber to five-sixths in panel production. Commercial roundwood output in 1989 amounted to 28 million cubic meters while that in 1992 amounted to 22 million cubic meters. By 1993, it had declined a further 5 million cubic meters to 17 million cubic meters (**Figure 4.17**). Producing 9 million cubic meters of lumber in 1989, by 1992, output had declined to only 6 million cubic meters (**Figure 4.18**). By 1993, lumber production amounted to only 4.4 million cubic meters. Panel output declined from 780 thousand cubic meters to 490 thousand cubic meters in 1992 and was marginally lower in 1993 at an estimated 468 thousand cubic meters (**Figure 4.19**). Not a producer of paper, paperboard production declined more steeply from 110 thousand tons to only 60 thousand tons in 1992 and to 40 thousand tons by 1993 (**Figure 4.21**). A marginal producer of pulp, only some 10 thousand tons were seemingly produced in each of 1989, 1992, and 1993.

Producing forest products surplus to its domestic needs, West Siberia has been a net export of a selected range of wood products while needing to import pulp and paper. When the share of roundwood exported is considered, nearly 23 percent of the total fiber available depended in one

form or another on markets external to West Siberia in 1989 (**Figure 4.22**). Roundwood accounted for two-thirds of the export volume with the balance contributed mainly by lumber exports. Imports of forest products contributed 5 percent of the demand in West Siberia, consisting primarily of imports of paper and paperboard. The shares had declined between 1989 and 1992 to 15 percent for exports and 3 percent for imports, although lumber now accounted for more than one-half of the export volume. Although data is not sufficiently robust to provide an estimate for 1993, results significantly different from 1992 are not expected.

Commercial roundwood exports represented approximately one-fifth of the 1989 output, or almost 5 million cubic meters. By 1992, exports accounted for less than 10 percent of the commercial harvest, or some 1.6 million cubic meters (**Figure 4.17**).[114] In 1989, nearly one-fifth of the lumber, or 1.6 million cubic meters, produced was destined for markets outside of West Siberia (**Figure 4.18**). While export volumes declined by 1992, net exports still accounted for one-fifth of the production (1.2 million cubic meters).[115] A producer of panel products, West Siberia seems to have exported a small share of its output in 1989, amounting to less than 30 percent of output, or 30 thousand cubic meters (**Figure 4.19**).[116] By 1992 however, West Siberia seems to have become an importer of panel products accounting for one-fifth of the inferred consumption, or 150 thousand cubic meters. West Siberia has imported small quantities of pulp which in 1992 amounted to 20 thousand tons, down from the 30 thousand tons imported in 1989 (**Figure 4.20**). West Siberia seems to be a major importer of paper products, which accounted for 85 percent of consumption in 1989 (560 thousand tons) and two-thirds in

Footnotes

[114]Trade flows in commercial logs are based upon domestic production identifiable from *Goskomstat* data sources. When coupled with data describing the quantity of commercial wood delivered for use, also available from the same data source, an estimate of exports or imports of commercial roundwood can be derived. However, the figure so derived must be adjusted to account for an incomplete pool of enterprises. The total harvested commercial volume evident from (*Goskomstat Rossii* 1993b, p. 18-19) and (*Goskomstat Rossii* 1993c, p. 244-250) for 1992, and derivable from (VNIPIEIIlesprom 1991a, p. 126-130, 173) for 1989 do not match. The additional volume evident must be allocated between domestic consumption and export.

[115]The same procedure identified for commercial logs applies to lumber.

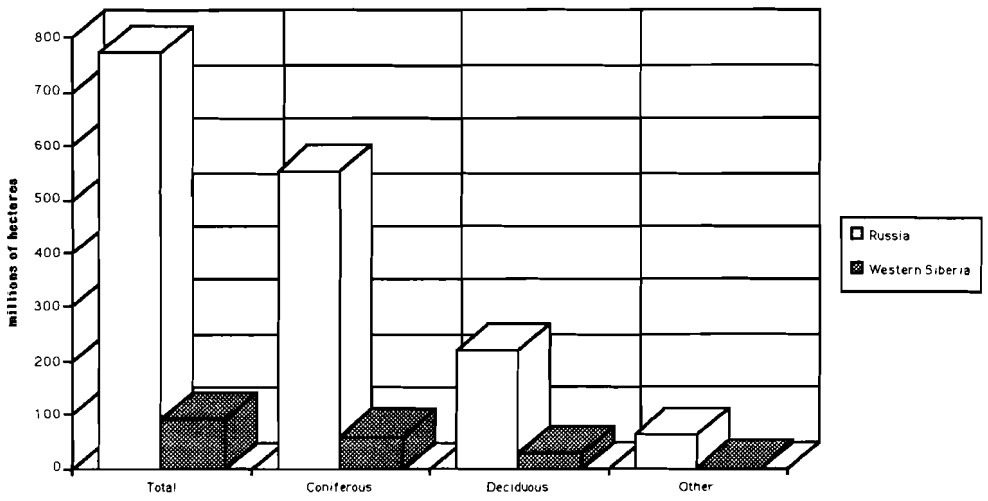
[116]Trade flows of panel products are based on domestic production and an estimated domestic consumption. The estimated consumption is based on the inferred per capita consumption derivable at a Russia level of aggregation. The so derived per capita consumption figure, through the population resident in the region, provides an estimate of domestic consumption. Consequently, the trade flow in panel products may not be as accurate as those derivable for commercial roundwood and lumber.

1992, or 130 thousand tons (**Figure 4.21**).[117] Data for 1993 was not sufficiently robust to provide an estimate.

Footnotes

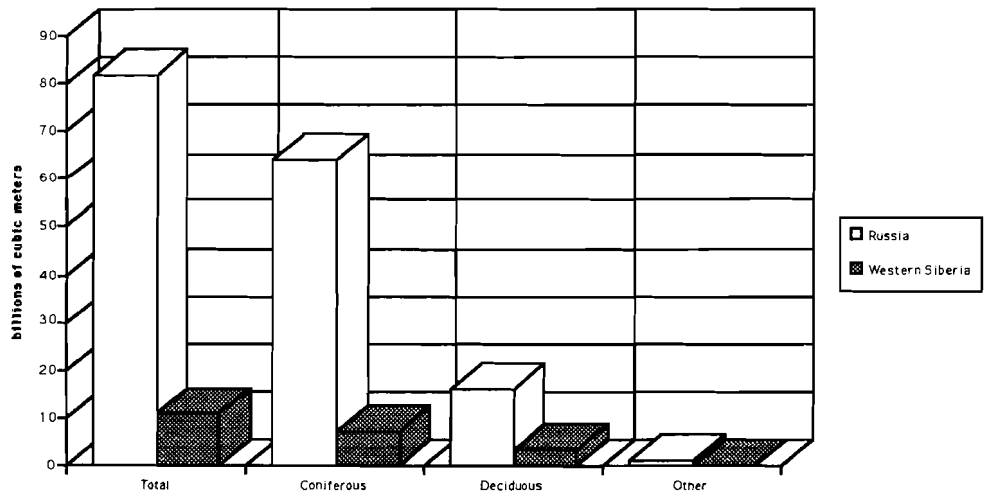
[117]The trade in paper products is an estimate based on per capita consumption determined at a Russia level of detail. The national per capita consumption figure is applied to the region through the population to estimate a domestic consumption quantity. The trade in paper products is a residual after domestic output is compared to the estimated consumption. Where domestic production is greater than the estimated consumption, a trade outflow takes place. Where domestic production is less than estimated consumption, a trade inflow is assumed to take place.

FIGURE 4.1: RUSSIA and Western Siberia - Stocked forest land



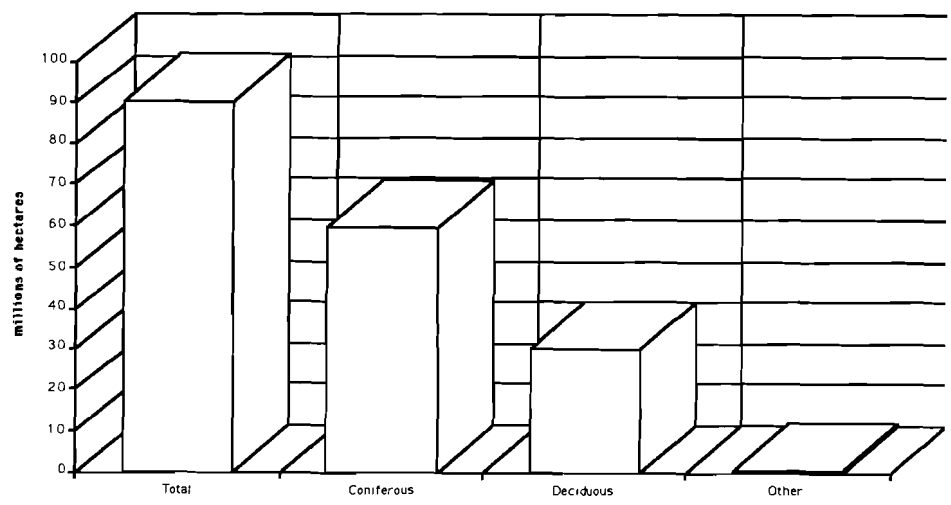
Source: Backman (1994b)

FIGURE 4.2: RUSSIA and WESTERN SIBERIA - Growing stock



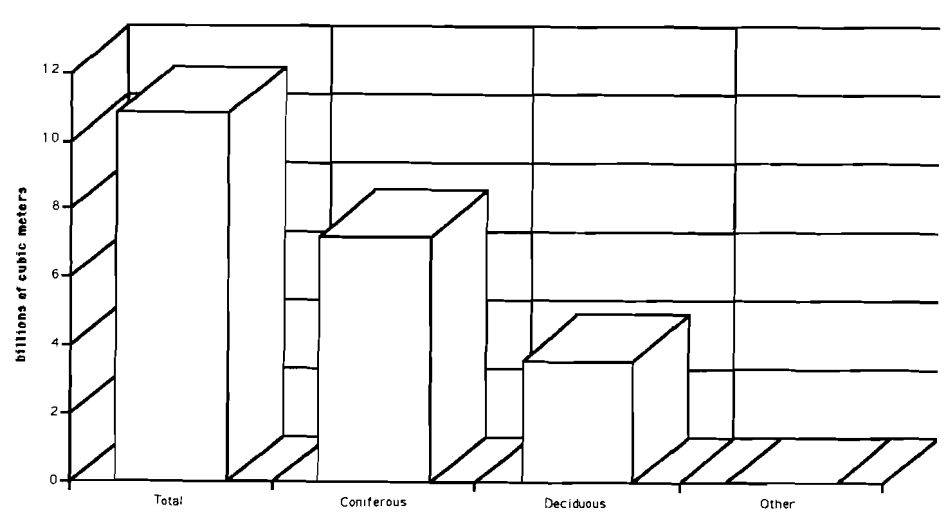
Source: Backman (1994b)

FIGURE 4.3: WESTERN SIBERIA - Stocked forest land



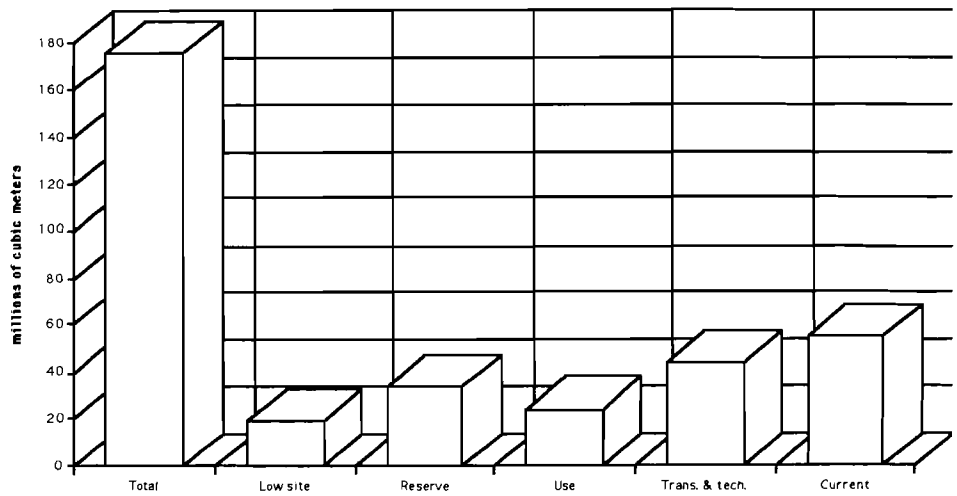
Source: Backman (1994b)

FIGURE 4.4: WESTERN SIBERIA - Growing stock



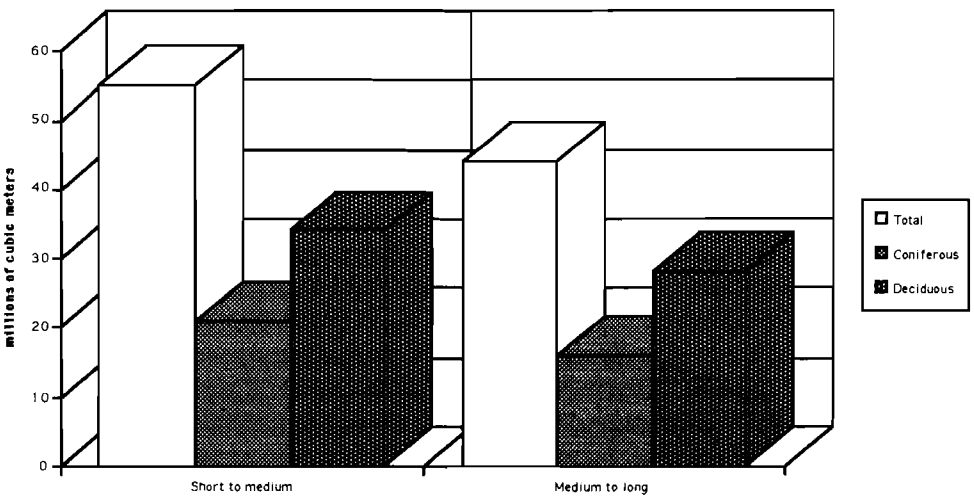
Source: Backman (1994b)

FIGURE 4.5: WESTERN SIBERIA - Estimated annual growth of forest resources



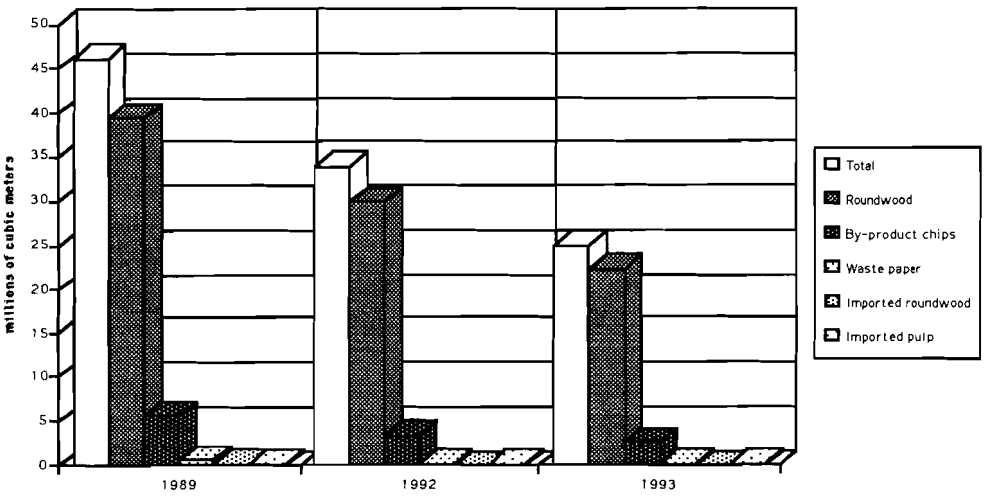
Source: C.A. Backman, Backman (1994b)

FIGURE 4.6: WESTERN SIBERIA - Estimated maximum annual accessible fiber



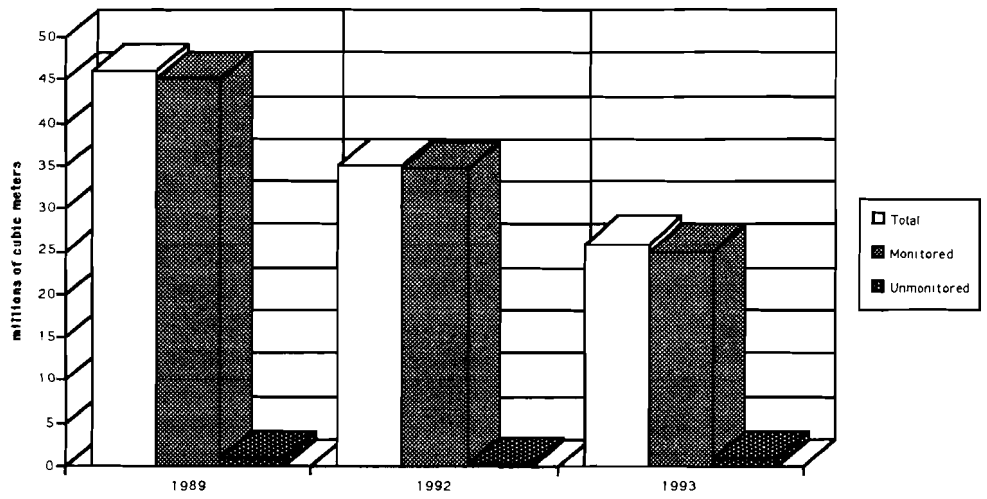
Source: Backman (1994b), C.A. Backman

FIGURE 4.7: WESTERN SIBERIA - Estimated fiber supply in wood chip equivalents



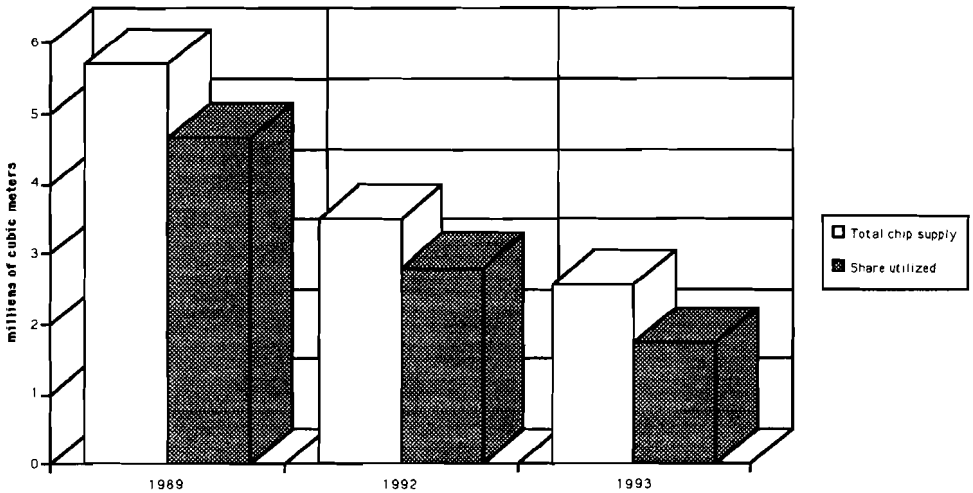
Source: C. A. Backman

FIGURE 4.8: WESTERN SIBERIA - Estimated total harvest from forest resource



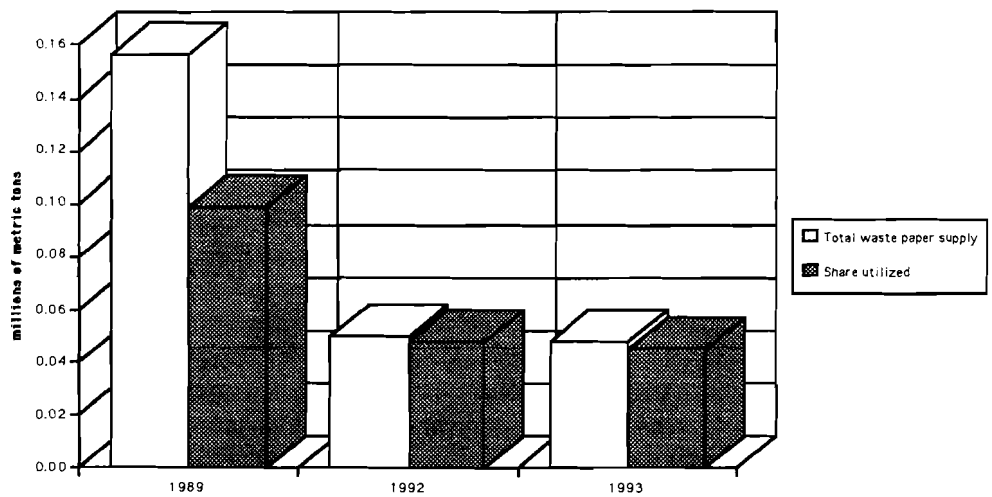
Source: C.A. Backman

FIGURE 4.9: WESTERN SIBERIA - Estimated by-product chip supply and share utilized



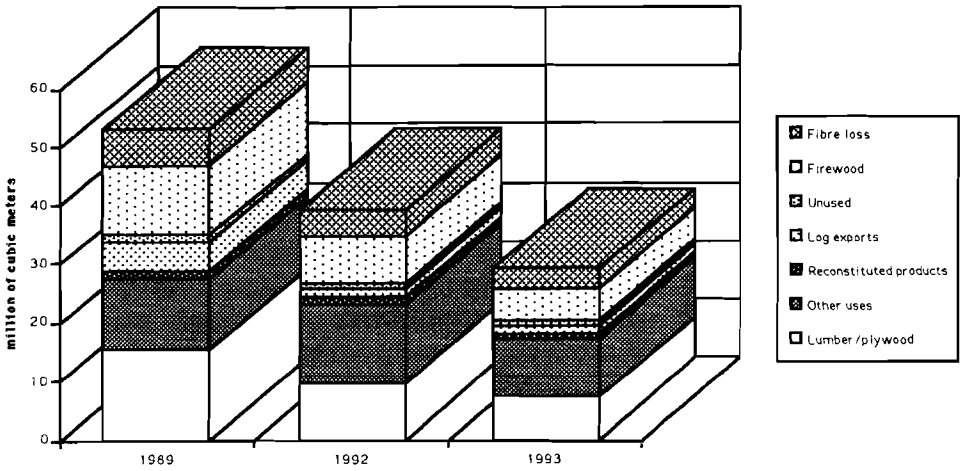
Source: C.A. Backman, Goskomstat (1994a)

FIGURE 4.10: WESTERN SIBERIA - Estimated waste paper supply and share utilized



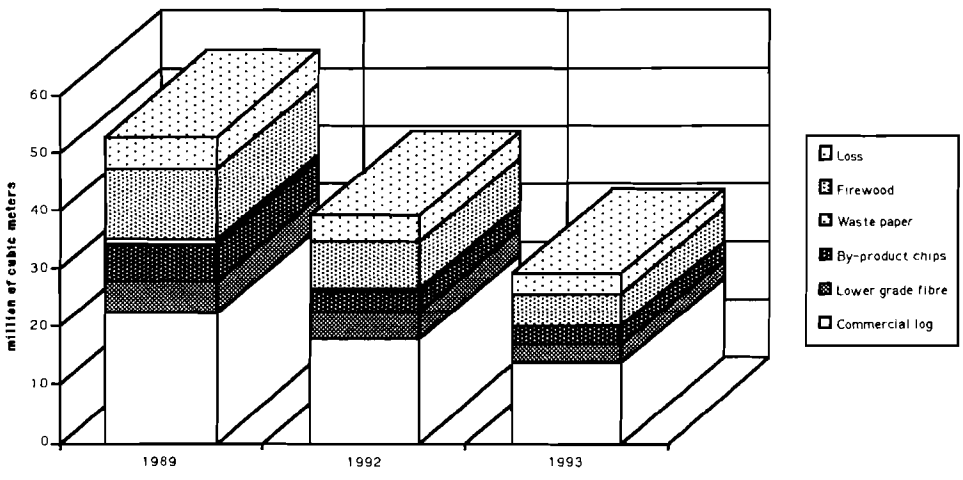
Source: VNIPIEillesprom (1991a), Goskomstat (1993b, 1994a)

FIGURE 4.11: WESTERN SIBERIA - Estimated distribution of fibre supply among uses in roundwood equivalents



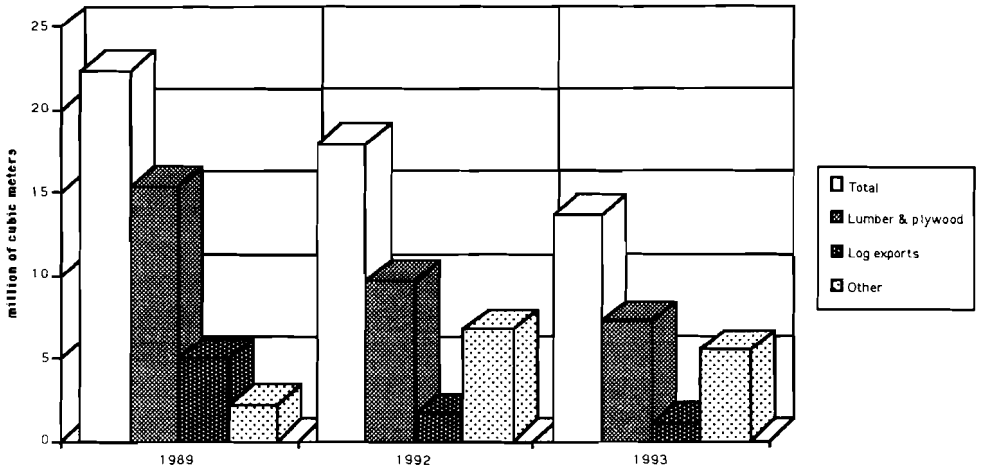
Source: C.A. Backman

FIGURE 4.12: WESTERN SIBERIA - Estimated contribution to fibre supply by the components in roundwood equivalents



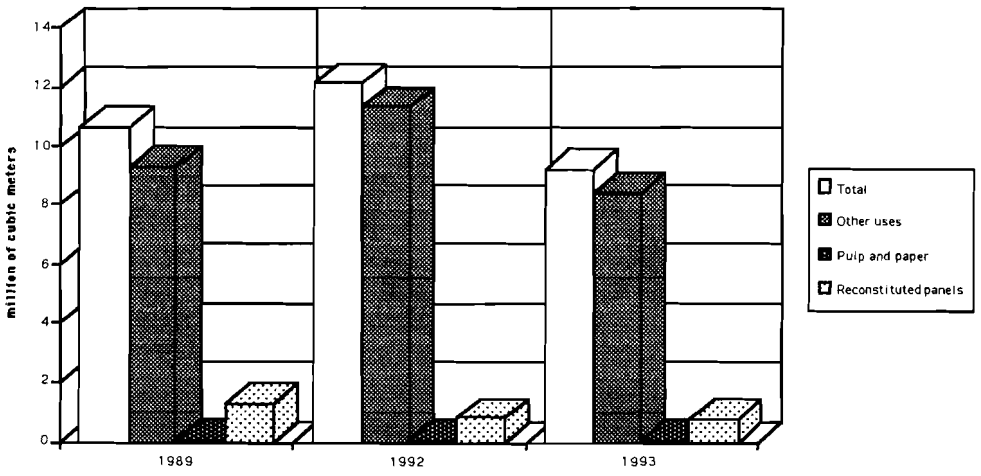
Source: C.A. Backman

FIGURE 4.13: WESTERN SIBERIA - Estimated distribution of commercial log supply among uses in roundwood equivalents



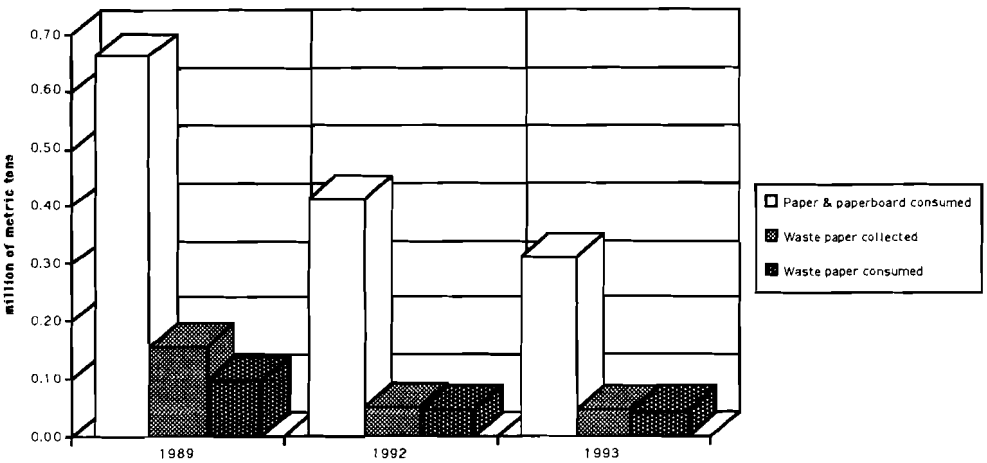
Source: C.A. Backman

FIGURE 4.14: WESTERN SIBERIA - Estimated distribution of residual wood fibre supply among uses in fibre equivalents



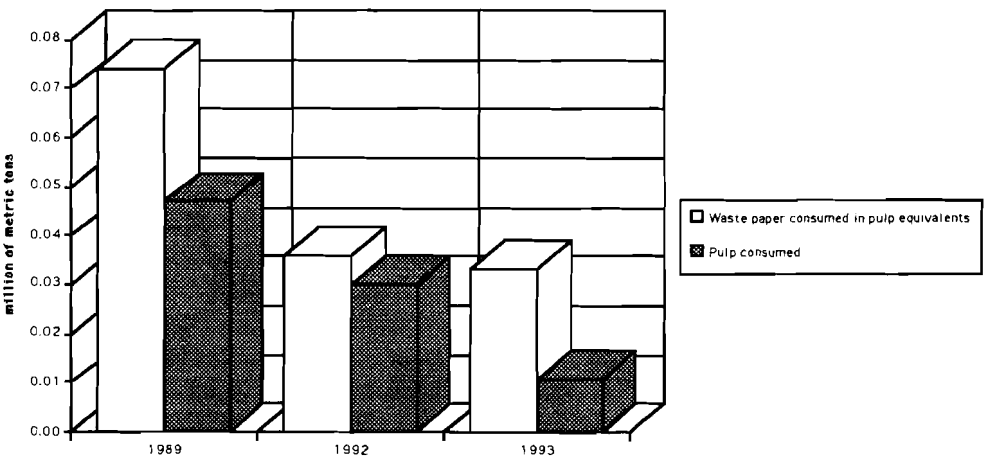
Source: C.A. Backman

FIGURE 4.15: WESTERN SIBERIA - Consumption of paper and paperboard, share available to be recycled, and share recycled



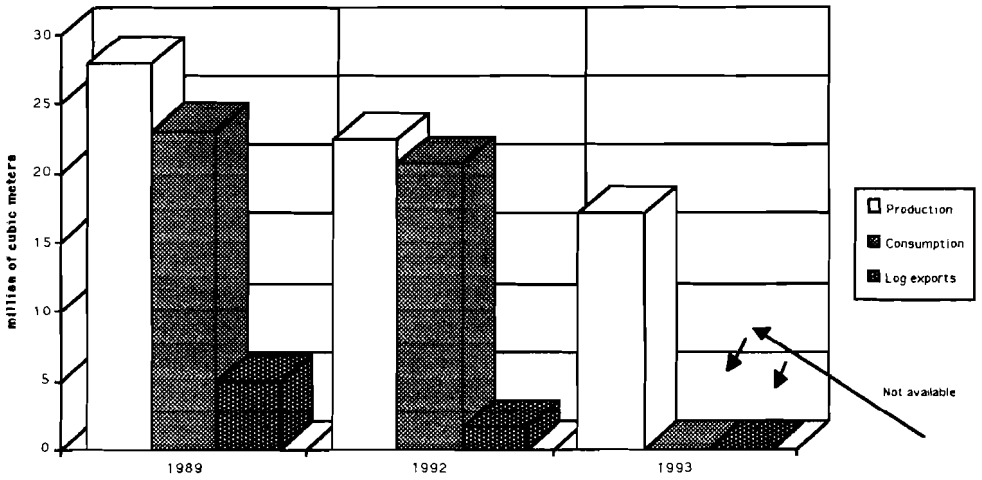
Source: C.A. Backman, Goskomstat (1993b, 1994a), VNIPIEIlesprom (1991a)

FIGURE 4.16: WESTERN SIBERIA - Estimated raw material supply in the production of paper and paperboard



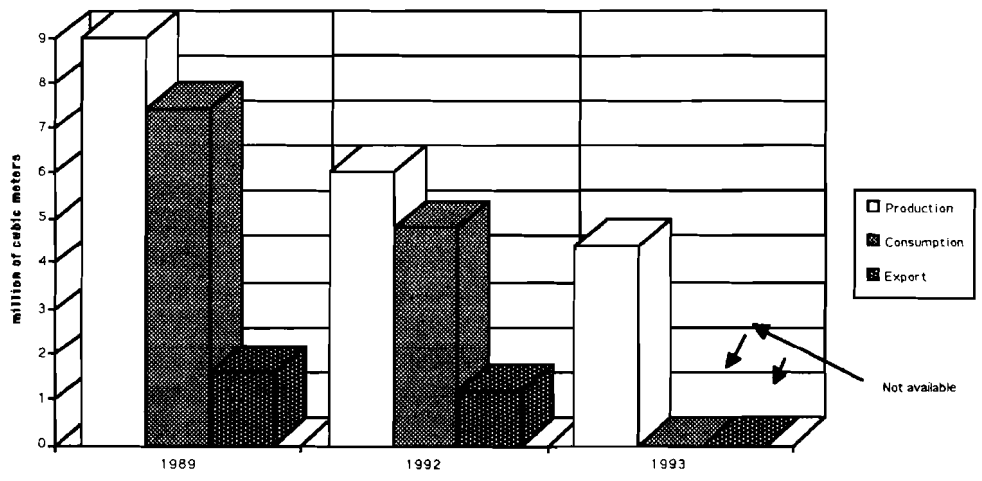
Source: C.A. Backman

FIGURE 4.17: WESTERN SIBERIA - Estimated commercial roundwood supply, share consumed domestically, and share exported



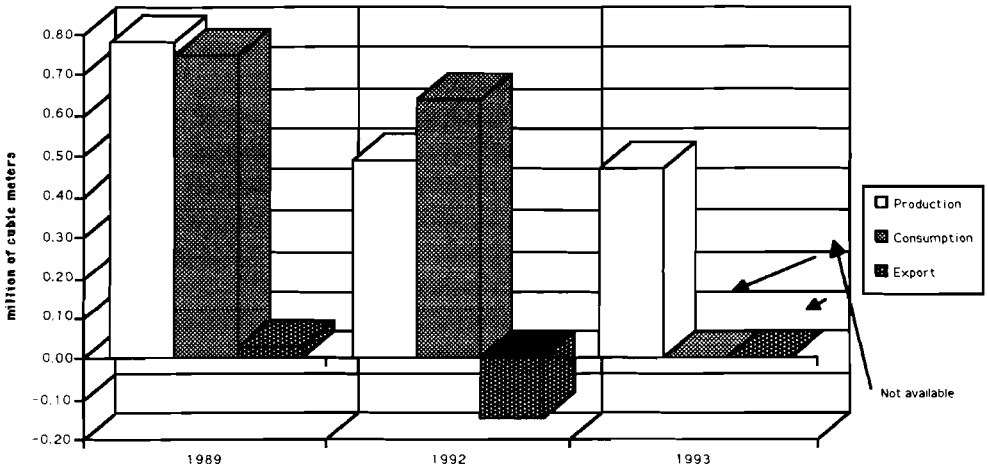
Source: C.A. Backman, VNIPIEIlesprom (1991a)

FIGURE 4.18: WESTERN SIBERIA - Estimated lumber supply, share consumed domestically, and share exported



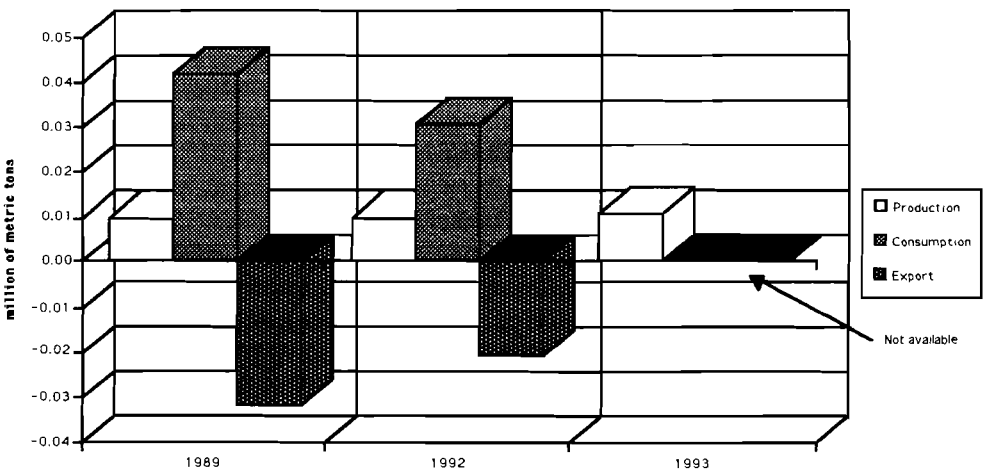
Source: C.A. Backman, VNIPIEIlesprom (1991a), Goskomstat (1994c)

FIGURE 4.19: WESTERN SIBERIA - Estimated reconstituted panel supply, share consumed domestically, and share exported



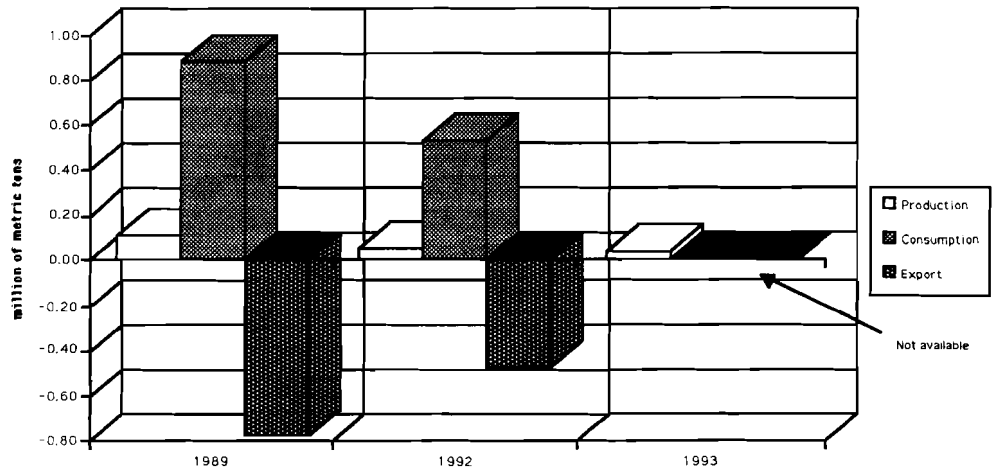
Source: C.A. Backman

FIGURE 4.20: WESTERN SIBERIA - Estimated pulp supply, share consumed domestically, and share exported



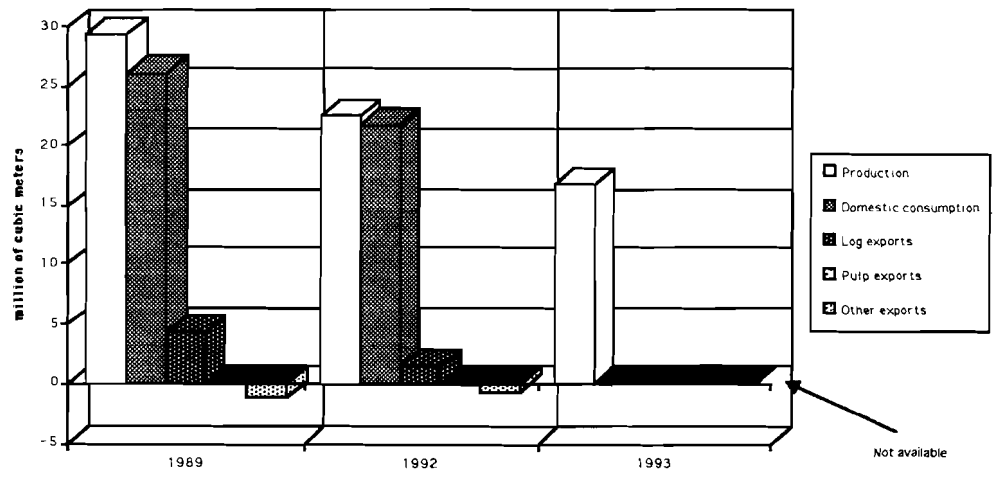
Source: C.A. Backman

FIGURE 4.21: WESTERN SIBERIA - Estimated paper & paperboard supply, share consumed domestically, and share exported



Source: C.A. Backman, Goskomstat (1993b, 1994c), VNIPIEltlesprom (1991a)

FIGURE 4.22: WESTERN SIBERIA - Estimated fibre supply supply, share consumed domestically, and share exported according to product



Source: C.A. Backman

5.0 EAST SIBERIA

The forest sector of East Siberia is presented through 3 sections. In section **5.1 FOREST RESOURCES**, the potential of the resource to support harvest is examined. Section **5.2 FIBRE SUPPLY** describes the extent to which the forest resources have been utilized, illuminating the role of secondary fiber in the overall fiber balance. Section **5.3 FOREST SECTOR ACTIVITY** identifies the different uses to which the fiber supply has been placed and reveals the extent to which trade has contributed to activity in the forest sector.

5.1 Forest Resources

The forest resources in East Siberia are placed in a Russian perspective. The ability of the forest resource to support a flow of fiber is then examined offering an estimate of the degree to which the potential of the resource to support harvest must be modified when developing an estimate of fibre supply accessible to the forest sector.

5.1.1 The Russian Perspective

The East Siberian Economic Region, located between West Siberia and the Far East, accounts for 30 percent of the stocked forest land and 36 percent of the growing stock of Russia, or 234 million hectares and nearly 29 billion cubic meters. More rugged terrain and inhospitable climate than in either West Siberia or European Russia has favoured a coniferous resource which represents one-third of the Russian coniferous forest area and 40 percent of the concomitant growing stock. Some 20 percent of the national deciduous inventory is also located in this economic region. **Figure 5.1** and **Figure 5.2** shows for selected indicators, the forest resources of East Siberia and Russia.

5.1.2 The Wood Basket

Shown in **Figures 5.3** and **Figure 5.4**, the East Siberian coniferous resource, accounting for more than 80 percent of the forested land and 90 percent of her volume, is contained on 187 million hectares of forested land stocked with 26 billion cubic meters of growing stock. The deciduous resource of 3.1 billion cubic meters is supported on 35 million hectares. The

balance of 12 million hectares (one percent) and 276 million cubic meters (one percent) consists of species which do not contribute a significant share of the aggregated inventory.

While the forests of East Siberia can be credited with annual growth of almost 361 million cubic meters, much of this potential is not realizable in the short to medium term let alone longer term. Limitations, identified below, decrease the overall potential of the forest resource by almost three-quarters to some 95 million cubic meters in the short to medium term and an overall estimated accessible volume of nearly 170 million cubic meters over the short to longer term.

5.1.2.1 Growth Potential

The total growth potential of East Siberia, shown in **Figure 5.5**, is estimated to be in the vacinity of 361 million cubic meters. A moderate amount of the forest resource is low site (accounting for 12 million cubic meters of the growth potential) and cannot be expected to contribute to industrial development.[118] Another 120 million cubic meters of the growth potential is located in forests which have uses which directly conflict with harvesting or which are located in the periphery areas, well beyond the projected transportation network thought to be realizable during the next twenty years.[119,120] Another 44 million cubic meters is lost due to modification of harvesting practices necessary to accommodate multiple use leaving almost 170 million cubic meters available in the short, medium and long terms. However, lack of existing major transportational arteries and inappropriate harvesting technology effectively eliminate 73 million cubic meters from the pool of resource usable in the short to medium term.[121]

Footnotes

[118]The quantity credited to the low site category is based on an aggregated quantity identifiable for Russia as a whole (Backman 1994b, p. 75). The total quantity is then allocated to each region based on the share of the total low site lands present.

[119](Backman 1994b, p. 152)

[120]Much of this volume may in fact never be realizable. Much of East Siberia is underlain by permafrost, with virtually all of the reserve volume thought to be contributed by forest located on it. Difficulties connected with re-establishment of another crop of trees following harvesting may effectively eliminate this pool from consideration when a transportational network is finally established.

[121](Backman 1994b, p. 60)

Thus, of the 361 million cubic meters of potential growth in the East Siberian forests, only some 95 million cubic meters can be considered possibly realizable in the short to medium term. The deciduous component, amounting to 26 million cubic meters, accounts for less than 30 percent of the total short to medium term potential while the coniferous component accounts for the remaining 70 percent, or 68 million cubic meters (**Figure 5.6**).[122] Coniferous forest also dominate the medium to long term fibre potential supporting some 70 percent of the 73 million cubic meter total, or 52 million cubic meters. Deciduous forest supports the remaining 21 million cubic meters (**Figure 5.6**).

5.2 Fibre Supply

The fiber supply is made-up of contributions from roundwood, wood chips and waste paper. Imported roundwood and imported pulp do not contribute to the overall supply (**Figure 5.7**). Roundwood is the dominant component of the fiber supply accounting some 85 percent of the fiber in 1989, 1992, and 1993, with most of the remainder contributed by by-product wood chips.

The fiber supply when translating each of these components into chip equivalents shows that nearly 93 million cubic meters were available for distribution in 1989. By 1992, the fiber supply had decreased by one-third to 66 million cubic meters as both domestic and foreign opportunities collapsed. In 1993, the fibre supply fell even further, declining by one-third to an estimated 46 million cubic meters.

5.2.1 Roundwood Harvest

Shown in **Figure 5.8**, the roundwood harvest, with contributions from the monitored system and the unmonitored system, provided 93 million cubic meters in 1989, 69 million cubic meters in 1992, and 46 million cubic meters

Footnotes

[122](Backman 1994b, p. 51) shows 64 million cubic meters of harvest potential supported by coniferous forest and 31 million cubic meters supported by deciduous forests. The numbers presented in the text are different, having been modified to reflect a new paradigm allocating the contribution to the fibre potential from intermediate utilization and other utilization. The distribution of the contributions from these two utilizations presented in the text was based on the experience derived for the principal utilization, and not from that evident from (Voreb'ev 1979, p. 81).

in 1993. More than 90 percent of the harvest is contributed from coniferous forests with the balance flowing from the deciduous forests.[123]

Unlike in West Siberia, not all of the harvest is captured by the Forest Service data collection system. Only between 85 and 90 percent of the harvest flows from within the monitored system. In 1989, the Forest Service system captured 82 million cubic meters of the 93 million cubic meters believed harvested. Together the harvest in 1989 seemed to fall within the ability of the forest resource to support. By 1992, the harvest had declined to 69 million cubic meters, of which 60 million can be accounted for by the Forest Service system. In 1993, harvest levels continued to decline, falling to 49 million cubic meters, 90 percent of which were captured by the Forest Service system, or 42 million cubic meters.

Falling harvest in 1992 to levels three-quarters that of 1989, and then to levels slightly more than one-half of 1989 by 1993 would underscore the easing of developmental pressures. However, while the absolute limits imposed by the resource may not be encroached upon, there may very well be regional imbalances taking place as harvesting spatially becomes more concentrated in response to increasing economic pressures.

5.2.2 Secondary wood fiber

Supplementing the fiber generated through harvesting are wood chips produced by manufacture of wood products and waste left in the harvest settings (**Figure 5.9**).[124] Secondary fiber is thought to contribute up to 10 percent of the overall fiber supply.

In 1989, secondary wood fiber amounted to 13 million cubic meters, 2 million of which are located in the harvested settings. By 1992, the volume of waste material had declined to only 8 million cubic meters, one million cubic meters of which is credited to the harvested areas. By 1993, secondary wood

Footnotes

[123]The information on the distribution of the harvest between coniferous and deciduous is based on experienced derived for 1989.

[124]The waste credited to the harvesting process is not included when determining the fibre supply available for distribution to the competing uses. It is only the by-product wood fibre generated during the manufactured of solid wood products which is actually included with the calculation. Harvesting waste is implicitly included in the harvest volume, inclusive of harvest loss and firewood components.

fibre amounted to an estimated 5 million cubic meters, less than one million of which are believed located in the harvest setting. Most of the secondary material is believed to be coniferous material consistent with the high share of lumber being produced from coniferous species.

5.2.3 Waste Paper Production

A major pulp producer and a region well endowed with forest resources, waste paper has only played a marginal role in meeting the fiber needs of the local paper and paperboard sector, providing less than 5 percent of the overall fiber balance. In 1989, nearly 110 thousand tons of waste paper were available to the forest sector, though only some 40 thousand tons were actually consumed (**Figure 5.10**). By 1992, the pool of waste paper had dropped by more than 80 percent to an estimated 20 thousand tons, 18 thousand of which were in fact consumed. While unavailable, levels of waste paper in 1993, both available and consumed, would most likely be similar to those in 1992.

5.2.4 Imported Roundwood

East Siberia, a net exporter of roundwood in both 1989 and 1992, is believed to also have been one in 1993.

5.2.5 Imported Pulp

East Siberia was a net exporter of pulp in 1989 and 1992. While data is unavailable for 1993, East Siberia also is expected to have been a net exporter of pulp.

5.3 Forest Sector Activity

Supported by the fiber potential, the forest sector has produced a number of products which have been available for export and domestic consumption. Focusing first on the distribution of the fiber supply among the different uses, the activity within the manufacturing sector is discussed.

5.3.1 Fiber Allocation

The fibre supply, amounting to 93 million cubic meters in 1989, has continued to decline since then. In 1992, the fibre supply amounted to 66 million cubic meters, a level slightly less than 30 percent below that evident in 1989. By 1993, the total amounted to 46 million cubic meters, one half the quantity available in 1989. Lumber and plywood output accounts for the largest share of the fibre supply, consuming some two-fifths of the total. Consumption in other unidentified uses and in the manufacture of reconstituted products were the next most important users (**Figure 5.11**).

The roundwood component dominates fiber supply accounting for almost 90 percent of the total. A large part of the roundwood supply consists of non-commercial firewood and another share is lost in transit between the harvesting site and the first point of processing (**Figure 5.12**). The commercial roundwood component of fibre supply is dominated by the commercial log, which accounted for almost 60 percent of the total fibre supply. Firewood with commercial uses contributed almost 5 percent while firewood which was turned into chips for the pulp and paper sector accounted for about 5 percent as well. By-product wood chips account for some 10 percent of the supply.

Fibre supply reached 105 million cubic meters in 1989, of which roundwood accounted for 93 million, or 90 percent. The commercial component of the roundwood supply, after factoring out the firewood and loss in transit, amounted to 65 million cubic meters. Commercial logs accounted for 57.2 million cubic meters while commercial firewood amounted to 3.3 million cubic meters. Lower grade wood turned directly into chips for the pulp sector accounted for 4.4 million cubic meters.

Lumber and plywood output accounted for the largest proportion of the commercial log supply, amounting to 55 percent, or 31.5 million cubic meters (**Figure 5.13**). Exports accounted for 4.4 million cubic meters, leaving 21.3 million cubic meters for distribution to the other uses than lumber and plywood output and export in unmanufactured form.

Adding in the 7.7 million cubic meters of lower grade wood fibre and 11.9 million cubic meters of by-product wood chips to the remaining commercial log supply provides a residual pool of 40.9 million cubic meters, 1.7 million

of which were not utilized. Translating the pool of fibre into fibre equivalents, and factoring out the volume which is not consumed shows a pool of 34 million cubic meters available for use.

The dominant consumer of the residual fibre supply was in the unmanufactured form and in commercial manufacturing uses other than pulp and panel production (**Figure 5.14**). Other uses accounted for more than two-thirds of the supply, or 23 million cubic meters in 1989. The pulp sector accounted for the next largest share of 29 percent (9.9 million cubic meters), while reconstituted panel products consumed the remaining 5 percent, or 1.3 million cubic meters.

By 1992, fibre supply had declined to 77 million cubic meters, of which roundwood contributed 69 million cubic meters. The commercial roundwood component of the roundwood supply available for use amounted to 47.5 million cubic meters. Commercial logs represented 41.8 million cubic meters.[125] Lower grade wood fibre accounted for 5.7 million cubic meters (**Figure 5.12**).

Slightly more than 50 percent of the commercial log supply was dedicated to the lumber and plywood producing sectors (20.1 million cubic meters) (**Figure 5.13**). Export beyond the borders of East Siberia accounted for 17 percent, or 7.1 million cubic meters, leaving 14.6 million cubic meters as a residual pool.

Considering the residual pool of 14.6 million cubic meters along with 5.7 million cubic meters of lower grade wood fibre, and 7.8 million cubic meters of by-product wood chips for consumption by sectors other than solid wood manufacturing and export in the unmanufactured form suggest a residual fibre supply of 28.1 million cubic meters in roundwood equivalents, only 1.4 million cubic meters were unused. Translating the residual pool into fibre equivalents and subtracting the unused fibre shows a pool of 23 million cubic meters available for use.

Footnotes

[125]The commercial roundwood supply presented in the text includes a component in addition to the commercial roundwood supply available from the *Goskomstat* data sources. This component amounts to 4.2 million cubic meters. The unrecorded volume is to account for the increasing porousness of the *Goskomstat* system following the break-up of the former USSR. Commercial wood according to *Goskomstat* data sources amounts to 29.5 million cubic meters.

Other unidentified uses, including consumption in unmanufactured form, accounted for almost two-thirds of the total, or 14.5 million cubic meters (**Figure 5.14**). Consumption in the pulp industry accounted for another third (7.2 million cubic meters), while the reconstituted panel sector consumed the balance of 1.3 million cubic meters.[126]

A declining fibre supply of 54 million cubic meters translates into a smaller roundwood contribution. In 1993, the roundwood supply amounted to 49 million cubic meters. After factoring out the firewood and loss in transit, commercial roundwood fibre supply amounted to almost 34 million cubic meters, less by 30 percent than in 1992. The category of commercial logs accounted for 29.7 million cubic meters of the total commercial volume while lower grade wood material accounted for 4 million cubic meters (**Figure 5.12**).

Lumber and plywood output continued to consume a large share of the roundwood log supply, consuming 43 percent, or 13.0 million cubic meters (**Figure 5.13**). While it is unclear the level of roundwood exported in unmanufactured form, assuming that levels declined marginally from the 1992 level (4.8 million cubic meters) would suggest that one-third of the supply, or 11.9 million cubic meters, were allocated to uses other than solid wood manufacture and export in unmanufactured form. Factoring in the 4 million cubic meters of lower grade wood fibre and 5 million cubic meters of by-product wood chips gives a residual pool of 21 million cubic meters. Translating into fibre equivalents and excluding the unused portion shows a supply of 15 million cubic meters available for other uses.

Presented in **Figure 5.14**, other unidentified commercial uses accounted for some 60 percent of the residual pool, or 10.7 million cubic meters, while the pulp sector accounted for 5.5 million cubic meters, or 37 percent. Panel

Footnotes

[126]The unrecorded but believed consumed commercial fibre of 4.2 million cubic meters has been implicitly allocated to the category of "other uses". Excluding the unrecorded volume from the residual pool, and then determining the share of that pool allocated to each of the three uses shows other uses accounting for 55 percent of the pool, pulp for 37 percent, and reconstituted panel products for 7 percent.

products accounted for the remaining 5 percent, or 0.750 million cubic meters.[127]

A major producer of pulp, the domestically produced paper and paperboard still relies on waste paper as a raw material. In 1989, the waste paper supply (105 thousand metric tons) accounted for one-quarter of the estimated paper and paperboard consumed in East Siberia (**Figure 5.15**). Waste paper consumed amounted to only 40 thousand tons accounting for about 5 percent of the raw material supply consumed in the production of paper and paperboard (**Figure 5.16**).

By 1992, the waste paper supply had plummeted to an estimated 20 thousand tons, less than 10 percent of the estimated consumption of paper products. Correspondingly, consumption of waste paper had declined to some 20 thousand tons accounting for about two percent of the raw material supply. Consumption figures for 1993 are not expected to be materially different from those in 1992.

5.3.2 Forest Product Utilization

East Siberia is a major producer of forest products, accounting for one-fifth of the commercial log output, almost one-quarter of the lumber output, 20 percent of the pulp production, but less than 10 percent of the paper and paperboard output. Since 1989, physical output has fallen and by 1992 varied in size from two-thirds in lumber and in pulp, to five-sixths in panel and paper product output (**Figure 5.17** through **Figure 5.21**). Further declines took place in 1993 with harvesting and lumber output levels falling by another one-third. Pulp production, though, fell by only one-fifth while paper and paperboard output fell by more than one-third.

Commercial roundwood fell from 64 million cubic meters in 1989 to 48 million cubic meters by 1992 (**Figure 5.17**). By 1993, harvest amounted to only 34 million cubic meters. Producing 19 million cubic meters of lumber in

Footnotes

[127]Excluding the unrecorded but believed to have been delivered commercial wood from the residual pool reduces it from 17 million cubic meters to 13.4 million cubic meters. Comparing the consumption in each of the three categories shows 54 percent consumed in other uses, almost 40 percent in the pulp sector, and 6 percent in the panel sector.

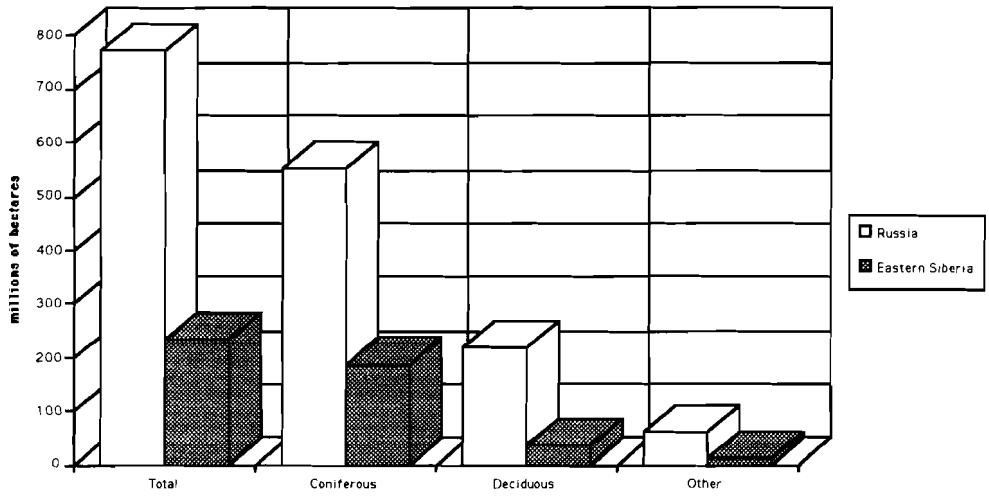
1989, by 1992, output had declined to only 12 million cubic meters before falling to 8 million cubic meters in 1993 (**Figure 5.18**). Although panel output remained constant at 0.8 million cubic meters between 1989 and 1992, by 1993, output had declined to 466 thousand cubic meters (**Figure 5.19**). Pulp output fell between 1989 and 1992 from 2 million tons to 1.5 million tons before falling again in 1993 to some 1.2 million tons (**Figure 5.20**). Paper and paperboard production declined from 0.6 million tons to only 0.5 million tons between 1989 and 1992 (**Figure 5.21**). In 1993, output of paper products continued to fall, to 0.3 million tons from 0.5 million tons in 1992.

While producing forest products surplus to its domestic needs, East Siberia has been a net exporter of a wide range of products. When the share of roundwood exported is considered, one-third of the total fiber available depended in one form or another on markets external to East Siberia in 1989. By 1992, although the volume exported had decreased, the share of total production had actually risen to 50 percent, clearly underscoring that the prospects for future prosperity depend on promoting trade with other regions of Russia and with foreign countries (**Figure 5.22**). Roundwood, while important, accounted for less than 20 percent of the exported fibre in 1989. The largest component was contributed from lumber exports which dominated the exported fibre, accounting for almost 50 percent. Pulp exports accounted for almost one-third. Although roundwood exports rose in importance by 1992 to almost 30 percent of the exported fibre, lumber still accounted for the largest single share, or 41 percent. Pulp exports fell to only one-fifth of the fibre exported.

Roundwood exports in 1989 accounted for 7 percent of commercial roundwood production, or almost 5 million cubic meters. By 1992, the share of roundwwod exported had climbed to almost 15 percent (**Figure 5.17**). In 1989, more than one-third of the lumber produced was destined for markets outside of East Siberia (**Figure 5.18**). By 1992, net exports accounted for more one-half of the production (6 million cubic meters). Although a minor producer of panel products, East Russia seemingly exported up to one-half of its output in 1989 (400 thousand cubic meters) (**Figure 5.19**). By 1992, the export levels had in fact increased to 500 thousand cubic meters. A large pulp capacity surplus to its domestic requirements has translated into more than one-half being destined for export markets (**Figure 5.20**). In 1989, 1.4 million tons were seemingly exported, representing two-thirds of products.

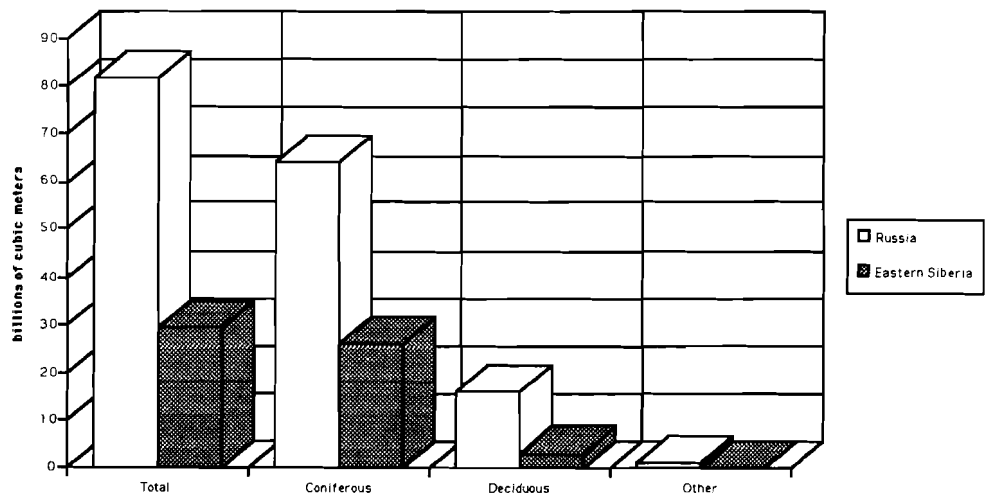
Declining economic activity translated into a smaller export volume in 1992, though the 900 thousand tons still represented almost two-thirds of the output. East Siberia is also a net exporter of paper and paperboard which between 1989 and 1992 varied between 100 and 200 thousand tons (**Figure 5.21**). While data available for 1993 is not sufficiently robust to clearly show exports of either logs or lumber, East Siberia continued to be a net exporter of panel products, pulp products, and paper products.

FIGURE 5.1: RUSSIA and EASTERN SIBERIA - Stocked forest land



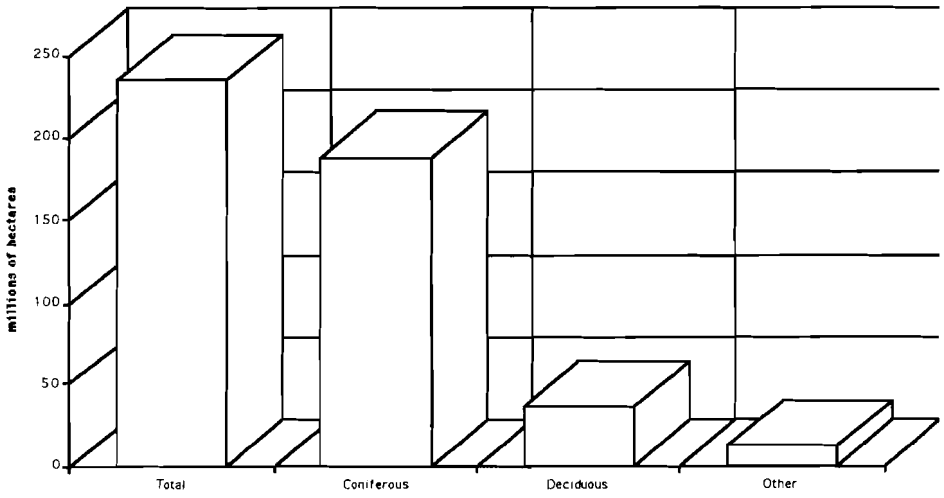
Source: Backman (1994b)

FIGURE 5.2: RUSSIA and EASTERN SIBERIA - Growing stock



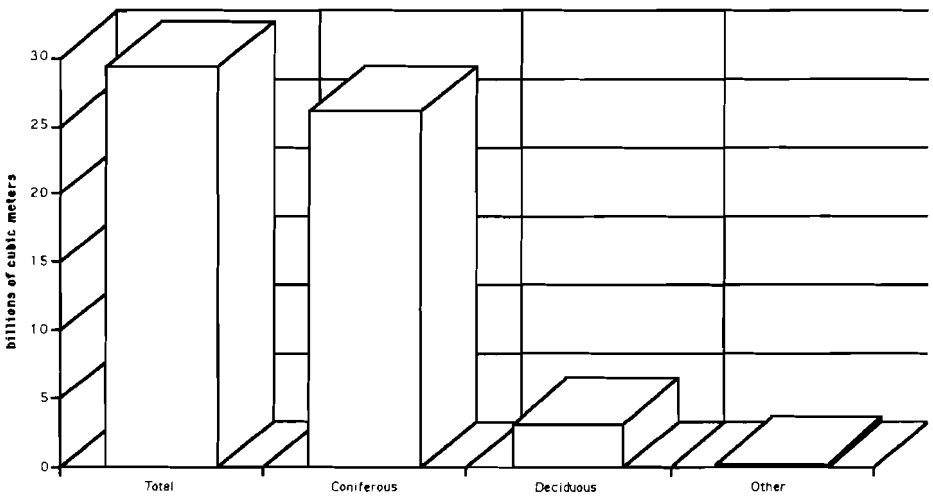
Source: Backman (1994b)

FIGURE 5.3: EASTERN SIBERIA - Stocked forest land



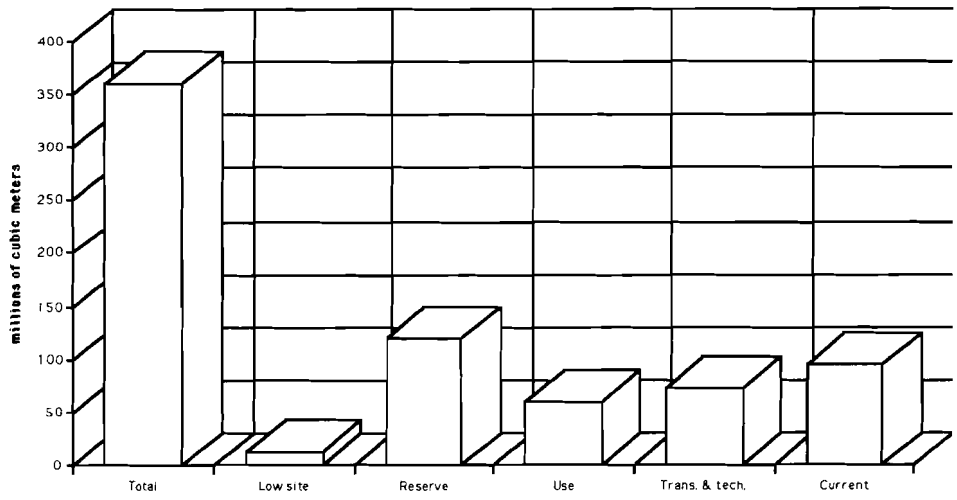
Source: Backman (1994b)

FIGURE 5.4: EASTERN SIBERIA - Growing stock



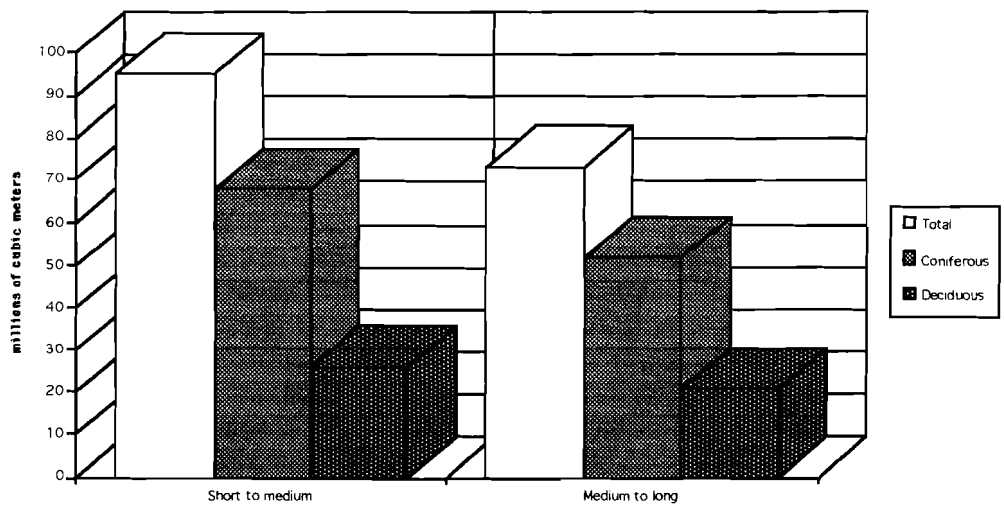
Source: Backman (1994b)

FIGURE 5.5: EASTERN SIBERIA - Estimated annual growth of forest resources



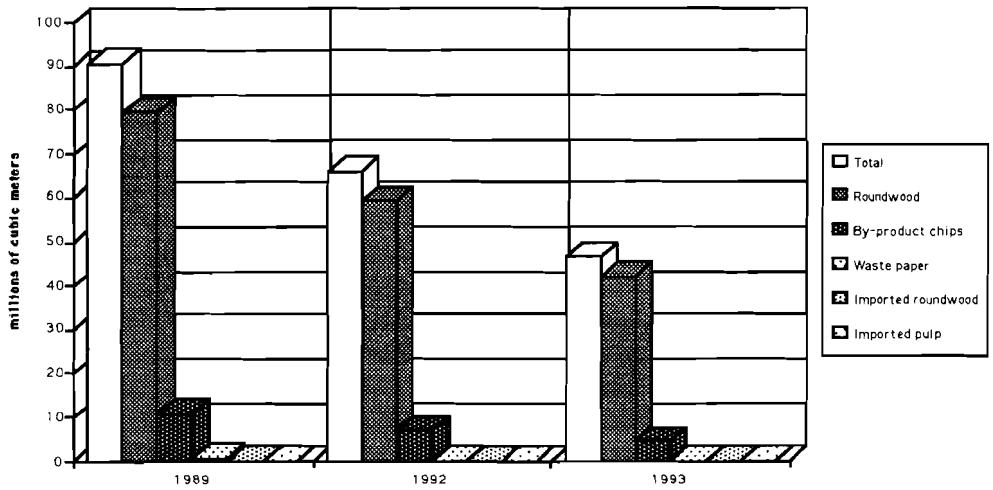
Source: C.A. Backman, Backman (1994b)

FIGURE 5.6: EASTERN SIBERIA - Estimated maximum annual accessible fiber



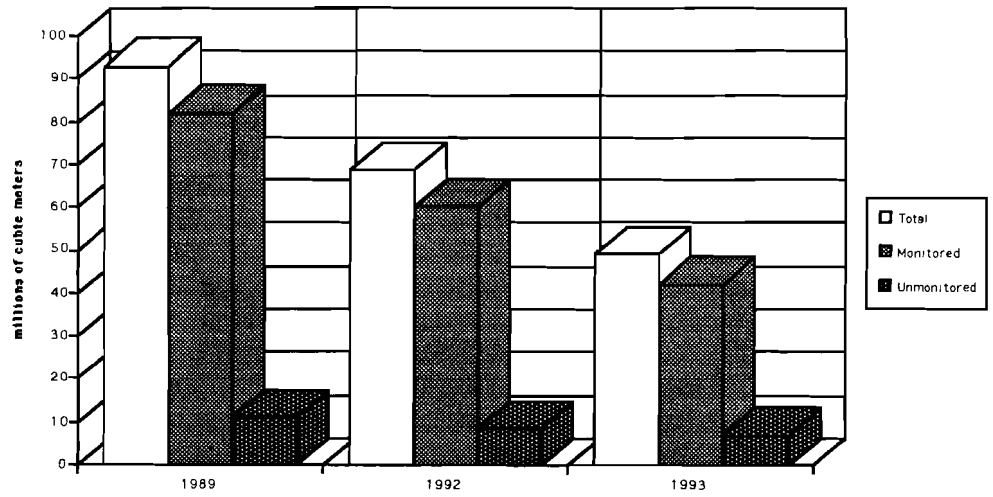
Source: Backman (1994b), C.A. Backman

FIGURE 5.7: EASTERN SIBERIA - Estimated fiber supply in wood chip equivalents



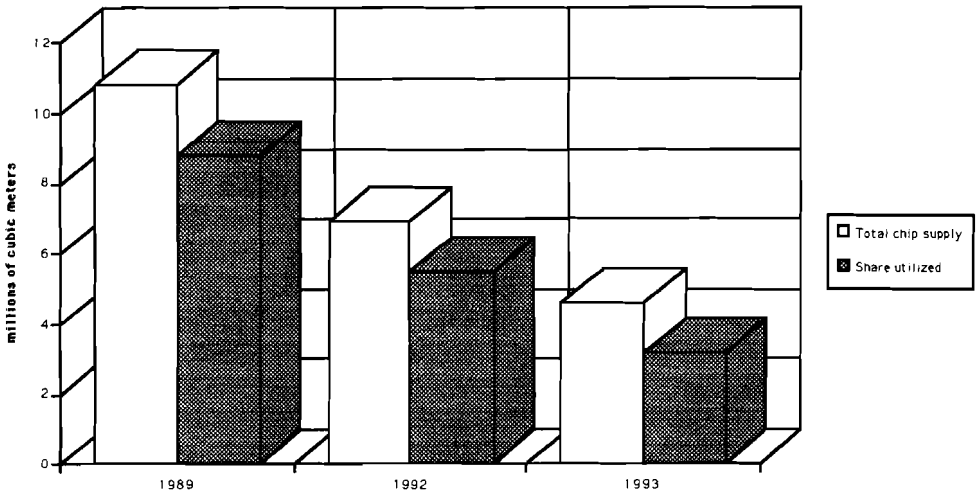
Source: C. A. Backman

FIGURE 5.8: EASTERN SIBERIA - Estimated total harvest from forest resource



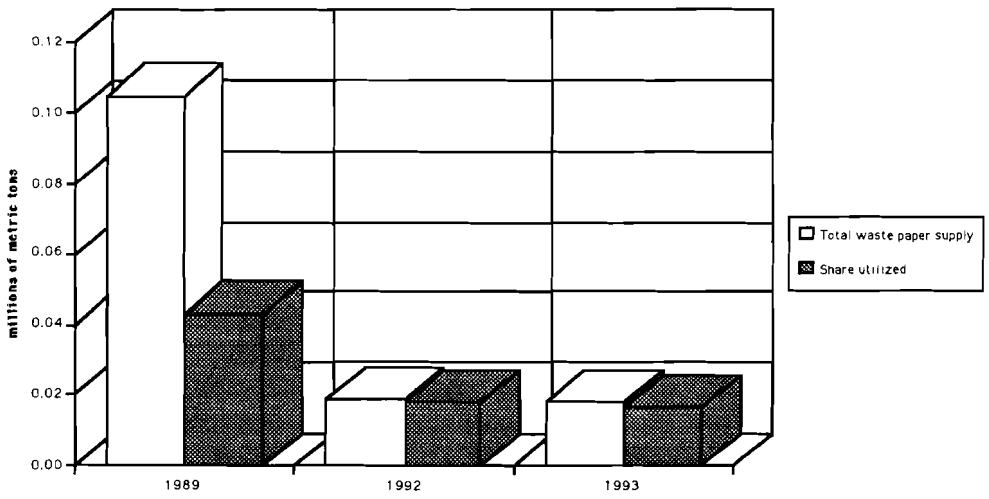
Source: C.A. Backman

FIGURE 5.9: EASTERN SIBERIA - Estimated by-product chip supply and share utilized



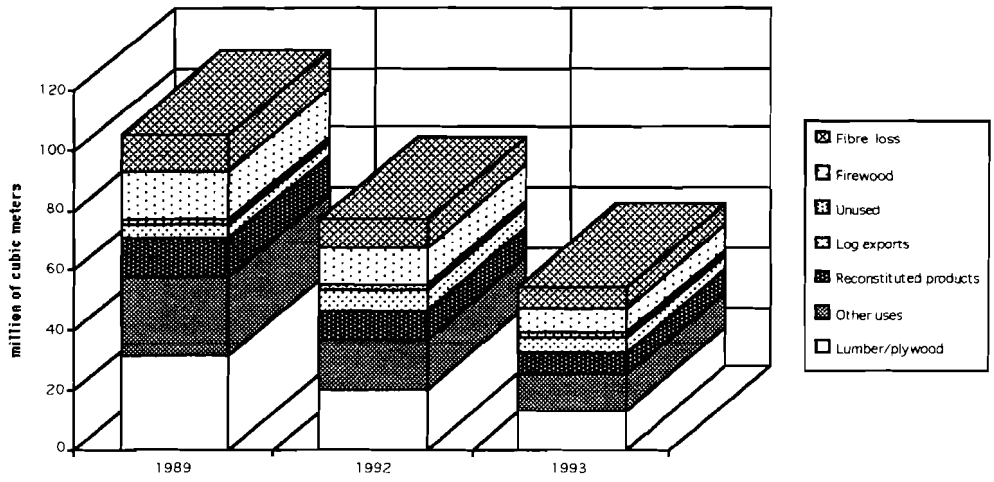
Source: C.A. Backman, Goskomstat (1994a)

FIGURE 5.10: EASTERN SIBERIA - Estimated waste paper supply and share utilized



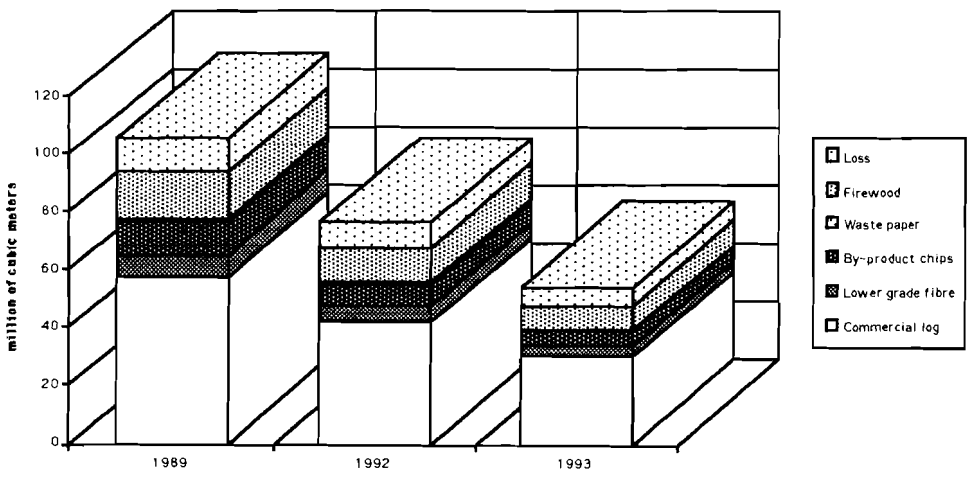
Source: VNIPIEIlliesprom (1991a), Goskomstat (1993b, 1994a)

FIGURE 5.11: EASTERN SIBERIA - Estimated distribution of fibre supply among uses in roundwood equivalents



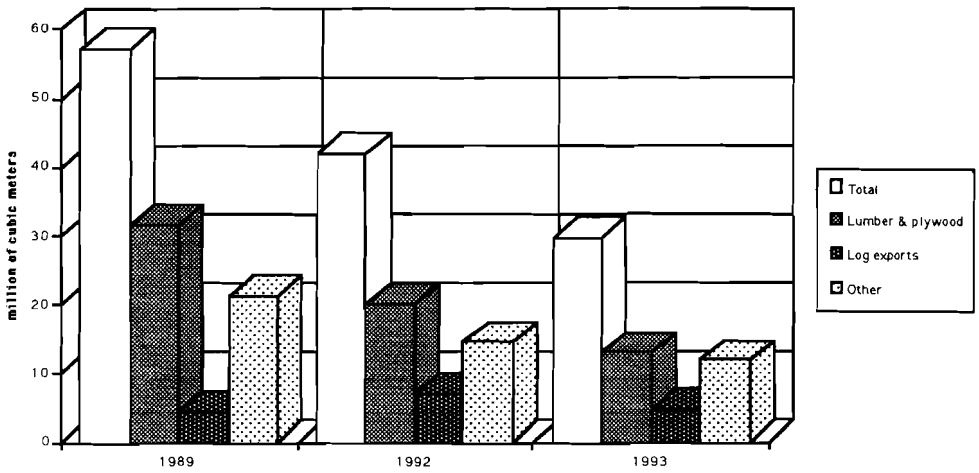
Source: C.A. Backman

FIGURE 5.12: EASTERN SIBERIA - Estimated contribution to fibre supply by the components in roundwood equivalents



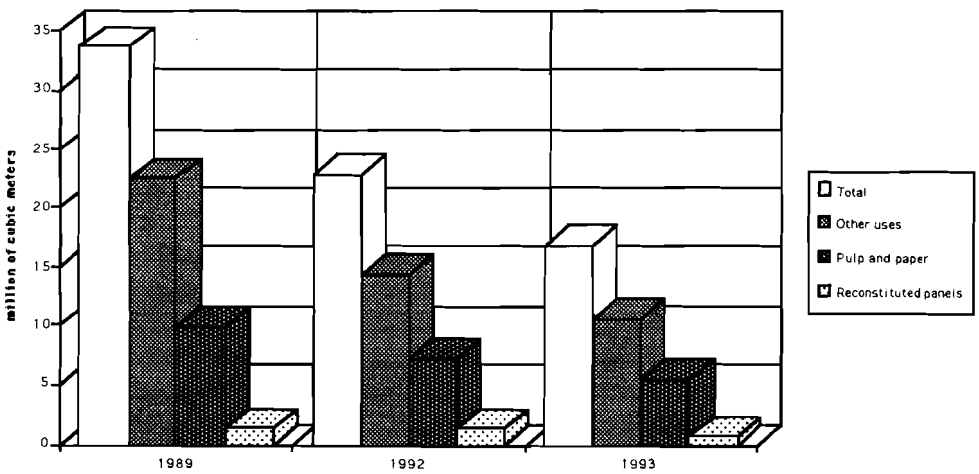
Source: C.A. Backman

FIGURE 5.13: EASTERN SIBERIA - Estimated distribution of commercial log supply among uses in roundwood equivalents



Source: C.A. Backman

FIGURE 5.14: EASTERN SIBERIA - Estimated distribution of residual wood fibre supply among uses in fibre equivalents

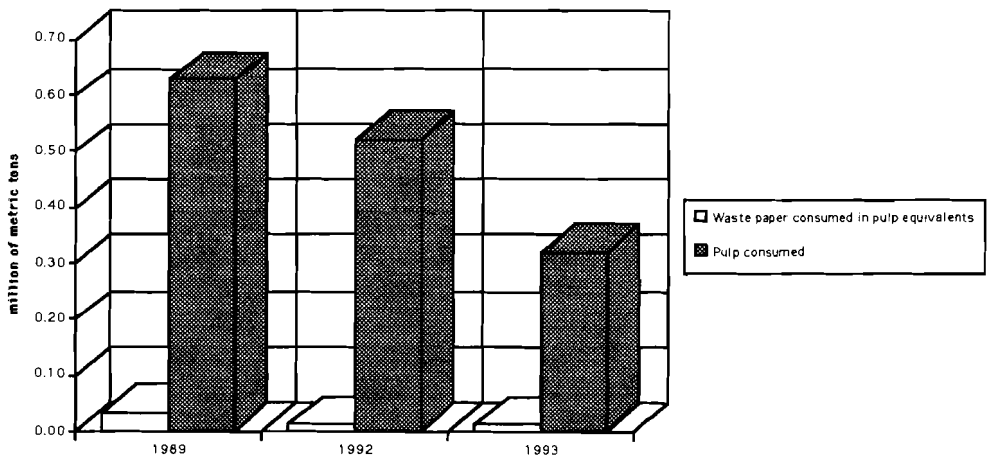


Source: C.A. Backman

FIGURE 5.15: EASTERN SIBERIA - Consumption of paper and paperboard, share available to be recycled, and share recycled

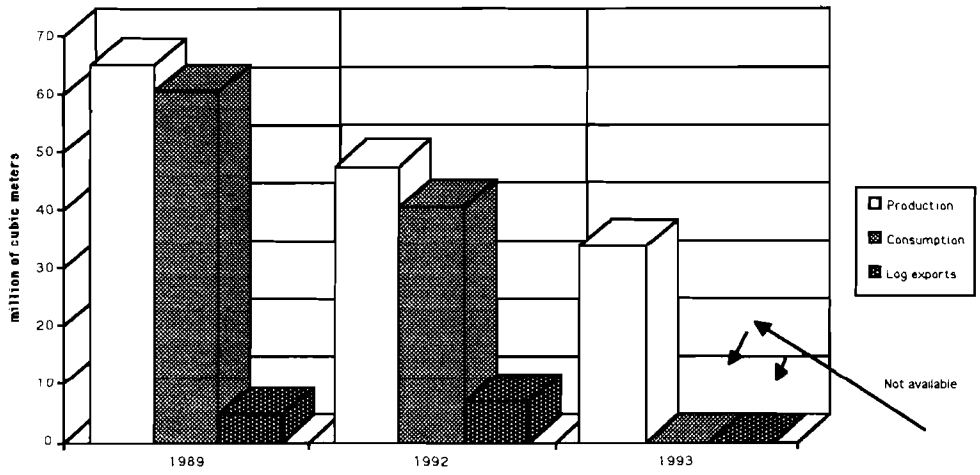
Source: C.A. Backman, Goskomstat (1993b,1994a), VNIPIEIliesprom (1991a)

FIGURE 5.16: EASTERN SIBERIA - Estimated raw material supply in the production of paper and paperboard



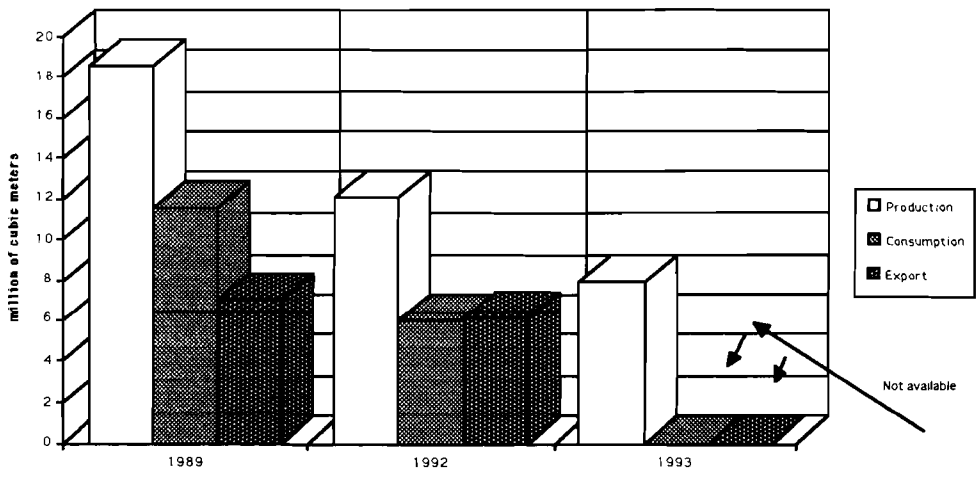
Source: C.A. Backman

FIGURE 5.17: EASTERN SIBERIA - Estimated commercial roundwood supply, share consumed domestically, and share exported



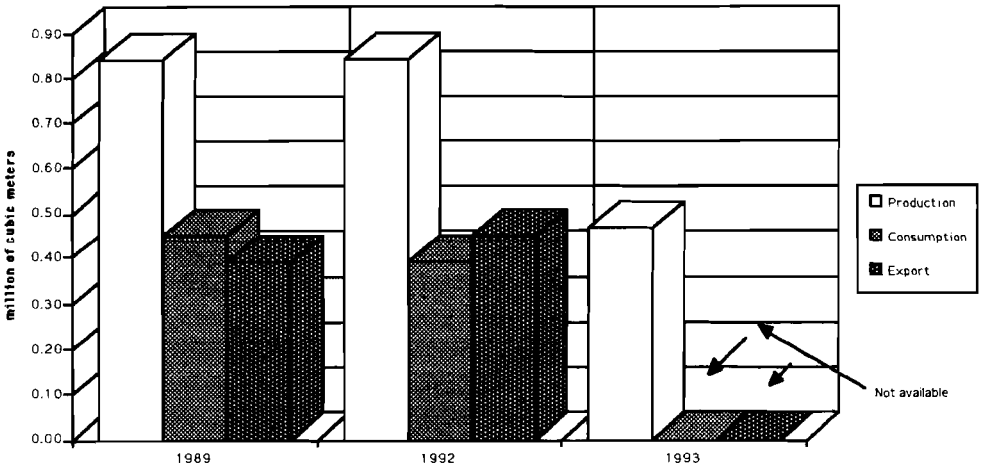
Source: C.A. Backman, VNIPIEIllesprom (1991), Goskomstat (1994c)

FIGURE 5.18: EASTERN SIBERIA - Estimated lumber supply, share consumed domestically, and share exported



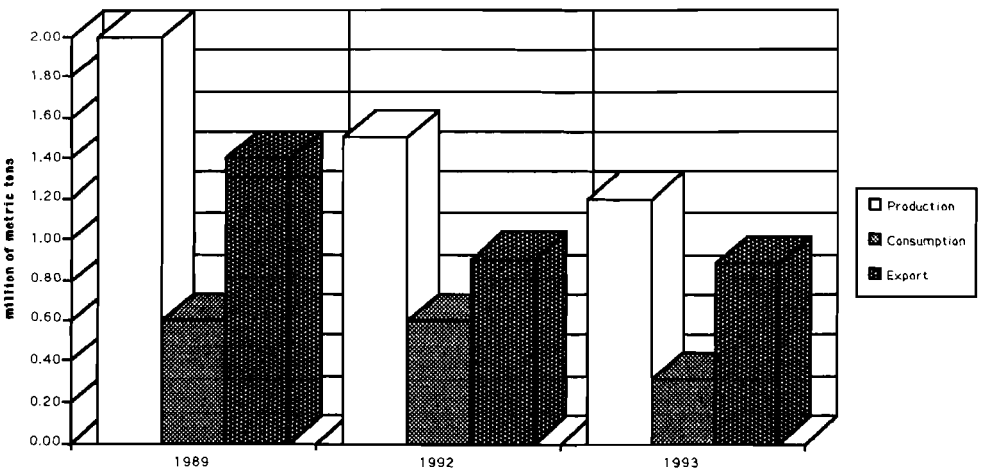
Source: C.A. Backman, Goskomstat (1993c, 1994c), VNIPIEIllesprom (1991)

FIGURE 5.19: EASTERN SIBERIA - Estimated reconstituted panel supply, share consumed domestically, and share exported



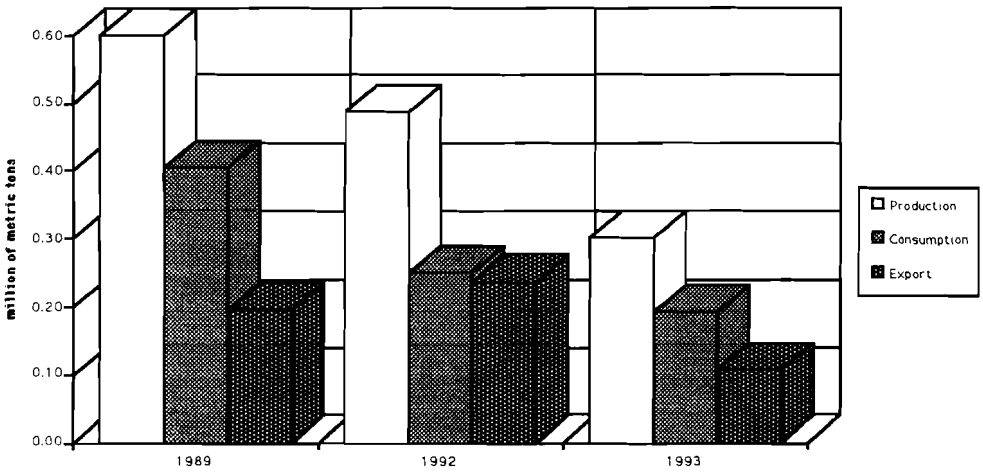
Source: C.A. Backman

FIGURE 5.20: EASTERN SIBERIA - Estimated pulp supply, share consumed domestically, and share exported



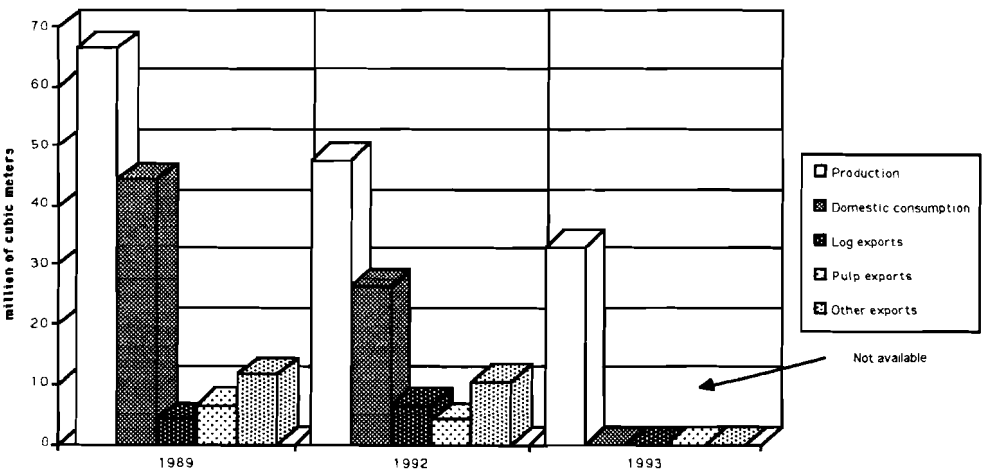
Source: C.A. Backman, VNIPIEIllesprom (1991a)

FIGURE 5.21: EASTERN SIBERIA - Estimated paper & paperboard supply, share consumed domestically, and share exported



Source: C.A. Backman, Goskomstat (1993c, 1994c), VNIPIEMesprom (1991)

FIGURE 5.22: EASTERN SIBERIA - Estimated fibre supply supply, share consumed domestically, and share exported according to product



Source: C.A. Backman

6.0 The FAR EAST

Section **6.1 FOREST RESOURCES** briefly describes the total forest resource, and presents the degree to which that resource can support a flow of fiber. Section **6.2 FIBRE SUPPLY** provides an indication of the extent to which the forest resources have been utilized. It also reveals the degree to which the fiber supply has been augmented by utilization of by-product wood chips and consumption of waste paper. Section **6.3 FOREST SECTOR ACTIVITY** illuminates manufacturing and consumption activities providing an indication to which markets external to the Far East have influenced production possibilities domestically.

6.1 Forest Resources

The forest resources in Far East are placed in a Russian perspective followed by a description of the existing inventory and the extent to which it supports annual growth. An estimate of the degree to which the potential of the resource to support harvest must be modified is then permitted.

6.1.1 The Russian Perspective

The Far East Economic Region, the largest of the four regions of Russia (**Map A**), accounts for a larger area of stocked forest land (albeit proportionally less share of growing stock) than any other single region. The Far Eastern Economic region accounts for 36 percent of the stocked forest land and 26 percent of the growing stock of Russia, or 281 million hectares and nearly 21 billion cubic meters. A more inhospitable climate favours a coniferous inventory which translates into the Russian Far East accounting for 37 percent of the national coniferous forested land and 28 percent of the growing stock. Only 19 percent of the national deciduous stocked forest land and 14 percent of the growing stock are located in this economic region. **Figure 6.1** and **Figure 6.2** compares selected indicators, the forest resources of the Far East with that of Russia.

6.1.2 The Wood Basket

The Far Eastern coniferous resource, accounting for approximately three-quarters of the forested land and five-sixths of her volume, amounts to 202 million hectares of stocked forest land and 17.9 billion cubic meters of

growing stock (**Figure 6.3** and **Figure 6.4**). The deciduous resource of 2.3 billion cubic meters is supported on 29 million hectares. The balance of 49 million hectares (18 percent) and one billion cubic meters (less than 5 percent) consists of species which do not contribute a significant share of the aggregated inventory.

While the forests of Far East can be credited with annual growth of almost 249 million cubic meters, much of this potential is not realizable by the forest industry due to sparse stocking and uses of the forest which either preclude industrial activity or location well beyond the expected transportational network development in the next two decades. It is these limitations just mentioned, *inter alia*, which decrease the overall potential of the Far Eastern forest resource by almost four-fifths to some 43 million cubic meters in the short to medium term and an overall estimated accessibility of nearly 105 million cubic meters in the longer term.

6.1.2.1 Growth Potential

The total growth potential of Far East is estimated to be in the vacinity of 249 million cubic meters (**Figure 6.5**). A significant amount of the forest resource is low site, accounting for 53 million cubic meters of the growth potential, and which cannot be expected contribute to industrial development.[128] Another 87 million cubic meters of the growth potential is located in forests which have uses which directly conflict with harvesting or which are located in the periphery areas, well beyond the projected transportation network thought to be realizable during the next twenty years.[129] A minimal volume is lost due to modification of harvesting practices necessary to accommodate multiple use leaving almost 105 million cubic meters available in the short, medium and long terms.[130] However, lack of major transportational arteries and inappropriate technology effective

Footnotes

[128]The estimated growth linked to low site lands is available for a geographic aggregation of Russia (Backman 1994b, p. 75). The quantity contributed by each region is based on the share of total low site lands for Russia situated in each of the four regions.

[129](Backman 1994b, p. 152)

[130]The reduction linked to multiple uses is directly related to the quantity of forest in the Group I and Group II categories and the forest lying outside of the jurisdiction of the forest sector organizations. Group I and Group II forests account for only some 10 percent of the forested area allocated in total to Group I, Group II, and Group III forest (*Goskomles SSSR* 1991a, p. 374-377), while not forest sector land accounted for only some one percent of the land (Backman 1994b, p. 178). Consequently, the opportunity for net downs is not large.

eliminate 62 million cubic meters from the pool of resource usable in the short, medium and long terms.[131]

Thus, of the 249 million cubic meters of potential growth in the Far Eastern forests, only some 43 million cubic meters can be considered possibly realizable in the short and medium term.[132] The deciduous component, amounting to 8 million cubic meters, accounts for one-fifth of the total with the coniferous component accounting for the remaining 80 percent, or 35 million cubic meters (**Figure 6.6**).[133] The coniferous forest resource also dominates the fibre resource possibly available in the medium to long term, supporting more than 80 percent of the 62 million cubic meter total, or 52 million cubic meters (**Figure 6.6**). The deciduous resource supports the remaining 10 million cubic meters.

6.2 Fibre Supply

While the fiber supply consists of contributions from roundwood, wood chips and waste paper, those consisting of imported roundwood and imported pulp are absent (**Figure 6.7**). Translating each of these components into chip equivalents shows that nearly 42 million cubic meters were available for distribution in 1989. By 1992, the fiber supply had decreased by 30 percent to 28 rnillion cubic meters as both domestic and foreign opportunities collapsed. The fibre supply continued to decline in 1993 falling to 22 million cubic meters.

6.2.1 Roundwood Harvest

Roundwood is the dominant component of the fiber supply accounting for between 90 percent and 95 percent of the fiber between 1989 and 1993.

Footnotes

[131](Backman 1994b, p. 60)

[132](Backman 1994b, p. 51)

[133](Backman 1994b, p. 51) identifies 10 million cubic meters supported by the deciduous forest and 34 million cubic meters supported by the coniferous forest, different from the 35 million cubic meters and 8 million cubic meters presented in the test. The differences are due to the different paradigm employed with the numbers in the text to determine the coniferous and deciduous component contributions from intermediate utilization and other utilization. Intermediate utilization an other utilization are two of the four building blocks of the estimated fibre supply potentially available in the short to medium term. In the text, the ratio of coniferous component evident in the principal utilization was applied to the total contribution by the intermediate utilization and other utilization. In (Backman 1994b), the ratio evident from (Voreb'ev 1979, p. 59) was employed for both intermediate and other utilization.

Accounting for 42 million cubic meters in 1989, by 1992, 30 million cubic meters were produced, while 24 million cubic meters were produced in 1993 (**Figure 6.8**). The harvest from the monitored system dominated the harvest, contributing 40 million cubic meters, 28 million cubic meters, and 22 million cubic meters in 1989, 1992, and 1993, respectively. Harvesting which apparently took place outside of the monitored system accounted for 3 million cubic meters, 2 million cubic meters, and 1.5 million cubic meters respectively. Some four-fifths of the harvest is contributed from coniferous forests with the balance flowing from the deciduous forests.[134]

While the harvest levels within the monitored system in 1989 amounted to the sustainable levels in the short to medium term, the incremental harvest of 3 million cubic meters which the forest service system did not capture no doubt pushed the use of the forest beyond what the sustainable levels in the short to medium term are.

Although harvest levels had dropped off by nearly 30 percent in 1992 to 28 million cubic meters, and then to 24 million cubic meters by 1993, pressures on the forest resource may not have necessarily eased. While the absolute limits imposed by the resource may not be encroached upon, there may very well be regional imbalances taking place as harvesting spatially becomes more concentrated in response to increasing economic pressures.

6.2.2 Secondary wood fiber

Supplementing the fiber generated through harvesting are wood chips produced by manufacture of wood products and unutilized waste left in the harvest settings (**Figure 6.9**). In 1989, secondary wood fiber amounted to 5 million cubic meters, one million of which are located in the harvested settings. By 1992, the volume of waste material had declined substantially to only 3 million cubic meters, one million cubic meters of which is credited to the harvested areas. Further declines were witnessed in 1993 with the volume of waste material falling to only 2 million cubic meters, one-half of

Footnotes

[134]The distribution of the harvest between coniferous and deciduous components is based on the experience in 1989.

which is not consumed. Most of the material is believed to be coniferous material.

6.2.3 Waste Paper Production

Although a net exporter of pulp, the Far East has found it necessary to combine domestically produced pulp with waste paper re-cycling to meet the fiber needs of the local paper and paperboard sector. In 1989, nearly 90 thousand tons of waste paper were available to the forest sector, representing one-fourth of the estimated paper and paperboard consumed in the Far East, although consumption was much less (55 thousand tons). By 1992, the pool of waste paper had declined by 30 percent to 40 thousand tons, representing less than 20 percent of the domestically consumed paper and paperboard. Actual consumption was slightly less than 40 thousand tons. While data is not yet available, the activity in 1993 is thought to be essentially unchanged from 1992.

6.2.4 Imported Roundwood

The Far East was a net exporter of roundwood in both 1989 and 1992, and is believed to have been one in 1993.

6.2.5 Imported Pulp

The Far East was a net exporter of pulp in 1989 and 1992, and is thought to have been one in 1993.

6.3 Forest Sector Activity

Supported by the fiber potential, the forest sector has produced a number of products which have been available for export and domestic consumption. Focusing first on the distribution of the fiber supply among the different uses, the activity within the manufacturing sector is discussed.

6.3.1 Fiber Allocation

The fibre supply has been falling since 1989 when 41 million cubic meters on a fibre equivalent basis were available for use. By 1992, the supply had declined to 28 million cubic meter, one-third less than in 1989. By 1993, after

falling to 22 million cubic meters, the fibre supply amounted to almost 55 percent of the levels evident in 1989.

Lumber and plywood production accounted for one-third of the supply in 1989 while log exports accounted for another one-third (**Figure 6.11**). The consumption in producing reconstituted panel products and pulp products was a low consumer of the fibre supply. While both lumber and exports plummeted in 1992, the dominant consumer was in unidentified uses. By 1993, recovering log exports and falling lumber output has reduced lumber and plywood to third most important.

The roundwood component dominates fiber supply accounting for some 90 percent of the 48 million cubic meters total (roundwood equivalent basis). After factoring out the firewood component and the share of fiber lost in transit, the contribution by roundwood to the commercial fiber supply amounted to 27.3 million cubic meters in 1989 (**Figure 6.12**). Wood chips contributed 15 percent or 3.8 million cubic meters in 1989. Waste paper contributed a nominal share to the overall fiber supply in 1989. Corresponding figures for 1992 were 18.6 million cubic meters of roundwood (90 percent), 1.9 million cubic meters of wood chips, and less than one hundred thousand cubic meters of waste paper. In 1993, figures amounted to 14.5 million cubic meters, 1.2 million cubic meters, and less than one thousand tons.

Commercial logs accounted for the largest share of the commercial roundwood supply, amounting to 90 percent in 1989, or 24.7 million cubic meters. Lower grade wood contributed four percent (1.3 million cubic meters) while lower grade wood used to produce chips for the pulp and paper industry contributed six percent, or 1.5 million cubic meters.

Lumber and plywood consumption dominated the consumption of the commercial log supply, accounting for 42 percent, or 10.5 million cubic meters in 1989 (**Figure 6.13**). Export in unprocessed form accounted for 40 percent, or 9.9 million cubic meters, leaving only 4.4 million cubic meters (18 percent) for distribution to uses other than for lumber and plywood, and export in unmanufactured form. After considering the 2.9 million cubic meters of lower grade wood fibre, a by-product wood chip supply of 4.2 million cubic meters, some 11.5 million cubic meters were available as a pool for other uses.

Translating into fibre equivalents, and excluding the unused wood chips, shows 9.1 million cubic meters as a residual pool. Other unidentified uses represented the majority of the residual pool, accounting for more than one-half, or 5.2 million cubic meters (**Figure 6.14**). Pulp production accounted for one-third (3.2 million cubic meters), while reconstituted products consumed the balance of 0.6 million cubic meters.

By 1992, fibre supply had declined to 34 million cubic meters on a roundwood equivalent basis, of which roundwood contributed 30 million cubic meters (**Figure 6.12**). The commercial roundwood fibre amounted to 18.6 million cubic meters, more than 90 percent of which were contributed by commercial logs (17.3 million cubic meters).[135] By-product chips provided another 2.1 million cubic meters rounding out the wood fibre supply of 20.7 million cubic meters on a roundwood equivalent basis.

Lumber and plywood accounted for almost one-third, or 5.3 million cubic meters, while exports represented only 17 percent (2.9 million cubic meters) (**Figure 6.13**). The unallocated share, amounting to 9.1 million cubic meters, comprised one-half of the total. Adding the 1.3 million cubic meters of lower grade wood and the 2.2 million cubic meters of by-product wood chips provided a pool of 12.6 million cubic meters in roundwood equivalents for distribution to uses other than log exports and lumber and plywood production. Translating into fibre equivalents, excluding the unused portion of by-product chips, shows a pool of 10.8 million cubic meters.

Other unidentified commercial uses accounted for the largest share of the residual pool, consuming approximately three-fifths, or 6.2 million cubic meters (**Figure 6.14**). Pulp production accounted for approximately one-fifth (2.0 million cubic meters), while reconstituted panel products consumed less than 5 percent, or 0.4 million cubic meters.

The fibre supply continued to decline into 1993, amounting to 27 million cubic meters on a roundwood equivalent basis (**Figure 6.12**). Roundwood

Footnotes

[135]Commercial wood recorded by *Goskomstat* data sources shows a total commercial wood supply of 16.3. Another 2.3 million cubic meters of commercial are believed to have been made available, but due to the increasing porousness of the *Goskomstat* data system, not have been recorded.

accounted for 24 million cubic meters, of which the commercial component amounted to 14.5 million cubic meters. Commercial logs accounted for virtually all of the volume, or 13.5 million cubic meters. Adding in the 1.3 million cubic meters of by-product chips provided a pool of 15.8 million cubic meters on a roundwood equivalent basis.

Lumber and plywood accounted for less than one-quarter of the commercial log supply, or 3.2 million cubic meters (**Figure 6.13**). Exports accounted for 4.5 million cubic meters, or one-third of the commercial log supply. Adding to the balance of 5.8 million cubic meters, a lower grade wood fibre supply of 2.3 million cubic meters provides a balance of 8.1 million cubic meters. Translating into fibre equivalents shows a residual pool of 6.8 million cubic meters.

Pulp production accounted for only 12 percent of the overall residual supply, or 0.8 million cubic meters (**Figure 6.14**). Panel products consumed 5 percent, or 0.3 million cubic meters, while the largest share was consumed by unspecified uses (5.7 million cubic meters or 84 percent).

Although a major exporter of pulp, the domestic paper and paperboard still relies on waste paper as a raw material. The waste paper supply amounted to one-quarter of the estimated paper and paperboard consumed in 1989, somewhat higher than the level evident in 1992 (less than 20 percent) (**Figure 6.15**). However, slightly more than one-half of the available supply was in fact consumed on 1989, thus reducing the recyclable amount to only one-eight of the consumed quantity. Waste paper actually consumed amounted to 50 thousand tons which represented some 7 percent of the raw material supply consumed in the production of paper and paperboard (**Figure 6.16**). By 1992, consumption of waste paper had declined to 40 thousand tons representing only 9 percent of the raw material supply. While data describing 1993 is not available, the differences with 1992 are not expected to have been very different.

6.3.2 Forest Product Utilization

The Far East has been a moderate producer of forest products, accounting for approximately 10 percent of the Russian commercial log production and between 5 and 10 percent of the lumber and pulp and paper product output. Since 1989, physical output has fallen and by 1992 varied in size from 60

percent of 1989 levels in panel output and pulp and paper product output (**Figure 6.17** through **Figure 6.21**).

Lumber production collapsed to levels one-half of those existing in 1989, while commercial roundwood fell by one-third. Producing 27 million cubic meters of commercial logs in 1989, by 1992 production amounted to only 18.6 million cubic meters (**Figure 6.17**). Corresponding figures for lumber output were 6 million cubic meters in 1989 and 3 million cubic meters in 1992 (**Figure 6.18**). Panel output declined from 0.4 million cubic meters to 0.3 million cubic meters (**Figure 6.19**) while pulp production declined more steeply from 0.7 million tons to only 0.4 million tons (**Figure 6.20**). The production of paper and paperboard also declined falling from 0.5 million tons in 1989 to 0.3 million tons by 1992 (**Figure 6.21**).

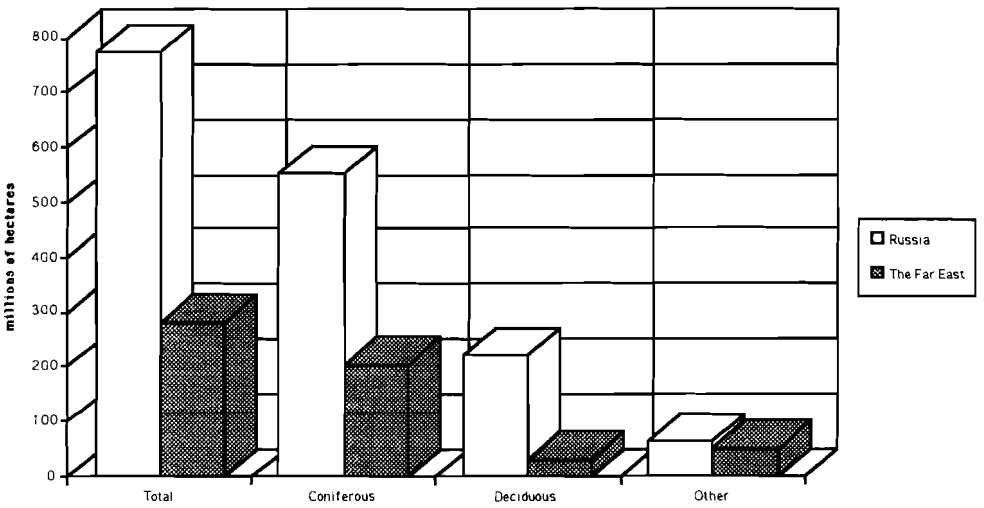
The decline in output, evident between 1989 and 1992, continued into 1993 with delivered harvest levels amounting to 14.5 million cubic meters versus 18.6 million cubic meters in 1992. Lumber output fell to 2 million cubic meters from 3.2 million cubic meters while pulp production fell to 160 thousand tons from 400 thousand tons. Paper output fell more precipitously to 62 thousand tons from 151 thousand tons while paperboard output also fell by a similar ratio to 52 thousand tons from 152 thousand tons.

Producing forest products surplus to its domestic needs, the Far East has been a net export of a wide range of products, though especially in the roundwood exports (**Figure 6.22**). When the share of roundwood exported is considered, more than 40 percent of the total fiber available depended in one form or another on markets external to the Far East in 1989. Roundwood dominated the exports, accounting for 75 percent of the exported volume. While the share has declined between 1989 and 1992 to 25 percent, largely on the decline of roundwood exports, though they still accounted for two-thirds of the total exported fibre.

In 1989, more than one-third of the commercial roundwood produced was destined for export markets (**Figure 6.17**). By 1992, the share had declined sharply to less than one-fifth of the volume produced. In 1989, one-sixth of the lumber produced was destined for markets outside of Far East (**Figure 6.18**). However, by 1992, net exports accounted for only 10 percent of the production. Being a marginal producer of panel products, the Far East exported an insignificant quantity of output in both 1989 and 1992 (**Figure**

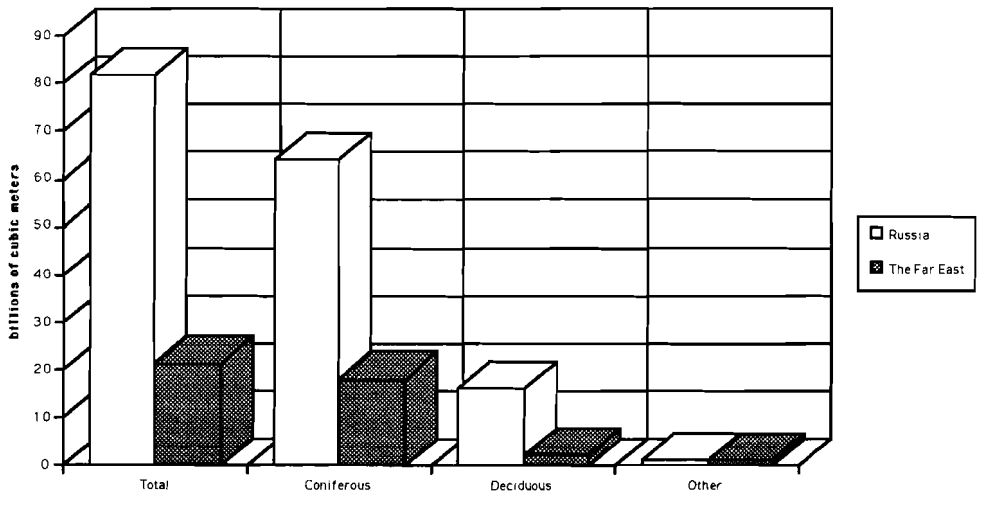
6.19). The Far East has exported small quantities of pulp which in 1992 amounted to 200 thousand tons, up from the 100 thousand tons exported in 1989 (**Figure 6.20**). While producing small quantities of paper and paperboard products, the Far East has apparently been able to export small quantities of paper and paperboard products which accounted for one-third of output in 1989 and one-quarter of output in 1992 (**Figure 6.21**).

FIGURE 6.1: RUSSIA and THE FAR EAST - Stocked forest land



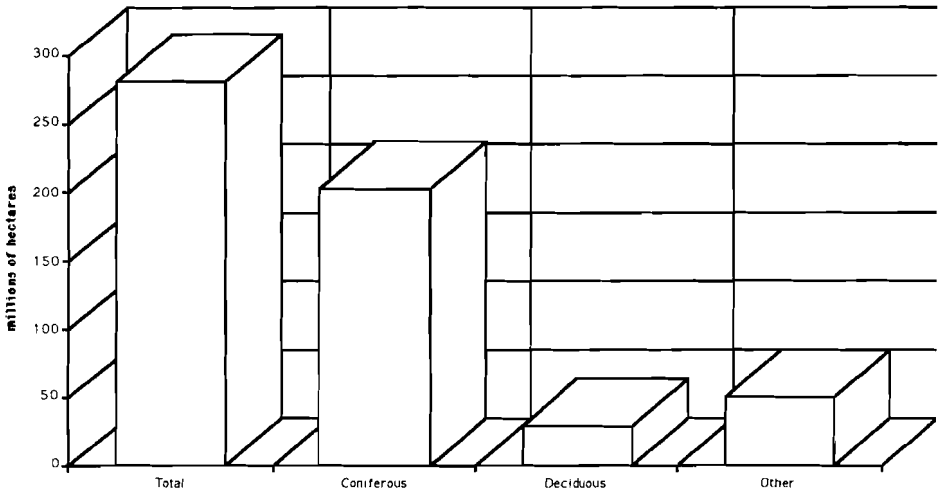
Source: Backman (1994b)

FIGURE 6.2: RUSSIA and THE FAR EAST - Growing stock



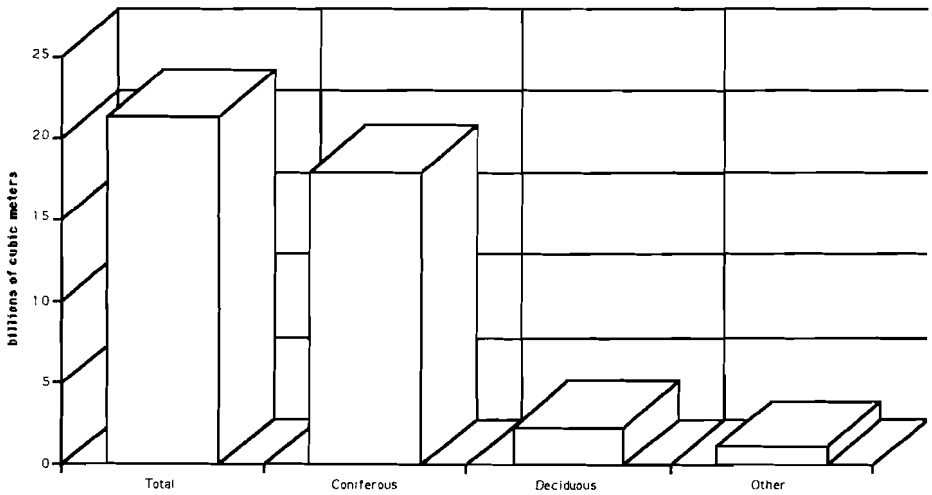
Source: Backman (1994b)

FIGURE 6.3: THE FAR EAST - Stocked forest land



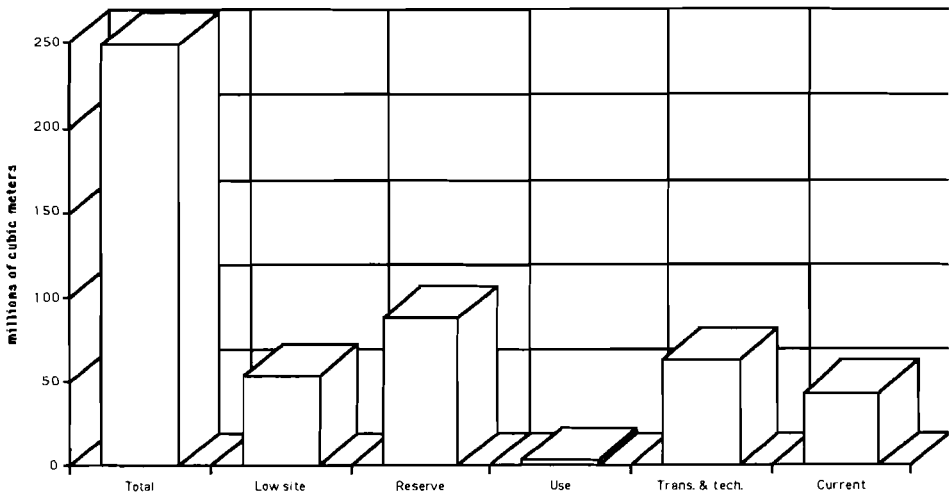
Source: Backman (1994b)

FIGURE 6.4: THE FAR EAST - Growing stock



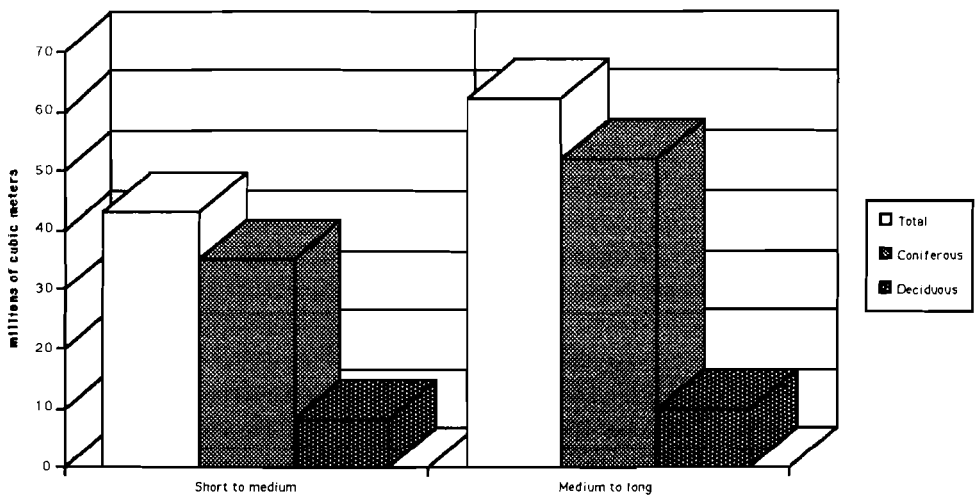
Source: Backman (1994b)

FIGURE 6.5: THE FAR EAST - Estimated annual growth of forest resources



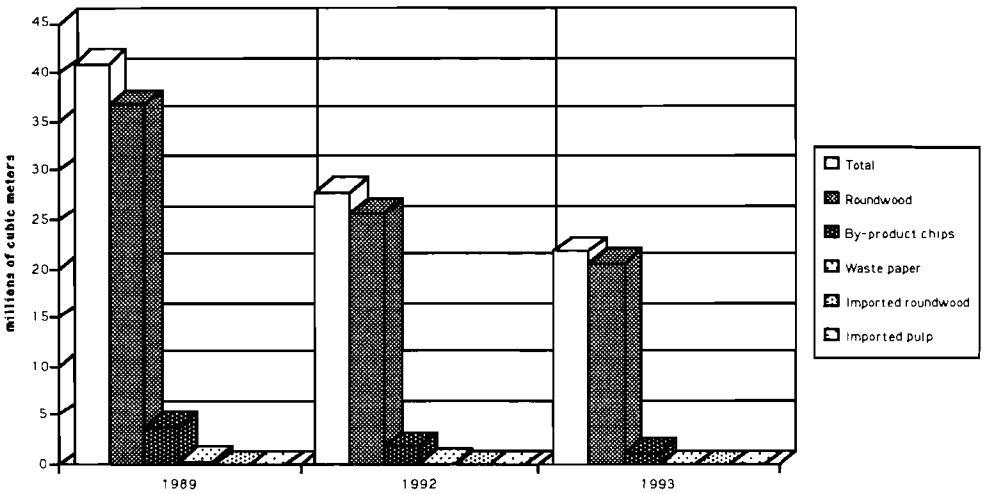
Source: C.A. Backman, Backman (1994b)

FIGURE 6.6: THE FAR EAST - Estimated maximum annual accessible fiber



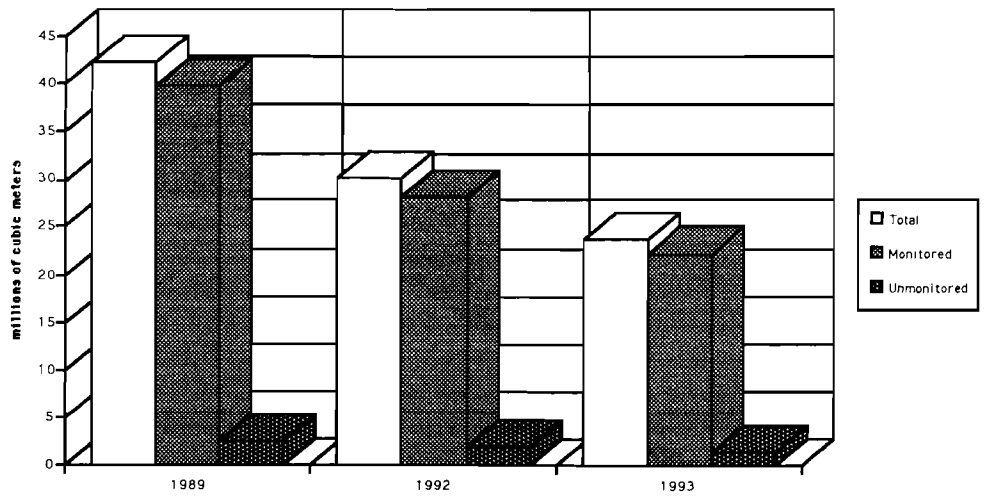
Source: Backman (1994b), C.A. Backman

FIGURE 6.7: THE FAR EAST - Estimated fiber supply in wood chip equivalents



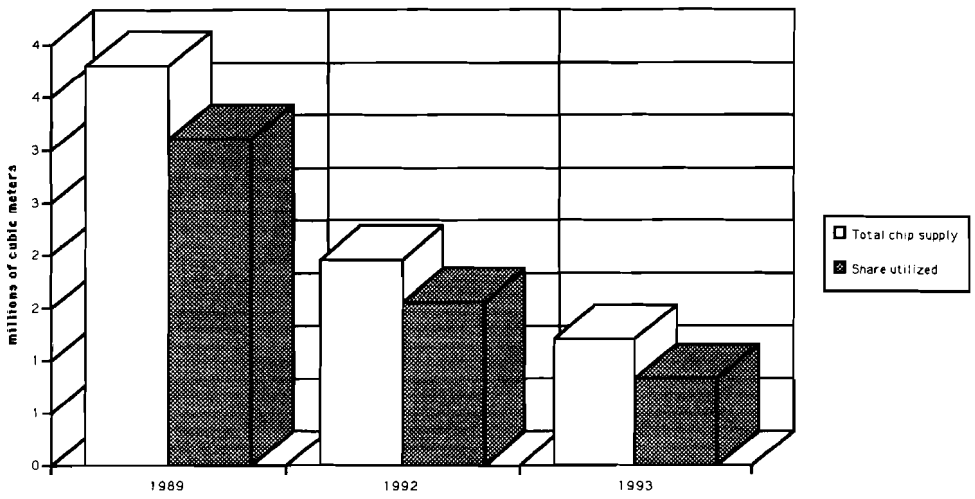
Source: C. A. Backman

FIGURE 6.8: THE FAR EAST - Estimated total harvest from forest resource



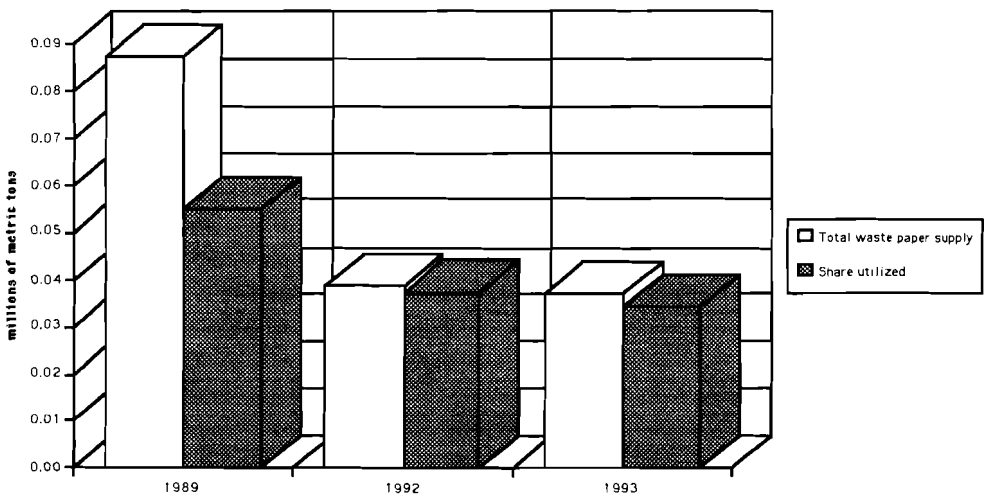
Source: C.A. Backman

FIGURE 6.9: THE FAR EAST - Estimated by-product chip supply and share utilized



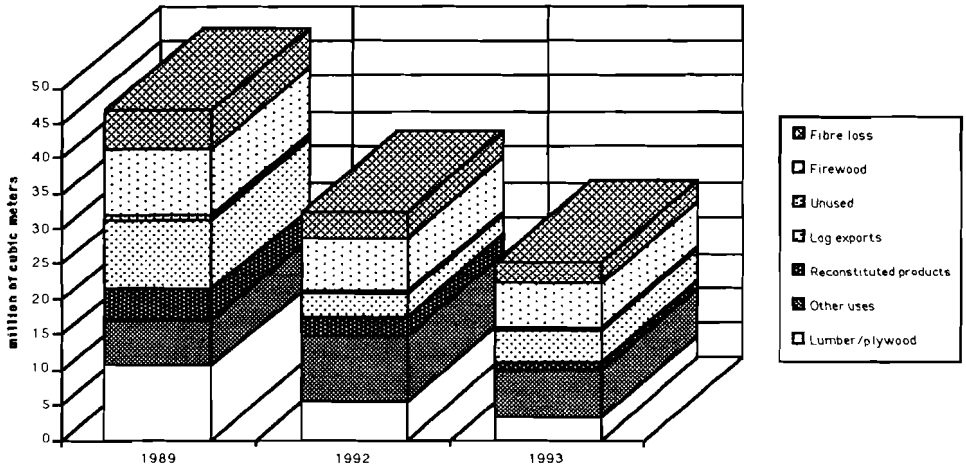
Source: C.A. Backman, Goskomstat (1994a)

FIGURE 6.10: THE FAR EAST - Estimated waste paper supply and share utilized



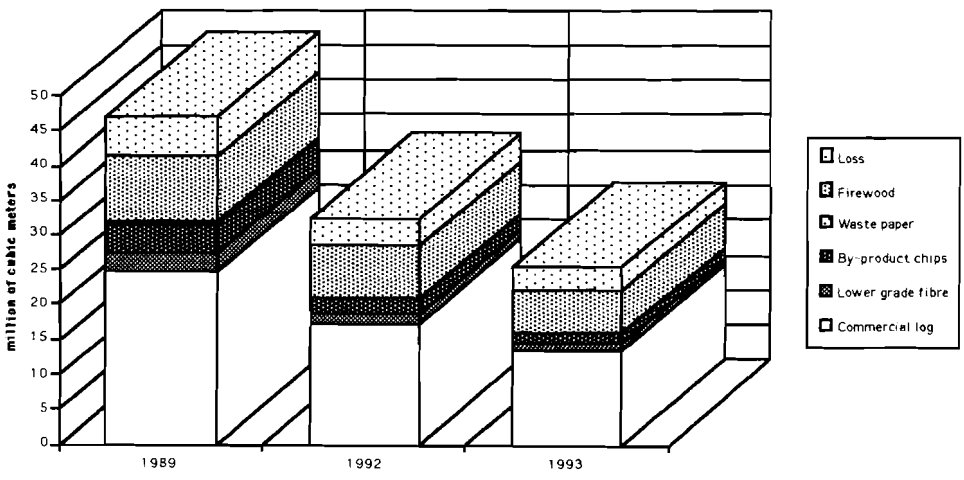
Source: VNIPIEIllesprom (1991a), Goskomstat (1993b,1994a)

FIGURE 6.11: THE FAR EAST - Estimated distribution of fibre supply among uses in roundwood equivalents



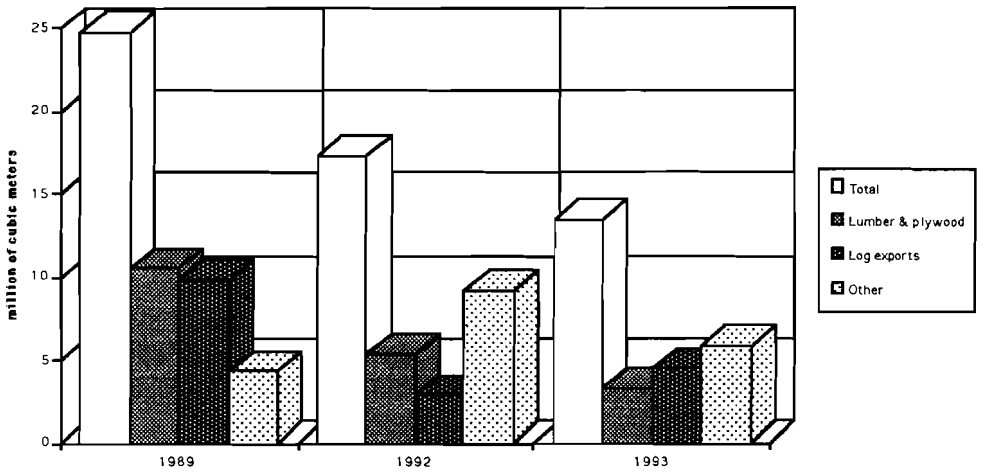
Source: C.A. Backman

FIGURE 6.12: THE FAR EAST - Estimated contribution to fibre supply by the components in roundwood equivalents



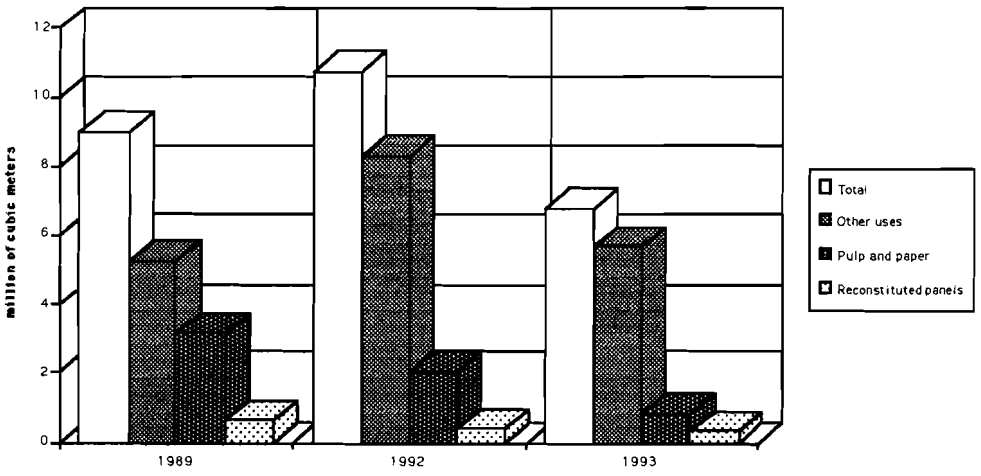
Source: C.A. Backman

FIGURE 6.13: THE FAR EAST - Estimated distribution of commercial log supply among uses in roundwood equivalents



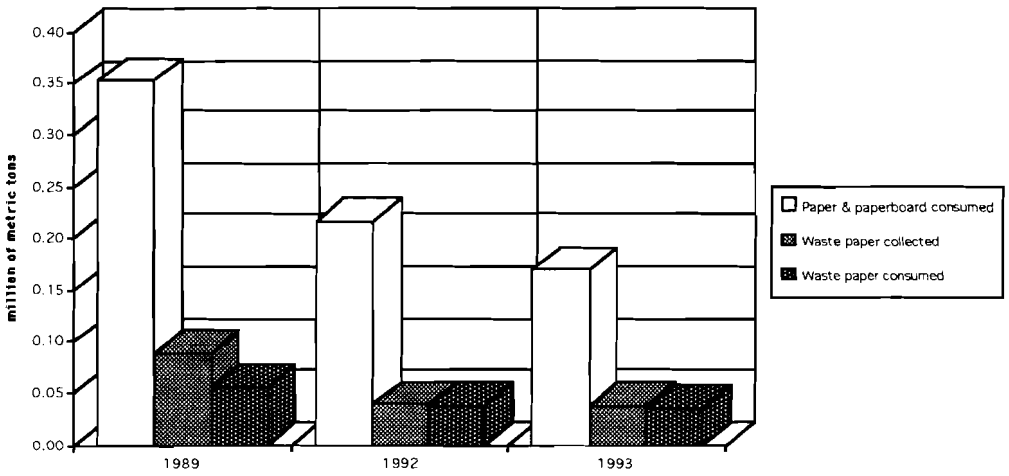
Source: C.A. Backman

FIGURE 6.14: THE FAR EAST - Estimated distribution of residual wood fibre supply among uses in fibre equivalents



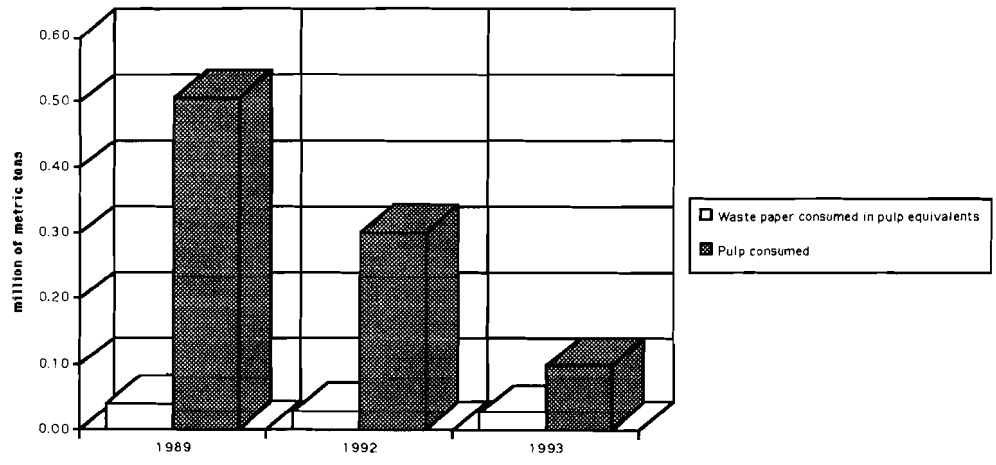
Source: C.A. Backman

FIGURE 6.15: THE FAR EAST - Consumption of paper and paperboard, share available to be recycled, and share recycled



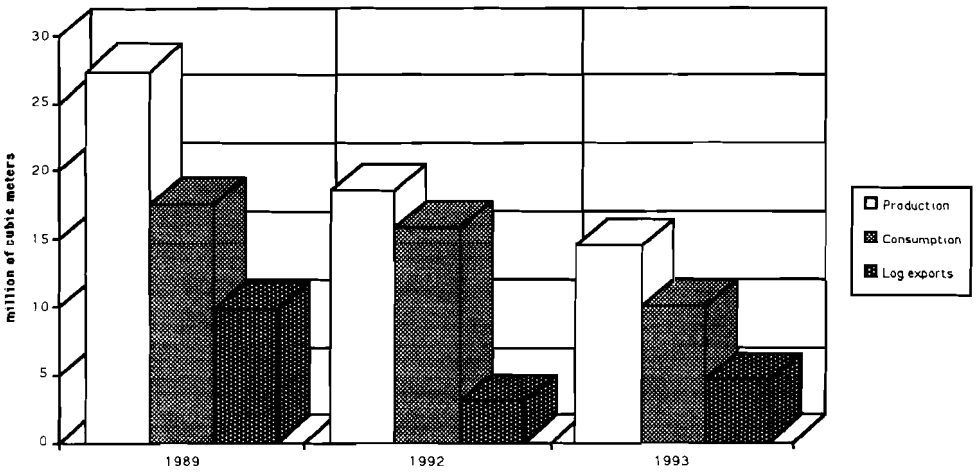
Source: C.A. Backman, Goskomstat (1993b, 1994a), VNIPIEIllesprom (1991a)

FIGURE 6.16: THE FAR EAST - Estimated raw material supply in the production of paper and paperboard



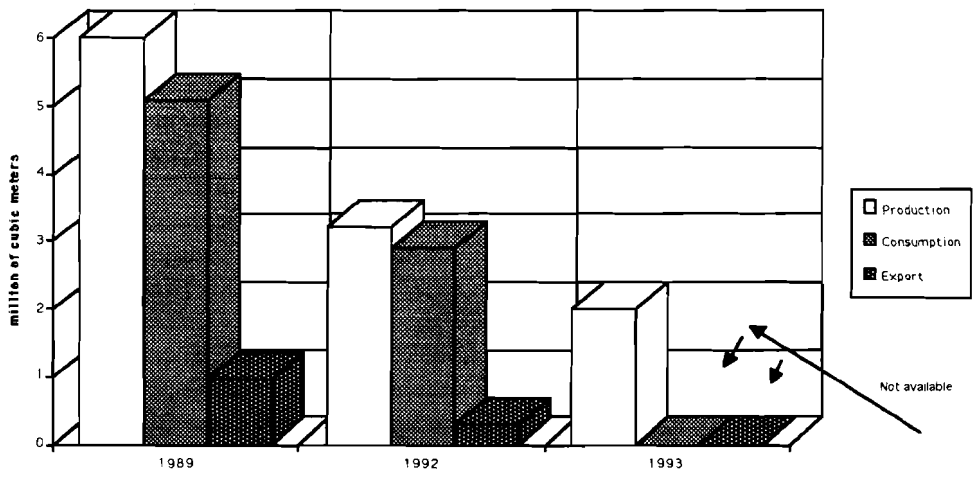
Source: C.A. Backman

FIGURE 6.17: THE FAR EAST - Estimated commercial roundwood supply, share consumed domestically, and share exported



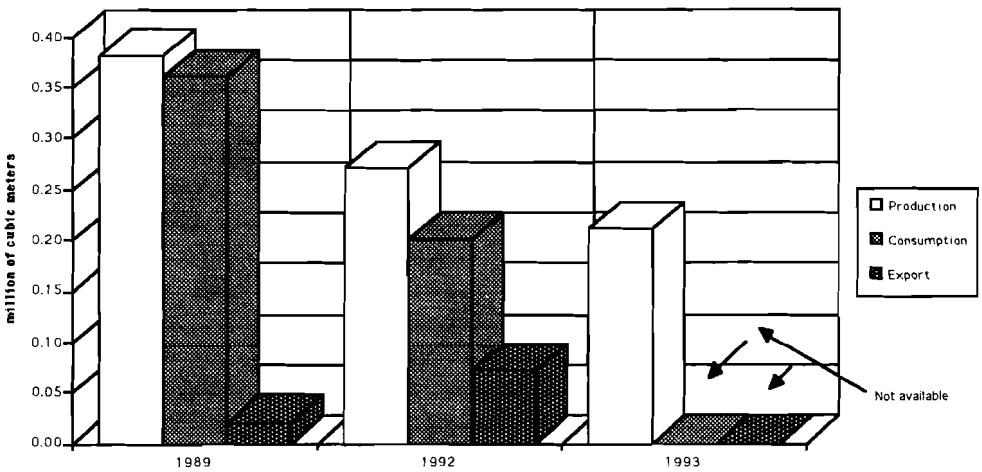
Source: C.A. Backman, VNIPIEllesprom (1991a), Zausaev (1994)

FIGURE 6.18: THE FAR EAST - Estimated lumber supply, share consumed domestically, and share exported



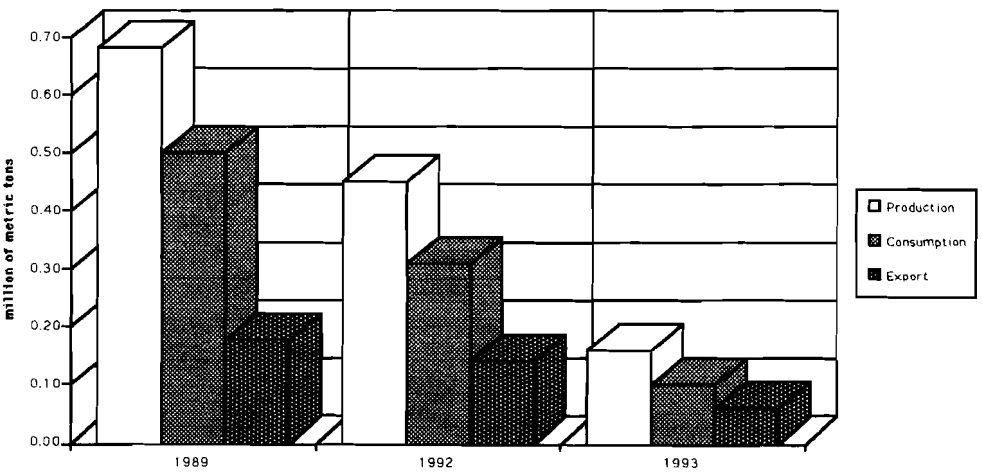
Source: C.A. Backman, VNIPIEllesprom (1991a), Goskomstat (1993c, 1994c)

FIGURE 6.19: THE FAR EAST - Estimated reconstituted panel supply, share consumed domestically, and share exported



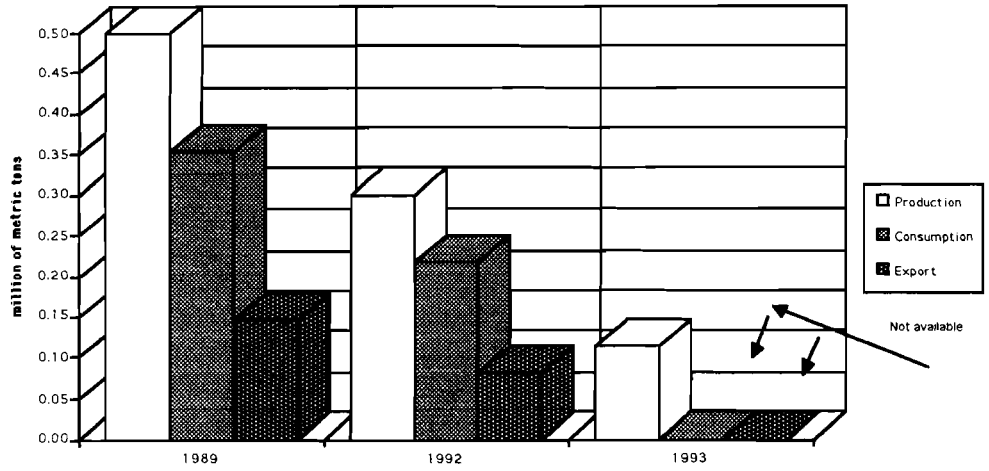
Source: C.A. Backman

FIGURE 6.20: THE FAR EAST - Estimated pulp supply, share consumed domestically, and share exported



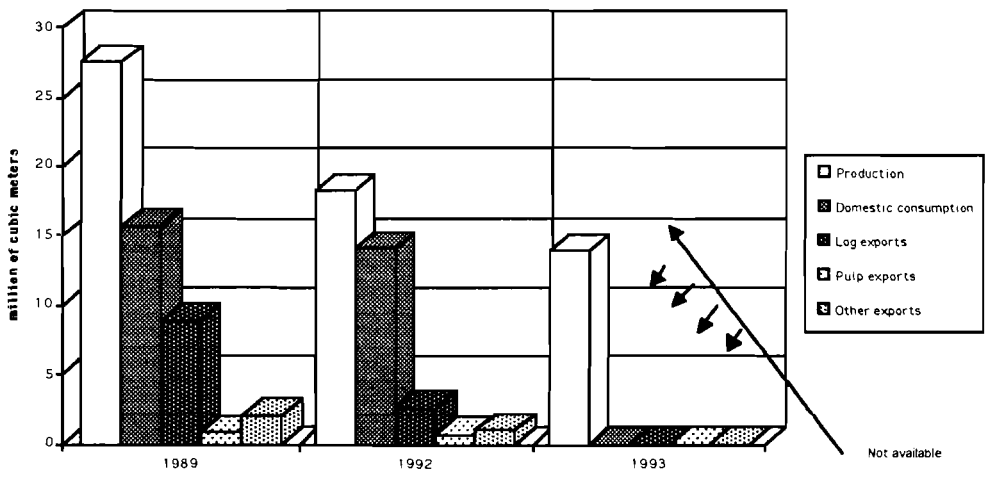
Source: C.A. Backman, VNIPIEIllesprom (1991a)

FIGURE 6.21: THE FAR EAST - Estimated paper & paperboard supply, share consumed domestically, and share exported



Source: C.A. Backman, VNIPIEliesprom (1991a), Goskomstat (1993c, 1994c)

FIGURE 6.22: THE FAR EAST - Estimated fibre supply supply, share consumed domestically, and share exported according to product



Source: C.A. Backman

7.0 PROGNOSIS

Section **7.1 BACKGROUND FACTORS** provides an overview of the important considerations which must be factored into a long-term projection of forest sector activity. Included are discussions of prices and costs, risk perception, and domestic demand. Section **7.2 RESULTS** discusses the prognosis for both domestic production and exportable surpluses of roundwood for four scenarios.[136]

7.1 Background Factors

The sharp declines in domestic production and export volumes have been driven by the break-up of the centrally planned economic system and the collapse of the administered pricing structure. The matrix of internal prices and costs sustained under the former regime is adjusting to the international valuation and domestic scarcities. A large uncertainty is contributing to the high levels of risk which the international community is ascribing to Russia.

The interaction of the inflationary expectations with a fluctuating exchange rate makes long-term estimates of activity in the Russian forest sector rife with uncertainty. However, imposing a vector of international prices and costs onto the structure of the Russian forest sector can provide an indication of one equilibrium in domestic harvest and consumption, and the surplus which is available to fuel the development of export markets.

Domestic demand has plummeted since the end of the 1980's, casting some doubt on the likely course of internal demand in the future. Priorities on domestic consumption could very well limit the share of domestic production available for export even if export were economically viable, and so must be considered when making long-term projections.

Footnotes

[136]The scenarios are generated through the Russian Forest Sector Assessment Model described at length in (Backman 1993).

7.1.1 Prices and Costs

Since 1991, prices and costs in Russia have been generally free to find their own levels. This freedom has also applied to the forest sector. Shown in **Figure 7.1** through **Figure 7.4**, prices and costs of selected forest products have increased between 300 and 600 times depending on the product since 1989. However, evident from **Figure 7.5**, the exchange rate has also been able to adjust to market forces thus providing a mechanism through which to compare domestic prices and costs with costs and prices existing in the international arena.

Figure 7.6 through **Figure 7.9** provide an indication of the average price and cost of selected forest products realized by industrial organizations in the Russian Far East. Since 1991, prices in U.S. dollar terms have been steadily rising towards the world levels, reflected by average prices for 1992 available in the global market place.[137]

The trends evident between 1991 and 1993 are expected to continue as arbitrage and greater access to information by Russian buyers and sellers are translated into a sharply higher domestic price, and corresponding cost matrix. In this way, the gap between domestic costs and prices and the comparable costs and prices experienced in the international arena evident in 1993 should continue to narrow. Indeed, if the cost of transportation is viewed, by the middle of 1994, the cost advantage enjoyed by the Russian forest sector compared to a proxy in North America seemed to have completely been eroded (**Figure 7.10**).[138]

7.1.2 Risk

Investment decisions under the former regime did not incorporate to any great extent a time preference for money. Compounding the absence of time preference is the surplus capital stock left over from the former regime which has lead to an apparent marginal cost pricing on the part of the forest sector

Footnotes

[137]The world prices are based on (FAO 1994).

[138]The proxy for an international transportation tariff was based on conversations with personnel at Burlington-Northern in the United States *circa* 1992.

in the domestic market.[139] As the endowed capital stock is consumed either through attrition or use in the production process, the decision to invest or not to invest will incorporate some expectations concerning the security of the investment.

Investment decisions are presently being severely compromised by the high level of country risk which is ascribed to Russia. The perception of such a high country risk can only work against investment in the forest sector in the long term, encouraging an attitude which places a preference on exploitation rather than wise husbanding of the natural resources. Evident from **Figure 7.11**, Russia is viewed as being one of the most risky places in which to invest, ranking only behind Iraq in the list of countries prepared by the Economist.[140]

7.1.3 Domestic Demand

While consumption in the former Soviet Union generally lagged behind those of the more industrialized countries (**Figure 7.12** through **Figure 7.14**), since the end of the 1980's, domestic consumption within the former republics and in particular Russia have collapsed. Lumber consumption has fallen by almost 50 percent while paper consumption has declined by almost 75 percent. Surprisingly, the consumption of panel products continues to hold up.

As Russia and the region which encompassed the republics of the former USSR grapple with the transition from the planned to the market oriented economy, the likely path of domestic consumption will play a key role in determining the surplus of forest products available for export either to the near abroad or to the far abroad.

While consumption levels in 1993 provide a floor for consumption inside Russia, the timing and size of the re-birth of the Russian economy will have a profound effect on the demands placed on the forest resource and domestic productive capacity. Furthermore, in the absence of strategies which

Footnotes

[139](Backman 1993, p. 64)
[140](Economist 1994, p. 96)

cultivate either the forest resource available but lacking either the appropriate technology or access supportable by the forest sector become even more critical.[141]

7.2 RESULTS

Shown in **Figure 7.15** are results from the BASE CASE.[142] The long-term equilibrium with the current forest resource under a base case scenario amounts to a commercial harvest of 49 million cubic meters in the combined region of East Siberia and the Far East, down from the 66 million cubic meters evident in 1992 and similar to levels experienced in 1993 (48 million cubic meters). Economic harvest levels in the combined region of European Russia and West Siberia amount to 103 million cubic meters of commercial harvest down considerable from the 1992 levels of 149 million cubic meters, and lower than the 118 million cubic meters harvested in 1993.

The exportable fiber is marginally better than the 37 million cubic meter experienced in 1993, amounting to some 40 million cubic meters. In the east region, consisting of East Siberia and The Far East, the exportable surplus amounted to 21 million cubic c meters while that from the west region, consisting of European Russia and West Siberia, amounted to 19 million cubic meters.

SCENARIO 1, shown in **Figure 7.16**, shows the effects of a higher price realizable in the Pacific Rim market than in the European export market on the BASE CASE.[143] The long-term delivered harvest in the west region amounts to 127 million cubic meters versus the 103 million cubic meters in

Footnotes

[141]However, almost 45 million cubic meters of economically accessible commercial fiber exists in the East Siberian and Far Eastern regions subject to infrastructural development and/or additions of the appropriate technology. Almost 25 million cubic meters exists in West Siberia and European Russia. A further increase in the economic harvest could be achieved by concentrating capital and labour resources on the forest resources of European Russia.

While the volume would not be available immediately, a successful transition to the market economy would be a magnet for the increased productivity of the Russian forests brought on by additions of capital and labour.

[142]Capital constraints do not exist while export prices available in European markets and Pacific Rim markets are the same. Demand is *circa* that evident in 1993.

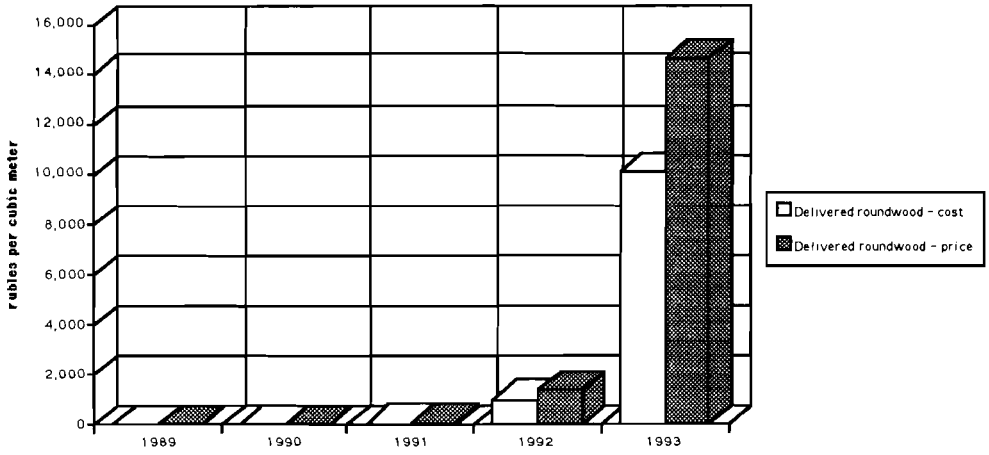
[143]The figures presented in this section are different from those presented in Backman (1995a). A different vector or international prices was utilized for this report, it being a slightly higher price available in the Japanese market than available in the European market.

the BASE CASE while exportable fibre doubles to 38 million cubic meters. In the east region, long-term economic commercial harvest levels amount to 73 million cubic meters, nearly 50 percent higher than in the BASE CASE. Exportable fibre doubles to 45 million cubic meters.

SCENARIO 2, shown in **Figure 7.17**, shows the effects of capital constraints on the BASE CASE visibly encountered within 10 years. Exportable surplus collapses by the second period. Within 20 years, virtually all of the forest products demanded by the BASE CASE domestic demand must be imported. Thus, the need to address those issues which are either constraining the flow of capital regardless of risk and those factors which are contributing to the high rates of return demanded by investors is underscored.

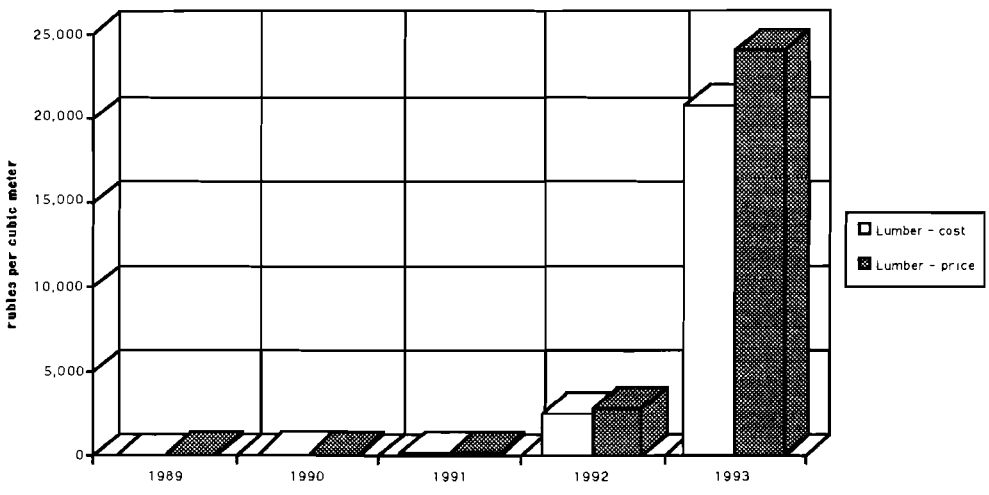
SCENARIO 3, shown in **Figure 7.18**, provides an indication of the impacts of a successful transition away from the centrally planned structure. Represented by rising domestic demand brought on by a 4 percent GNP growth, exports and domestic production increase during the next decade. Rising demand begins to constrain export within 15 years, completely eliminating them within 20 years in the absence of increasing the fiber potential of the forests.

FIGURE 7.1: THE RUSSIAN FAR EAST - Realized price and cost of production of delivered roundwood



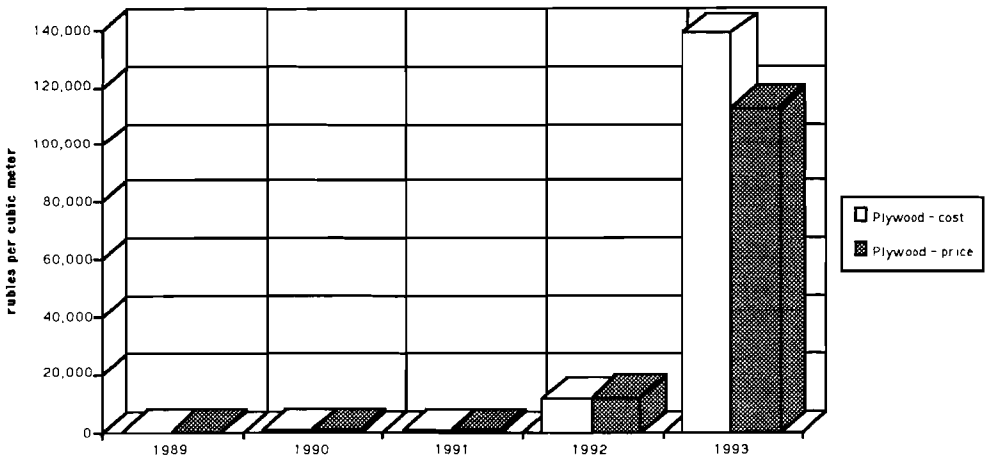
Source: Zausaev (1994), VNIPIEIlesprom (1991a)

FIGURE 7.2: THE RUSSIAN FAR EAST - Realized price and cost of production of lumber



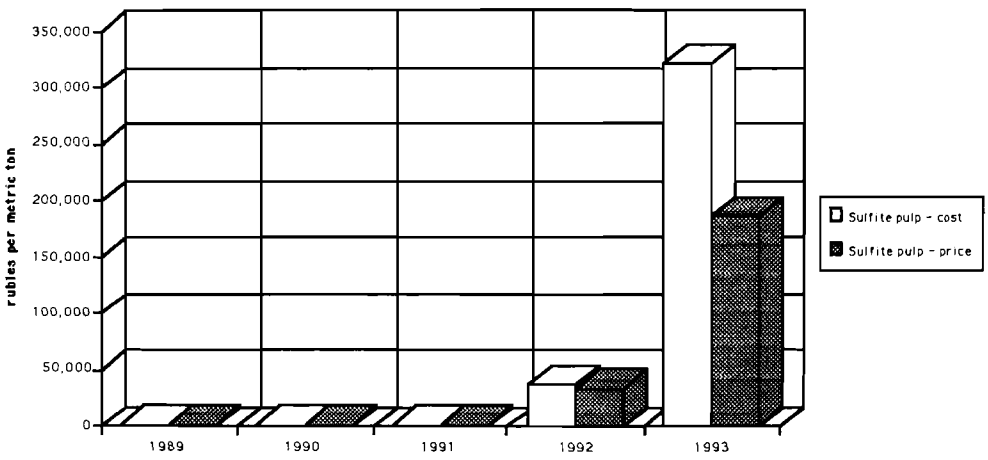
Source: Zausaev (1994), VNIPIEIlesprom (1991a)

FIGURE 7.3: THE RUSSIAN FAR EAST - Realized price and cost of production of plywood



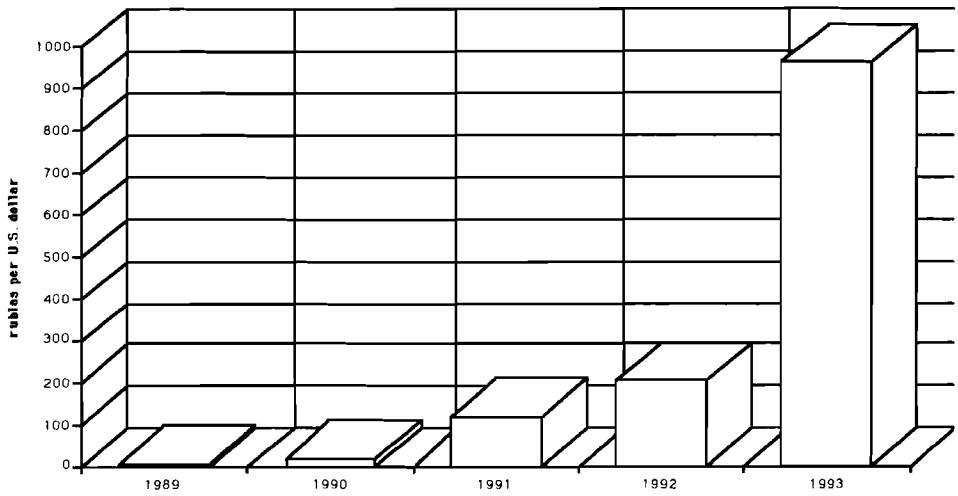
Source: Zausaev (1994), VNIPIEIllesprom (1991a)

FIGURE 7.4: THE RUSSIAN FAR EAST - Realized price and cost of production of sulfite pulp



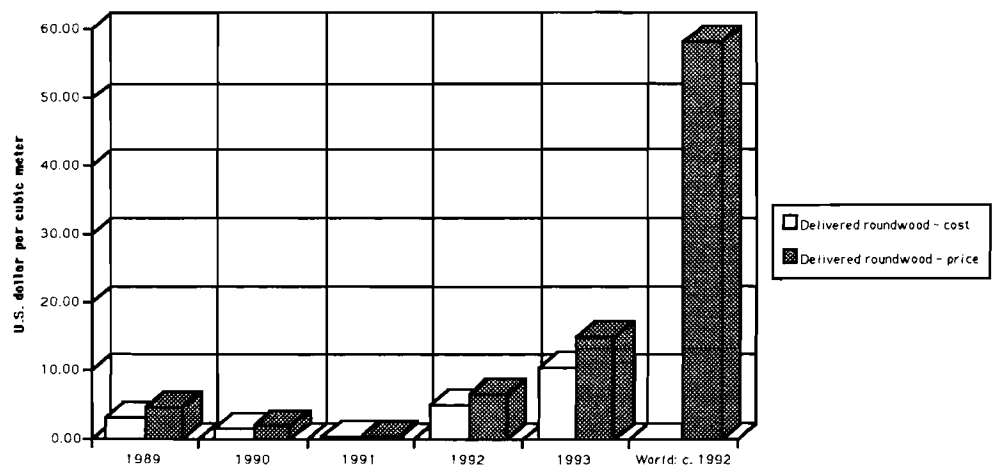
Source: Zausaev (1994), VNIPIEIllesprom (1991a)

FIGURE 7.5: RUSSIA - Average exchange rate of rubles per U.S. dollar



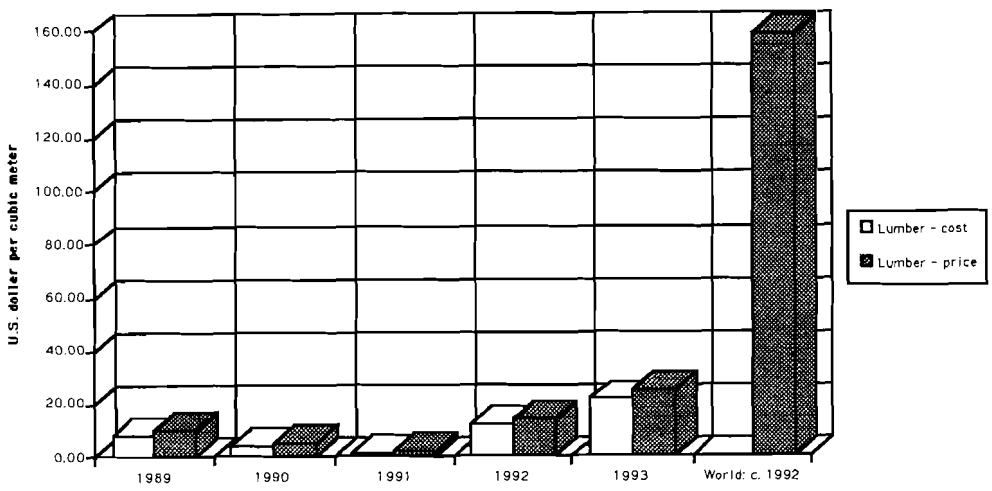
Source: Vienna Institute for Comparative Economics (1994)

FIGURE 7.6: THE RUSSIAN FAR EAST - Realized price and cost of production of delivered roundwood



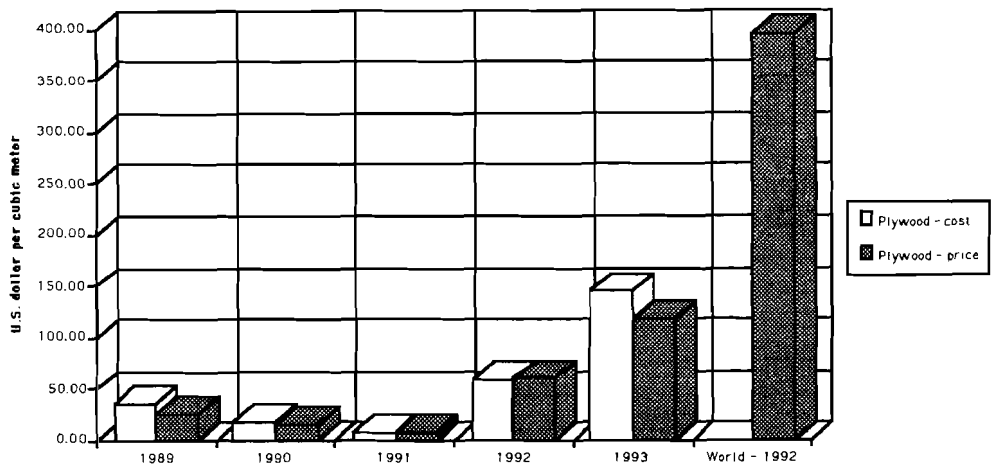
Source: C.A. Backman

FIGURE 7.7: THE RUSSIAN FAR EAST - Realized price and cost of production of lumber



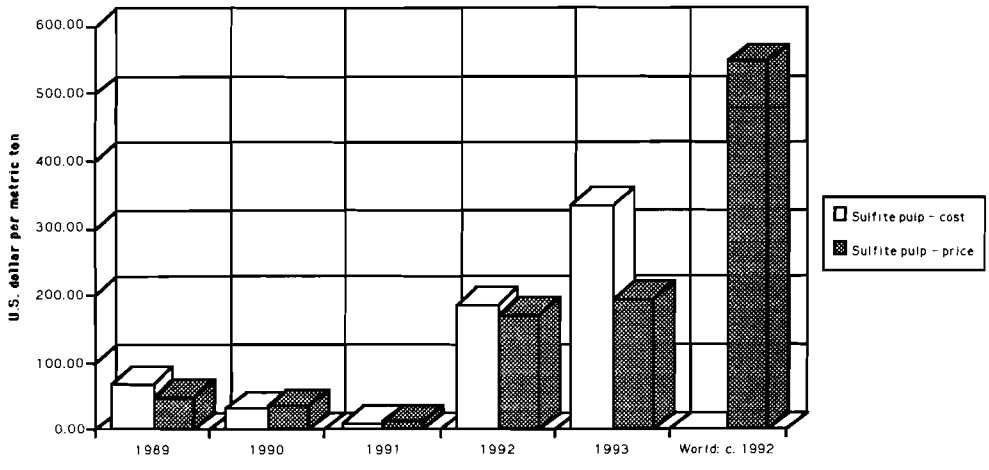
Source: C.A. Backman, FAO (1994)

FIGURE 7.8: THE RUSSIAN FAR EAST - Realized price and cost of production of plywood



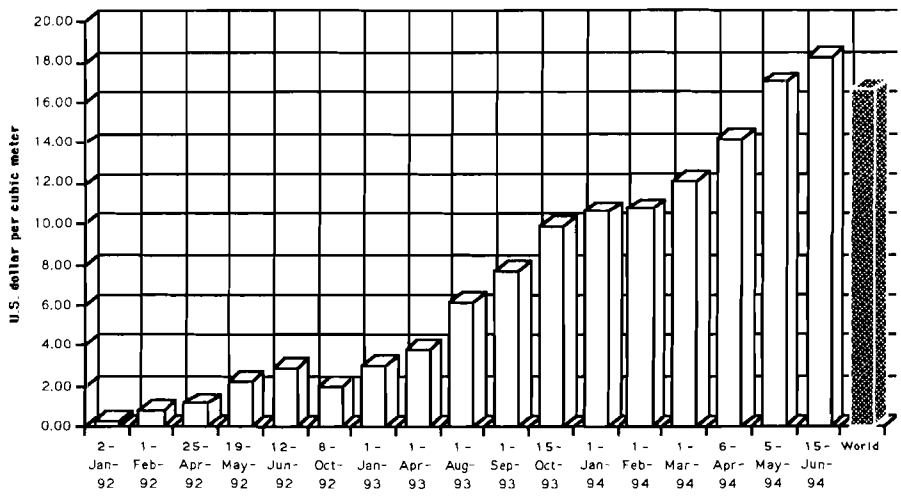
Source: C.A. Backman, FAO (1994)

FIGURE 7.9: THE RUSSIAN FAR EAST - Realized price and cost of production of sulfite pulp



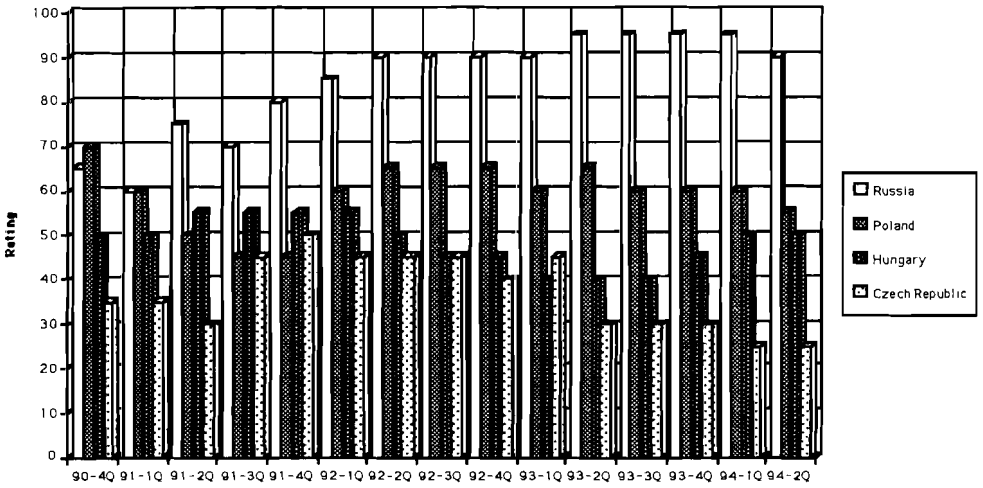
Source: C.A. Backman, FAO (1994)

FIGURE 7.10: RUSSIA - Estimated transportation tariff on railway system - 900 km



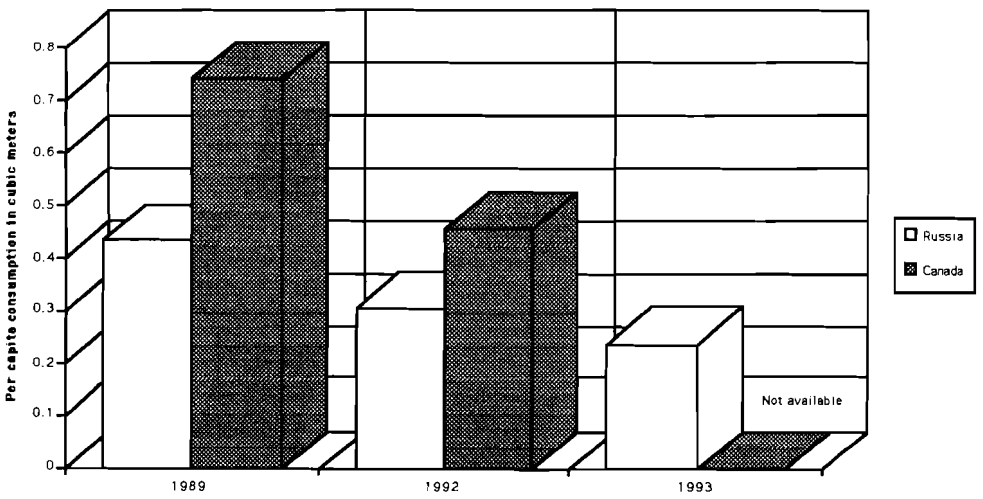
Source: Stanick (1994), C.A. Backman

FIGURE 7.11: RUSSIA - The Economist risk rating of selected countries



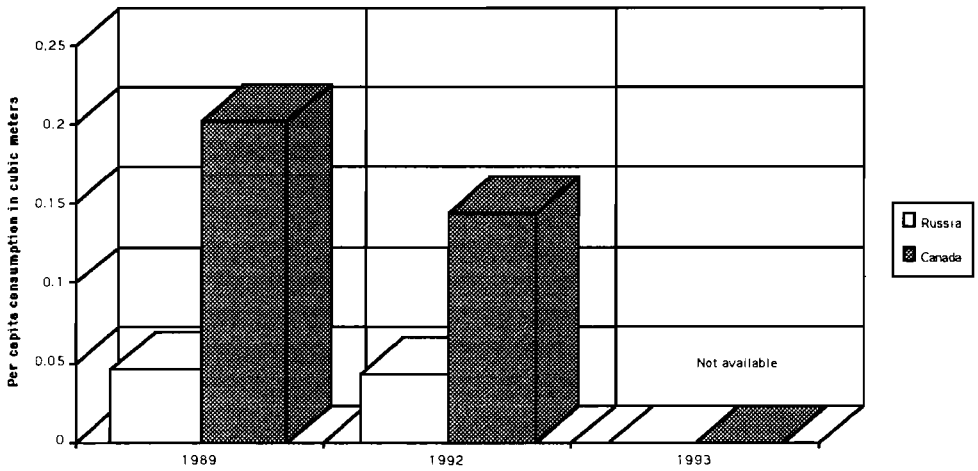
Source: Economist (1994)

FIGURE 7.12: RUSSIA and CANADA - Per capita consumption of lumber



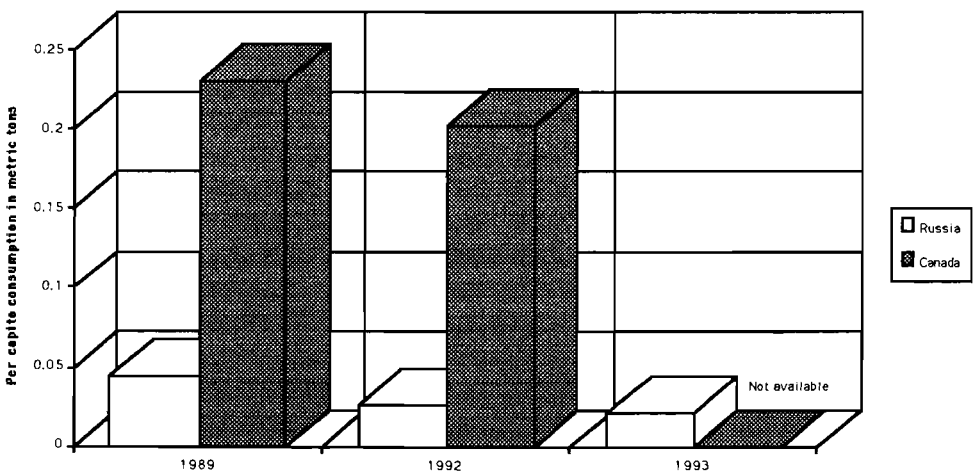
Source: C.A. Backman

FIGURE 7.13: RUSSIA and CANADA - Per capita consumption of reconstituted panel products



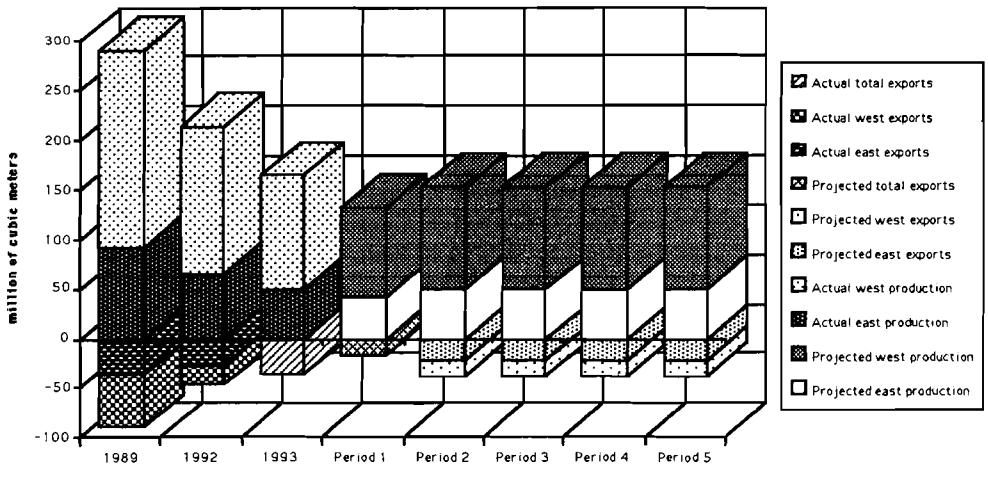
Source: C.A. Backman

FIGURE 7.14: RUSSIA and CANADA - Per capita consumption of paper and paperboard products products



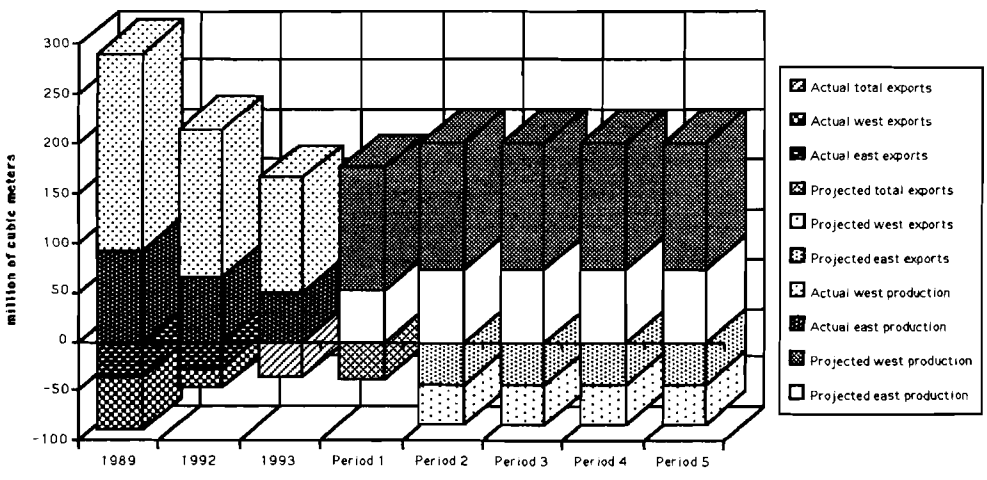
Source: C. Backman

FIGURE 7.15: RUSSIA and REGIONS - BASE CASE - Actual and projected commercial harvest and export of fibre



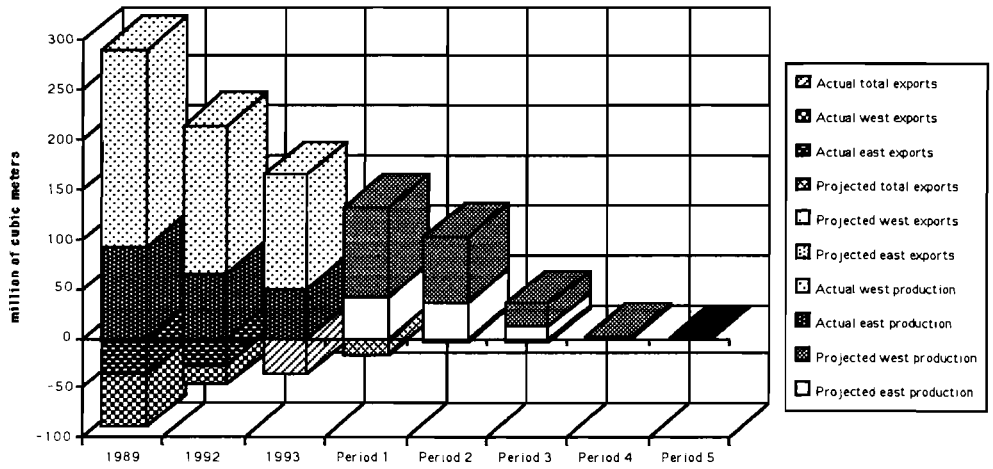
Source: C.A. Backman

FIGURE 7.16: RUSSIA and REGIONS - SCENARIO 1 - Actual and projected commercial harvest and export of fibre



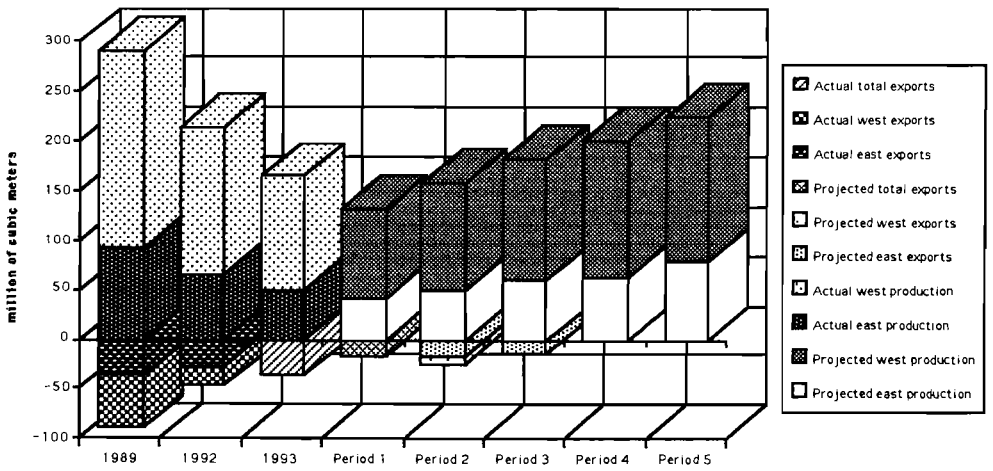
Source: C.A. Backman

FIGURE 7.17: RUSSIA and REGIONS - SCENARIO 2 - Actual and projected commercial harvest and export of fibre



Source: C.A. Backman

FIGURE 7.18: RUSSIA and REGIONS - SCENARIO 3 - Actual and projected commercial harvest and export of fibre



Source: C.A. Backman

8.0 WRAP-UP

Opportunities do exist in the Russian forest sector, but cannot necessarily be taken for granted. In Western Russia, while short to medium term opportunities may be linked to export, in the longerterm, rising domestic demand brought on by the introduction of a successful social contract among the difference participants of Russian society could well reward those souls investing now. Opportunities in the eastern part of Russia, due to large distances to the west and an absence of a large domestic demand, are more likely to be found in meeting rising demand in the Pacific Rim countries. However, domestic demand in the western portion of Russia could still be met providing products produced can support the rising tariff structure evident in rail transportation.

8.1 FOREST RESOURCE

The sustainable fibre supply in the western region of Russia, which incorporates European Russia and West Siberia, contains a significant portion supported by the deciduous resource. It accounts for 50 percent of the fibre supply potentially available to the forest sector in the short to medium and medium to long terms. However, due to a preference for coniferous species, the harvest has historically been waited away from the deciduous species. Deciduous forests seem to account for only two-fifths of the actual harvest.[144] Due to the higher share of commercial wood, coniferous species account for an even larger share of the commercial roundwood supply, representing almost two-thirds of the fibre available for use within the forest sector.

With such a large and seemingly unutilized deciduous resource, attention should be focused on manufacturing processes which can make the best use of it. Increasing consumption of the deciduous resource has been made possible since the 1960s with the increasing capacity to manufacture reconstituted panel products, and increases in capacity to consume deciduous fibre in the manufacture of pulp. However, future increases may not only be linked to additions of capital but to education on substitution of

Footnotes

[144]The shares are based on results derived for 1989. While more recent numbers are unavailable, the preference for the coniferous species is believed to have continued, and even have increased

products historically made from the coniferous resource. Economic incentives possible under the emerging economy in Russia undoubtedly will work in this direction. However, it can be promoted by a well thought out program to demonstrate the possible uses for the resource.

Contrarily, the fibre supply potential in the eastern region of Russia (East Siberia and the Far East) does not contain a large contribution supported by the deciduous resource. In fact, the deciduous resource accounts for only one-quarter of the sustainable potential fibre flow, but less than 10 percent of the harvest due to the lower commercial content in the deciduous species.

Utilization of the forest resource has been higher in European Russia due to the concentration of demand and an installed manufacturing capacity to utilize lower grade wood fibre and deciduous species. The decline in harvest in the western regions from 1989 to 1993 was less overall than that experienced in both East Siberia and the Far East. Harvest between 1989 and 1993 fell by 40 percent in European and West Siberian regions versus almost 50 percent in the combined region of East Siberia and The Far East. Furthermore, the long-term estimated economic harvest in the west region under the BASE CASE amounts to almost three-fifths of the total harvestable volume while that in the east region amounts to just one-half.

8.2 INDUSTRY

Rising transportation tariffs relative to the other costs of production effectively penalized those regions with a heavier reliance on export markets and those which were more dependent on the export of unmanufactured roundwood. Thus, the periphery areas to domestic demand and external markets to Russia faced a more restricted opportunity than those regions with a large captive demand. By 1992, the share of commercial fibre supply depending on export opportunities had halved to 13 percent in European Russia from 25 percent in 1989, and declined by nearly one-half from 40 percent the Far East, while seemingly increasing in importance in East Siberia. In West Siberia, the share plummeted seemingly to zero percent from about one-fifth in 1989. The rising relative importance in East Siberia where export dependency climbed from one-third to nearly one-half can be linked to the higher contributions of lumber and pulp to overall trade and the sharply higher log exports evident in 1992 over 1989. However, transportational tariffs have risen faster than either domestic prices or costs of production. As

the equilibration process continues, prices should rise faster thus neutralizing some of the effects of uneven adjustment in cost structure witnessed to date. Indeed, the results flowing from the modeling are based on prices and costs which have all reached some sort of equilibrium.

Opportunities in the east region are heavily dependent on the expected prices obtainable for forest product exports. Evident from SCENARIO 1, significantly higher prices available in the Japanese market for roundwood over those apparent in Europe provide a large boost to harvest activity. Long-term economic harvest levels in the east region amount to slightly more than three-quarters of the potential available in the short to medium term, up significantly from the 50 percent level evident in the BASE CASE. The economic level rises less steeply in the west region, climbing to only 72 percent from the three-fifths mark presented in the BASE CASE. Consequently, some effort should be spent to monitor the degree to which the internal vector of prices and costs are in fact adjusting as a way to test the assumptions latent in the overall outlook.

Evident from SCENARIO 2, capital is crucial to the long-term survival of the forest sector and developing the export potential. Consequently, the perception of risk, and security of capital, must be addressed by the government if the private sector is to be called upon to participate in a major way in the re-birth of the Russian nation. Decreasing perception of risk by the international community will lower the premium demanded by domestic and international investors alike. Not only will overall rates of return needed decline, but investors will not be looking for a quick repatriation of the invested capital to minimize a "windfall" loss within the labyrinths of Russian society.

As prices and costs inside Russia continue the adjustment process, approaching some equilibrium with the market economy, a long-term economic harvest can be more realistically estimated. However, while the long-term economic harvest levels are important, the future expectations for domestic demand will play a large role in determining the degree to which

wood fibre will be surplus to the domestic needs.[145] Furthermore, rising domestic demand in the absence of an increasing fibre supply could effectively deprive the Russian peoples of both export opportunities and a higher standard of living linked to higher domestic consumption levels, evident in SCENARIO 3. Additions of capital and labour to the forest resources of the western part of Russia could postpone the convergence of fibre supply and domestic demand in the absence of development of the fibre resource possible available in the medium to long term.[146] Limited opportunities for extensive development suggest that trade-offs between the returns of intensive management and extensive development and or transportation of currently accessible forest resource from the periphery regions will need to be examined.[147]

8.3 STUDY TOPICS

In realizing the opportunities discussed above, there are a number of areas which the Russian peoples can focus on now which can help the process along.

From the resource side, they include utilization of the deciduous fibre supply, increasing ability to monitor and control utilization of the forest resource, and utilizing the surplus labour presently available in the forest sector to improve the forest resource's ability to meet the future demands placed on it by a resurgent domestic economy.

Footnotes

[145]Additionally, the degree to which domestic consumption will take precedence over export opportunities will need to be examined so that decision makers in Russia can be more aware of what the trade-offs are.

[146]The possible low state of productivity that the Russian European forests may be in is amply evident by comparing estimated growth contributions in both coniferous and deciduous forests between those existing in Finland and those in the adjacent forest of Russia. Seemingly, the coniferous forests of Finland, assumed to be of similar potential, contribute nearly twice the "annual growth" per hectare to the allowable annual harvest. The deciduous forests are even more disadvantaged with productivity figures of five times evident. Thus, if the difference in inferred productivity is linked to more intensive management, relying on inputs of capital and labour, a dramatic rise in the available fibre of European Russia may be realizable.

[147]However, the trade-offs most likely will not be simply focusing on the economics. Increasing demands by consumers in developed countries for forest products produced with environmentally friendly technologies using wood fibre generated by ecologically sound forest management practices may need to be considered. Furthermore, a large pool of labour in the forest sector is presently under employed, thus posing a social cost not directly measurable. This surplus labour could be effectively put to good use through employment in forest management activities.

From an industry perspective, much can be accomplished by reducing the perceived high risk attached with investing in Russia. This could include improving the financial infrastructure and capabilities of the informational industry. The existing transportational infrastructure may need to be examined to identify where limited capital should be placed first, so that future growth opportunities linked either to rising domestic demand or export possibilities are not prematurely dissipated. The trade-offs between meeting domestic demand versus seizing export opportunities should be identified so that decision makers have can be aware of possible impact of their decisions.

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