

Working Paper

Ukrainian Forest Sector and Market for Timber Products

Maxim Poliakov

WP-95-116
December 1995



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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 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, now in its second phase, is focusing on assessment studies of the greenhouse gas balances, forest resources and forest utilisation, biodiversity and landscapes, non-wood products and functions, environmental status, transportation infrastructure, forest industry and markets, and socio-economics. This report, carried out by Maxim Poliakov, is a contribution to the analysis of the topic of forest industry and markets.

Acknowledgements

Many people have helped during the preparation of this working paper both in the Ukraine and at IIASA not only during my time this summer as a participant in the YSSP but subsequently as well. However, in bringing this working paper to a conclusion, I would like to especially thank Dr. Charles A. Backman for his council and time which he took from his busy schedule to talk with me about my research. Additionally, he provided extensive comments to earlier drafts many of which were incorporated in the final version of the text.

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Glossary of Important Abbreviations

krb.	Ukrainian rubles
NMP	Net Material Product
ha	Hectare
m ³	Cubic meter

1. Introduction

Being part of the Soviet Union and its administrative command system, the Ukrainian economy developed under conditions of a centralised wood supply system. During the 1970s and 1980s, it consumed 45 million cubic metres of wood and wood products annually. Recent political and economical upheaval caused by the transition away from the centrally planned economy have caused significant changes in size and structure of wood products demand and supply however. While economic activity fell by almost 50 percent following the collapse of the Soviet Union, consumption of forest products declined even more sharply, by two-thirds, falling to some 17 million cubic meters by 1993. While domestic production of forest products fell more or less in line with declining economic activity, imports primarily from the Russian Federation, collapsed and accounted for a disproportionate share of the drop in consumption.

Recovery in the economy of the Ukraine will undoubtedly lead to a rebound in the consumption of forest products. However, the institutional factors affecting production and trade will be decidedly different. The political, social, and economic environments into which the Ukrainian forest sector is heading are creating a large amount of uncertainty, raising a number of vexing questions for Ukrainian economists, foresters, and scientists on the future path which this sector will follow. These questions are of no less interest to those in Russia which have to date relied on the Ukraine as a market for Russian manufactured products, and to those outside of the former USSR who are trying to understand the global markets for forest products in the aftermath of the break-up of the former Soviet Union.

To develop an appreciation of the future direction of the Ukrainian forest sector, the following working paper provides a brief review of background factors affecting the forest sector in Chapter 2. Chapter 3 describes the forest sector, including the ability of the sector to meet domestic demand. Important factors influencing the sector are presented in Chapter 4 while one interpretation of the future supply and demand in the Ukraine is shown in Chapter 5. Chapter 6 concludes the working paper with some observations concerning the forest sector of the Ukraine, and factors which need to be addressed as the Ukraine enters the twenty-first century.

2. Background Information

Although there are many influences which can be expected to impact on the forest sector, three have been selected for greater discussion. The political environment, particularly the shift towards self-determination by the Ukraine and its move out of the umbrella of the former Soviet Union is of significant note. Now it will be the choices of the Ukrainian government and its peoples which will affect to a greater degree the brightness of their future, and not those made on distant places. The structure of the economy in the Ukraine is discussed revealing the degree to which imports contributed to the supply of forest products. While the demand for these products has declined, and with the decline, the need to import, a rebounding economy following a successful transition away from the centrally planned system will open opportunities once again for exporters. A small forest sector supported by a finite forest resource not at the present fully utilised offers some opportunity for investment. However, the domestic forest sector requires a motivated work force, willing to participate in the rebirth of the nation. The changing infrastructure supporting the labour market is creating the conditions which can make this happen.

2.1 Political Factors

Although the Ukraine has a rich history spanning many centuries, it is only rarely that the Ukrainian peoples have had their own state. For the most part, the Ukraine has been divided among different states (Russia, Austria-Hungary, Poland).

After the Civil War in 1922, the largest part of Ukrainian territory was joined to the USSR and the other part — to Poland. Just before the Great War started with Germany, this part of Ukraine, the part which had been part of Poland, also became part of the USSR. In the Ukraine's role as a part of the former Soviet Union, the forest sector as other sectors was managed as an integral part of the centrally planned economy.

With the crisis and fall of the administrative-command system in the USSR during the early 1990s, conditions appeared which offered the opportunity to the individual Republics belonging to the former USSR to sever their political relationship. The Ukraine and the other Republics seized this opportunity, and on 24 August 1991, the Supreme Soviet of the Ukraine adopted the State Independence Act, and began a movement towards a democratic society and market economy.

The road has been as difficult as it has been long, in part because it requires supporting legislation and changes in the paradigms by which Ukrainian society operates. Both processes, like all the other social changes, do not occur quickly.

The transitional period, the period in which the Ukraine finds itself at the present time, when the old administrative system has been fading from a central role in the economy while the new market-oriented system has not fully matured, are having a negative influence on the Ukrainian economy and society. However, unlike other troubled times under the previous regime, the Ukraine as a separate state has the opportunity to chart its own course of development. By choosing wisely the degree to which

it can be involved in the economical, political, and social environments underlying all activity, the Ukrainian peoples can forge a strong foundation for the betterment of their society in general and the forest sector in particular.

2.2 Economics of Ukraine

The Ukraine is one of the largest European countries in size, population, natural resources and economical potential, occupying 604 thousand square kilometres and supporting a population of 52 million people. Ukraine boasts an enviable range of minerals, particularly coal (69 percent of the former Soviet Union reserves), iron and manganese ore, graphite, potash, titanium, zirconium and uranium. Its climatic conditions and considerable resource of fertile soils (especially black soils — “chornozem”) are favourable for agriculture. Ukrainian forest resources, though, are not a significant factor in the overall economy, estimated as to contribute only four percent of the wealth potentially available from the natural resources (see Table 1).

Table 1. Ukrainian Natural Resources Potential (Assessment in Prices of 1990)

Resources	<i>million krb.</i>	%
Mineral	15244.8	28.3
Water	7054.8	13.1
Land	23946.3	44.4
Forest	2249.8	4.2
Animals	255.7	.5
Recreation	5201.4	9.6
Total	53952.8	100.0

Source: [21].

Accounting for one-sixth of the economic activity of the former USSR in 1990, industrial activity was the principal contributor to the Ukrainian national economy, being the largest among other sectors of national economics (Table 2). In 1992, the industrial sector accounted for 49 percent of the Net National Product.

The structure of Ukrainian industrial production is characterised by considerable predominance of metallurgical and fuel-power complexes, oriented towards machine-building and production of intermediate rather than final consumer goods. The forest sector accounts for only a small share of economic activity, which in 1993 contributed less than 3 percent to the Net Material Product (NMP). Industries that are energy- and material consuming are dominant. Energy sources supporting industrial activity, however, are poorly diversified. Thermal power stations continue to dominate, having provided 65 percent of electricity supplies as recent as 1991. Nuclear generated power provides most of the remainder, in 1991 having accounted for one-quarter of the electricity produced.

Table 2. Distribution of Net Material Product and Employees by Economic Sectors in 1992

Sectors	NMP		Employees	
	<i>million krb.</i>	%	<i>thousand people</i>	%
Agriculture	764464	19.7	4920	20.5
Forestry	4260	0.1	69	0.3
Industry	1903203	49.0	7401	30.8
of which forest industry	101064*	2.6	253**	1.4
Construction	462143	11.9	1910	8.0
Other material sphere	753033	19.4	3122	13.0
Nonmaterial sphere	0	0.0	6564	27.4
Total	3887103	100.0	23986	100.0

* Estimate.

**1993.

Source: [23], [12].

The Ukrainian agricultural sector also has a major role in the economy, accounting for 16 percent of the net national product in 1992. The main contributors to agricultural sector activity in Ukraine are grain and forage production. Nearly 47 percent of total growing area is used for grain and beans, 36 percent — for forage, 11 percent — for industrial crops and 7 percent — for vegetables. Ukrainian agriculture produced 45.6 million tones of grain, 2.8 million tones of meat, 18.4 million tones of milk in 1993.

Although Ukraine is rich in some important minerals and raw materials, it is seriously dependent on import of other products. Such products as mineral fertiliser, cotton, imported raw fuels (78 percent of gas and 88 percent of oil in 1992), and not unsurprisingly, roundwood, wood products, and paper products have been by necessity imported.

The Ukrainian economy is however currently in a deep structural crisis, caused by the break-up of the centrally planned economy and the liberalisation of prices. Prices, long held isolated from international market forces not only increased rapidly, but also in some instances changed their relative position with each other, particularly in the case of energy which rose steeply towards international levels. The steep decline and significant decrease of investment, first observed first in 1990 (see Table 3), steepened after 1991 as the republics of former USSR received their sovereignty. Unable to shift to a market economy quickly enough, a sharp drop in demand became unavoidable when government withdrew as the organiser of the market. The collapse in government demand brought on by the break-up of the centrally planned economy was not met by a corresponding increase in demand from private sector. As the links among the various players in the economy are re-established and the capital stock left over from the previous regime is consumed, demand can be expected to rise.

Table 3. Dynamics of Net Material Product (at Constant Prices of 1987, million krb.)

Indices	1980	1987	1990	1991	1992	1993	1994
NMP	70076	98724	101581	87980	70192	59699	..
Growth rate(%)	..	5.3	-3.4	-13.4	-20.2	-14.9	-28
Investments	13680	20379	14665	13557	9649	8192	..
Growth rate(%)	..	5.4	-22.8	-7.6	-28.8	-15.4	..

Source:[23].

As mentioned previously, the forest sector contributes a small share to the overall economic activity in Ukraine, accounting for less than 3 percent of the NMP in 1992. A large population coupled with little forest resource has in the past meant that a significant part of national economy's needs for timber and timber products were satisfied by imports. While the contribution of imports to domestic consumption of forest products has fallen recently, it can be expected to increase as the Ukrainian economy recovers. However, the changing price structure, specifically the rising absolute and relative costs of transportation, suggest that the Ukrainian forest sector may be able to some degree substitute domestically produced products for those historically imported, primarily from Russia.

2.3 Labour Forces and Social Factors

The population of Ukraine numbered 52 million people at the beginning of 1993, of which 68 percent were urban dwellers. The Ukrainian labour force amounts to 30 million people, of which some 24 million people were employed in the national economy. One percent of them were employed in forestry and forest industry (Table 2). While containing a bountiful labour supply, it is the changing institutional factors which can be expected to impact on the forest sector.

Ukrainian labour market is only beginning to form, and because of peculiarities of social and economic development, it has a number of features which are not typical for countries with stable market relations. In the former Soviet Union the right to a job was guaranteed for all the citizens, and furthermore, it was also considered the duty of all the citizens to work. There was, thus, not a "reserve army of unemployed". An internal passport system inhibited free movement into some big cities. Even though passports were provided to rural residents, thus making internal migration to town easier, they still needed a registration permit. In this way, a mechanism for controlling movement of the domestic population was retained. In a society, long use to these conditions, citizens can be expected to consider a job as a right rather than a blessing. The absence of unemployment in such a regime places an unfavourable attitude towards those who find themselves unemployed..

While unemployment in the longer-term can be expected to rise, in the shorter term this seems not to be the case. Many enterprises maintain unnecessary labour, and give to employees long- and short- term vacations without paying salaries. At the same time, redundant employees are being shed rather slowly as the result of reorganisation

or liquidation of enterprises or organisations. Furthermore, the discharged people go to the shadow economy or become self-employed, seldom registering as unemployed, thus maintaining the illusion of zero or low unemployment.

With the collapse of the centrally planned economy, the old guarantees of full employment with an access to sufficient goods and services, have disintegrated. Economic realities are encountering historical paradigms, affecting the enthusiasm with which the workforce can be expected to approach their responsibilities

Recognising that the restructuring brought on by the collapse of the Soviet Union is going to and has been leading to social hardship, the Ukrainian government has taken steps to create a new infrastructure supporting the labour market. These steps, paving the way for a more efficient allocation of the labour force, has included an infrastructure provided by the State Employment Service to create jobs through changing the qualifications for and organisation of public works. Additionally, the system for registering unemployed workers and in delivering assistance to them from a fund for the unemployed has been improved. Furthermore, the labour law has been modified, with the law, "About introducing of changes and additions to the Code of Labour Laws of Ukraine during the transition of the republic to the market economy" being recently adopted. All of these changes should in the future promote a healthier and more robust labour market, supporting the growth of the national economy in general and the forest sector in particular.

3. Forest Sector

First providing a description of the forest resources and their ability to support harvest, the forest industry is then revealed. The balance between supply and demand in for forest products, the allocation of the wood supply among different uses is presented. Following a brief discussion of the trade of forest products, a review of the forest sector is identified.

3.1 Forest Resources

The forest resources are first described including a comparison with other countries in Europe. Following this discussion, the ability of them to support harvest is presented.

3.1.1 Description

Table 4 presents for selected indicators the forest resources of several European countries. Among them are percentage of forest fund in the territory of country, percentage of private forests, acreage of exploited forests per inhabitant, growing stock and annual increment (both per hectare of exploited forests and per inhabitant).

Ukraine, while having comparable indices of forest productivity because of good natural conditions, is still a country with scarce forest resources. Clearly, the Ukraine is located in the end of the list identified in Table 4, which ranks countries according to growing stock per inhabitant. Furthermore, unlike the West European countries, all of the Ukrainian forests are the property of the State.

Evident from Table 5, which describes their distribution among users on January 1, 1988 when the last State Forest Account was made¹, approximately 19 percent of the forests have been allocated for use by collective agricultural enterprises (kolhozes). These forests serve primarily for satisfying local timber needs and do not affect the market of wood products. Less than 5 percent of the resource is managed by non-agricultural and non-forestry organizations. Nearly 72 percent of the forest fund is under the management of the Ministry of Forestry which has been delegated responsibilities by the state to manage the forest resources. It is this last component of the forest resource which is described in most detail in the forest inventory, and which is discussed further below.

¹ Forests belonging now to the Ministry of Forestry were in 1988 under the management of two ministries: the Ministry of Forestry and the Ministry of Forest Industry.

The Forest Enterprises in the Carpathian region of the Ukraine which were responsible for both forestry and industrial activity, were subordinated to the Ministry of Forest Industry. Thus, all of these forests were under the management of this ministry. State Forestry Enterprises in other regions were under management of Ministry of Forestry.

In the Carpathian region, Oblast Forestry Administrations responsible for forestry and under the jurisdiction of the Ministry of Forestry were formed in 1993. State Forestry Enterprises subordinated to the mentioned administrations were formed on the base of Forest Industrial Enterprises in 1995.

Table 4. Characteristics of Forest Resources of Selected European Countries

Country	Percent- and of forest cover	Share of private forests, %	Exploited forests				
			area, <i>ha</i> <i>per</i> <i>capita</i>	growing stock, <i>m</i> ³		annual increment, <i>m</i> ³	
				<i>per</i> <i>ha</i>	<i>per</i> <i>capita</i>	<i>per</i> <i>ha</i>	<i>per</i> <i>capita</i>
Finland	66.0	73.8	3.91	86.1	336.5	3.57	13.96
Sweden	59.9	71.2	2.58	112.1	288.7	4.13	10.63
Austria	47.0	81.9	0.43	286.2	123.6	7.20	3.11
Belarus	29.1	0.0	0.53	133.5	70.6	2.40	1.27
CzSFR (former)	35.8	10.7	0.29	220.7	63.3	6.91	1.98
Bulgaria	30.7	0.0	0.36	125.7	45.0	3.39	1.21
Poland	28.5	17.0	0.22	163.1	36.1	3.60	0.80
Germany	30.0	41.5	0.12	271.4	33.5	..	..
France	24.1	73.2	0.22	139.8	30.9	5.29	1.17
Ukraine	15.9	0.0	0.11	153.8	17.3	3.57	0.40
Italy	22.4	60.0	0.08	169.4	12.9	4.05	0.31
Great Britain	9.2	57.1	0.04	92.0	3.5	5.02	0.19

Source: [23].

Table 5. Distribution of State Forest Fund by Authorities

Authorities	Forest fund		Forest covered lands	
	<i>thousand ha</i>	%	<i>thousand ha</i>	%
Ministry of forestry	7174.9	72.2	6181.6	71.7
State agricultural enterprises	507.6	5.1	464.7	5.4
Collective agricultural enterprises	1884.1	18.9	1729.7	20.1
Other	375.9	3.8	244.9	2.8
Total	9942.5	100.0	8620.9	100.0

Source: [10].

The Ukrainian forest resources are divided into two groups depending on the primary purpose to which they are dedicated. Forests of the first group (48 percent) mainly fulfil the environmental functions such as soil and water protection and providing recreational opportunities. Timber utilization in these forests is limited. Forests of the second group satisfy industrial as well as environmental needs. About 30 percent of all the forests (more in the first group and less in the second group) are excluded from the final felling, [24].

Table 6. Distribution of Forest Fund by Groups (thousand ha)

Group	Forest Lands		Besides, long term use
	total	excluded from final felling	
I	3412.6	2334.1	40.3
II	3692.2	393.2	29.8
Total	7104.8	2727.3	70.1

Source: [10].

Ukrainian forests are equally divided into coniferous stands and deciduous stands. Coniferous stands are dominated by pine forests while deciduous forests are dominated by oak stands (about 48 percent of the oak stands of the former Soviet Union were located in the Ukraine). Distribution of the forest resource among the different forest associations is presented in Table 7.

Table 7. Distribution of Forest Stands by Predominant Species (State Forest Fund, without Long Term Use)

Groups of species and prevail species	Area		Growing stock	
	thousand ha	%	million m ³	%
Total	6149	100.0	1052.6	100.0
Coniferous	2930	47.7	575.1	54.6
Pine	2253	36.6	392.5	37.3
Spruce	571	9.3	151.2	14.4
Fir	98	1.6	30.5	2.9
Hardwood deciduous	2592	42.2	402.4	38.2
Oak	1722	28.0	233.4	22.2
Beech	554	9.0	133.7	12.7
Hornbeam	105	1.7	15.7	1.5
Softwood deciduous	627	10.2	75.1	7.1
Birch	293	4.8	33.9	3.2
Alder	239	3.9	27.9	2.7
Aspen	36	0.6	5.8	0.6

Source: [10].

In Figure 1, age distributions of the main species for Ukrainian forests are shown². They are characterised by predominance of middle-aged stands primarily due to his-

² The age distribution of forest stands is very significant for forest management and utilisation. One of the disadvantages of the current system of forest inventory statistics is the use of age groups, such as young class one, young class two, middle aged, approaching mature, mature, and overmature, instead of age classes the boundaries of which are demarcated by actual age in years. Age groups are relative ranges and their use gives incomparable results for species with different rotation ages or for forest management units with different rotation ages within one species.

torical reasons. Severe overcutting of the forests during and following the end of the Second World War decimated the mature and overmature age classes thus compromising the ability of the Ukrainian forest to match harvest with annual growth. Lack of mature stands does not permit timber to be cut proportionally to growing stock and annual increment since there is an absence of forest which can be economically harvested until much later.

Not only are forests characterized by uneven age class distribution, but forests are unevenly distributed on the territory of Ukraine because of climatic conditions variety and different intensity of human activity (see Figure 2). The uneven distribution of the forest resource and its utilization are better understood by examining them segregated into regions proposed by [13]. Thus, the Ukraine is divided into forest-economic regions the boundaries of which more or less overlaps climatic-vegetation zones and coincides with the boundaries of administrative units³. There are four forest-economic regions: Carpathians, Polesye, Forest Steppe and Steppe. The differences between these regions in economy and forestry are sufficient for this study and the number of regions is suitable for analysis.

3.1.2 Annual Allowable Cuts, Limits of Utilisation and Actual Harvesting

Ukraine is a country with intensive forest management, characterised by a high level of intermediate cuts conducted for forestry reasons. Final fellings contribute a lower share than normally would be the case because of the unbalanced age structure in the forest resource discussed earlier.

Size of intermediate harvesting and annual allowable cuts for final harvesting are determined for each forest management unit of each forestry enterprise based upon the forest inventory. The forest inventory takes place every 10 years thus providing a check comparing the actual ability of the forest resource to sustain harvest against the estimated ability initially estimated some years before.

For example, there are forest management units with age rotations 170, 130, 120, 110, 100, 90, 80, 70, 60 years for oak dependent on forest-vegetation zone, site index, and origination of stand. The cut ages for forest management units are established in accordance with the order № 114 of State Committee of Forestry adopted on the 17 of August, 1978. The division of oak stands by the age groups is show in Table 8. The totals of age groups for all the oak stands contain stands of different ages in each age group. It makes age groups inadequate for the long time periods predictions. Conversion of age groups to age classes leads to loss of accuracy.

³There are six vegetation-climatic zones located in the Ukraine [9]. Use of these vegetation-climatic zones for analyses is not suitable because their boundaries do not match to that of administrative units. The use of solely administrative regions is not suitable because this division does not take into account vegetation-climatic conditions.

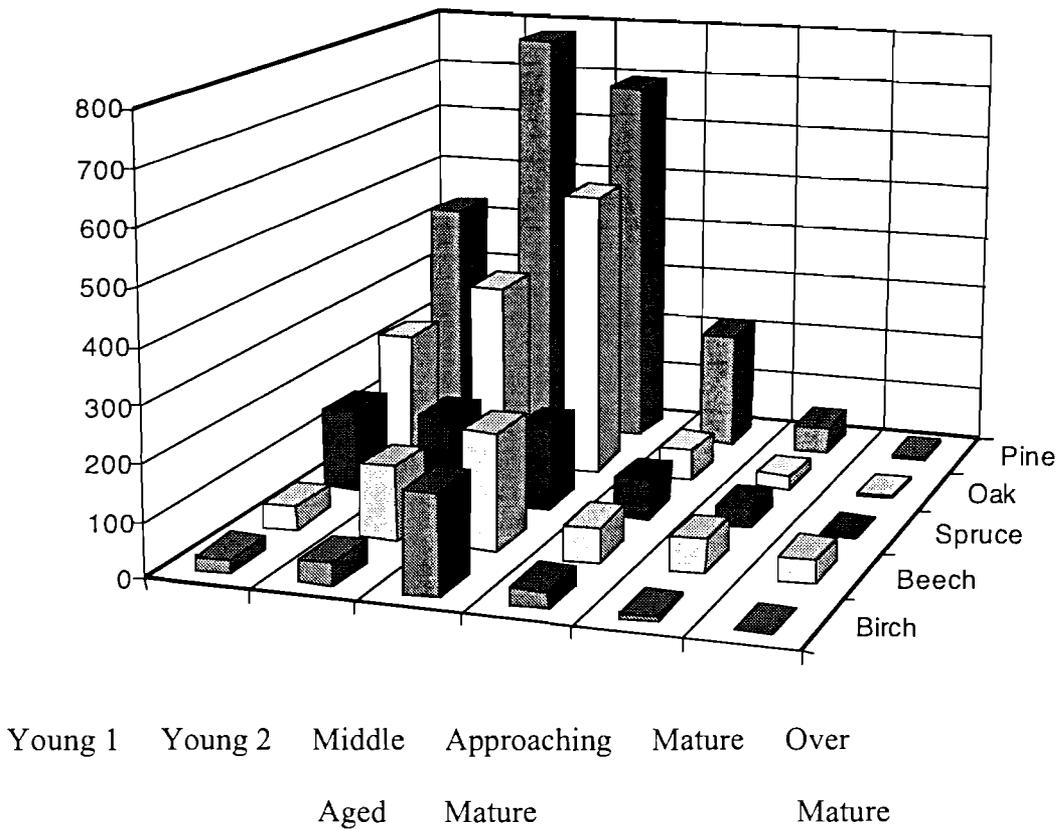


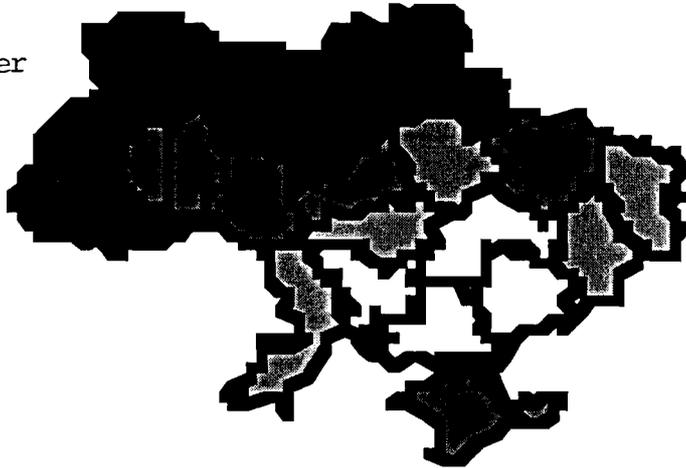
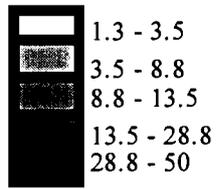
Figure 1. Age Distributions of Main Species

Table 8. Age Groups of Different Cut Rotations - Oak Stands

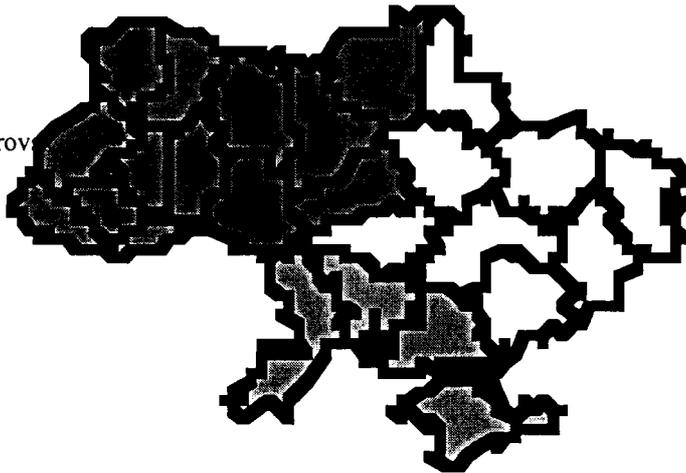
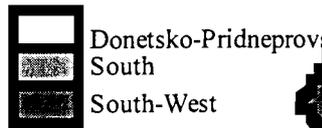
Cut ages	Ages of age groups				
	Young 1	Young 2	Middle-aged	Undermature	Mature
161-170	1-40	41-80	81-120	121-160	161-240
121-130	1-20	21-40	41-100	101-120	121-160
111-120	1-20	21-40	41-90	91-110	111-150
101-110	1-20	21-40	41-80	81-100	101-140
91-100	1-20	21-40	41-70	71-90	91-130
81-90	1-20	21-40	41-60	61-80	81-120
71-80	1-10	11-20	21-60	61-70	71-90
61-70	1-10	11-20	21-50	51-60	61-80
51-60	1-10	11-20	21-40	41-50	51-70

Sources: [22], [7].

Percentage of forest cover



Economic regions



Forest-Economic zones

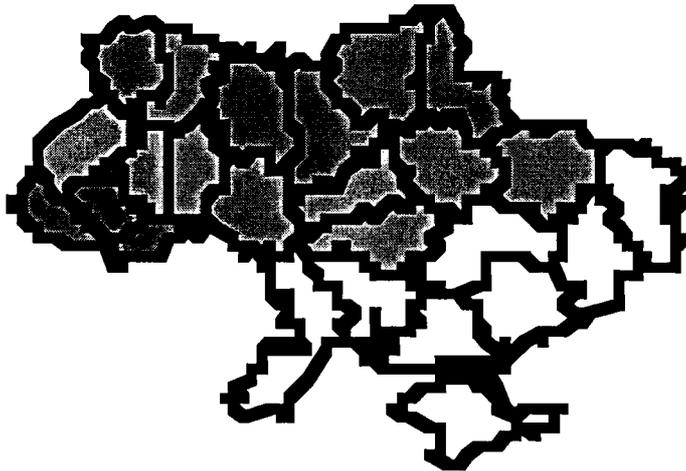
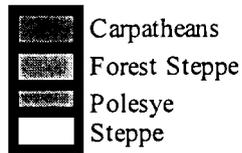


Figure 2. Percentage of Forest Cover and Location of Economic Regions and Forest Economic Zones of Ukraine

A number of prognoses for the dynamics of final and intermediate fellings for Ukrainian forests have been made in [8], [13], [20], which are shown in Table 9. GKL is the prognosis made by USSR Goskomles [8], BFS is the Basic model developed in the IIASA Forest Study project, UAA is the model developed in Ukrainian Agricultural Academy [22]. MF and CSPF are forecasts made for Program of Forestry and Forest Industry Complexes Development by Ukrainian Ministry of Forestry and Council for Study of Productive Forces respectively. Only figures for forests belonging to the state forest authorities have been shown in this table. The Steppe region was not taken into account in BFS and UAA models because of insignificant size of final fellings.

Table 9. Harvesting Forecasts (State Forest Fund, *million m³*)

Fellings	Year	GKL	UAA	BFS	MF	CSPF	Actual
Final	1990	..	7.22	6.94	..	..	5.8
	1995	5.83	7.82	8.24	5.2	7.2	4.5*
	2000	6.21	7.82	8.34	5.3	7.3	..
	2005	6.60	8.02	9.44	..	..	..
	2010	7.00	8.92	9.44	5.5	8.0	..
Inter- mediate	1990	6.33	6.50	5.50	..	..	6.9
	1995	6.33	6.50	5.50	5.3	6.5	4.6*
	2000	6.33	6.40	5.50	5.4	6.4	..
	2005	6.33	6.00	5.30	..	..	..
	2010	6.33	5.70	5.30	5.6	6.5	..

* 1994

Sources: [8], [20], [13].

All these forecasts show a growth of final fellings and a decrease of intermediate fellings consistent with an ageing forest resource hitherto dominated by immature forest. Furthermore, as recent data shows, industrial use of the domestic forest has declined introducing some unutilized volume which could be available for later use.

The potential of the forest resource to support harvest, evident from Table 9, is not uniformly distributed across the country. The regional diversity and size of final and intermediate fellings for forests belonging to the state forest authorities are presented in Tables 10 and 11. This information is presented segregated by the forest-economic regions. The amounts of commercial wood and industrial roundwood (inclusively) are shown for intermediate and principle utilisations⁴. Established limits of cuts in terms

⁴ The commercial or merchantable wood includes industrial roundwood, fuelwood, and firewood with technological uses in the wood chemistry industry, the manufacture of chips and the production of low grade sawnwood. "Technological" firewood and fuelwood are in a category, called "firewood", in yield tables and in reports of Ministry of Forestry. After 1965 industrial roundwood and "technological" wood are presented as industrial wood in official state statistics.

of commercial wood are given for the principal utilisation. Planned cuts in terms of growing stock are given for intermediate utilisation.

Clearly evident from Tables 10 and 11, final fellings in all Ukrainian forests have decreased by 15 percent and intermediate fellings by 30 percent since 1990.

Table 10. Dynamics of Final Fellings (State Forest Fund, *thousand m³*)

Region	Indices	1985	1990	1992	1993	1994	1995
Carpathens	Limits	1960	1960	1788	1709	1690	2031
	Commercial	1949	1877	1625	1382	1161	
	Industrial	1418	1283	1106	896	793	
Polesye	Limits	2499	2515	2388	2420	2362	2357
	Commercial	2469	2376	2360	2405	2352	
	Industrial	1805	1738	1711	1758	1739	
Forest Steppe	Limits	1526	1496	1020	973	973	959
	Commercial	1494	1471	1002	945	951	
	Industrial	969	946	645	590	585	
Steppe	Limits	15	29	29	29	29	28
	Commercial	15	30	30	28	27	
	Industrial	8	12	10	11	12	
Total	Limits	6000	6000	5225	5131	5055	5375
	Commercial	5927	5754	5017	4760	4492	
	Industrial	4200	3979	3472	3255	3128	

Sources: [14], [15], [16], [17], [18].

Table 11. Dynamics of Intermediate Fellings (State Forest Fund, *thousand m³*)

Region	Indices	1985	1990	1992	1993	1994
Carpathens	Plans	1920	..	1372	1331	1310
	Commercial	1660	1407	955	873	695
	Industrial	608	..	332	313	240
Polesye	Plans	3632	..	2465	2342	2388
	Commercial	3411	2837	2243	2121	2148
	Industrial	906	..	585	615	616
Forest Steppe	Plans	2424	..	1650	1609	1526
	Commercial	2259	2160	1517	1474	1383
	Industrial	721	..	439	465	383
Steppe	Plans	573	..	502	555	479
	Commercial	497	513	421	430	403
	Industrial	66	..	61	69	59
Total	Plans	8549	..	5989	5837	5702
	Commercial	7827	6917	5136	4898	4629
	Industrial	2301	..	1417	1462	1297

Sources: [14], [15], [16], [17], [18].

First, for the Carpathean region, the maximum principle harvest permitted has since 1990 declined by 13 percent. Furthermore, due to an undercut in 1993 and 1994, the upper boundary for 1995 has been increased to compensate for the undercut in previous years. The size of intermediate utilisation after 1990 has decreased as well. Intermediate fellings in the previous years exceeded the sustainable level, thus necessitating a period during which less wood was removed. Comparing actual intermediate fellings in 1990 (1.4 million cubic meters) with these calculated by models of the Forest Study Project (1.1 million cubic meters, [13]) shows the degree to which overharvest may have occurred.

The harvesting in the Polesye region has continued at levels close to the maximum sustainable level despite a decline in overall economic activity at the country level of detail. Even though the Chernobyl disaster excluded a sizeable forested area from use, increased harvesting in unaffected areas has more than compensated for the withdrawal of the forest land base.

The situation in the Forest Steppe region is the same as in the Carpathean region. Harvest levels have declined against levels in 1990, though much more steeply. By 1994, harvest levels were one-third less than those existing in 1990 while those in the Carpathians region fell by only 15 percent.

It is obvious from Tables 10 and 11, that actual final and intermediate harvesting were close to planned levels with some rare exceptions (undercut in Carpathean region in 1993 and 1994). Since annual allowable cuts and target levels of intermediate harvesting are valid for a period of 10 years, we can expect that the level of harvesting will not change significant in the coming 5-7 years⁵. Total harvest will be about 10.5 million cubic metres for the forests belonging to the state forestry authorities and about 12 million for all the Ukrainian forests. The annual allowable cut is expected to increase only about 0.5 percent per year should forestry practices remain unchanged suggesting that harvest levels should remain static into the next century.

Table 12. Fellings Dynamics (*million m³ of Commercial Wood*)

Forests	1985	1990	1992	1993	1994
State Forest Authorities	14.11	13.82	11.10	11.02	10.28
Other users	1.63*	1.60	1.38*	1.54*	1.66
Total	15.74	15.42	12.21	12.66	11.95
Growth rate (%)	..	-.4	-9.8	-.7	-6.7
NMP growth rate (%)	..	-3.4	-20.2	-14.9	-28

* Estimate.

Sources: [14], [15], [16], [17], [18], [23].

⁵ The last assessments in the largest forested regions took place in 1988 – 1992.

The annual increment of Ukrainian forests is utilised in relatively low level (about 37 percent in 1993, [20] which is much less than in European countries with intensive forestry). In part this is due to the uneven age structure of its forest resource discussed previously. Consequently, the Ukraine has significant potential to increase timber utilisation if more intensive ways of management (renewal, growing, utilisation) are introduced. This potential increase has been estimated at about 5 million cubic meters, a 40 percent increase over existing harvest levels [19].

3.2 Forest Industry

The Ukrainian woodworking and pulp and paper industries comprise 539 enterprises supporting an employment of 221 thousand people. Nearly 14.7 thousand enterprises and workshops, most of which are small ones, dealt with woodworking in 1993. However most of the timber was treated by the specialised enterprises of the woodworking industry.

The main types of the products manufactured by the woodworking industry are sawnwood, building components made of wood, wooden panels, plywood, furniture and other types of products. Most of the equipment of woodworking industry has been in operation for between 10 to 20 years.

At the present time particle board panels are produced by 13 enterprises with annual capacity of about 1.2 million cubic metres. Most of the equipment for producing particle board has been in operation for 25–35 years. One new plant with annual capacity of 110 thousand cubic metres is in the final stage of construction and two more are projected to be built. Fibreboard panels are produced by three plants with a total capacity of 39 million square meters. The Program of Forestry and Forestry Industry Complexes Development [20] provides construction of three new fibreboard plants each capable of producing 15 million square metres. Thus, the Ukrainian forest sector will be able to produce some 70 million square metres of fibreboard by the year 2015. Plywood, another panel product, is produced at four plants with a total capacity of about 200 thousand cubic meters, the plants employing nearly 4 thousand people.

Ukraine has a highly developed pulp and paper industry, consisting of 92 enterprises with an annual capacity of about one million tons of paper and paperboard. A significant part of pulp, paper, and cardboard manufacture is produced by the enterprises belonging to “Ukrbumprom”. They produced all of the pulp and about three-quarters of the paper and paperboard. The Ukrainian paper industry is specialised towards producing high quality kinds of paper and cardboard, with the paper mill located at Malin as an example, producing electrical insulating paper and condenser paper.

The raw material supporting the production of paper products includes both straw and wood fibre, although in recent years pulp mills originally constructed based on straw fibre have been converted to wood fibre using low grade soft wood and deciduous species [4]. In the future, both raw material sources are being considered. The

Program of Forestry and Forestry Industry Complexes Development, recognising the antiquated nature of the manufacturing equipment (three-quarters of the equipment are more than 20 years old while only 5 percent are less than 5 years old) has identified the construction of two new pulp manufacturing complexes using wood as the fibre raw material and a further two which will use straw as the fibre raw material. By the year 2015, the estimated pulp and paper producing capacities will be 1030 thousand tons and 970 thousand tons respectively.

The Ukrainian woodworking and pulp and paper industries are in a crisis as is the rest of the economy, amply evident from Table 13. From 1990 to 1994, net material product (in comparable prices) fell by 58 percent, with the output of forest products falling by a similar amount. Plywood manufacture fell faster due to a reliance on imported raw material, primarily from Russia. Paperboard and fibreboard fell more slowly because the low grade merchantable timber from domestic intermediate felling could be used as raw material. As mentioned before, imported roundwood fell at a faster rate than domestic production.

Table 13. Dynamic of Net Material Product and Wood Products Manufacture in Physical Units (1990 = 100)

Indices	1987	1990	1991	1992	1993	1994
NMP	97	100	87	69	59	42
Sawnwood	102	100	82	63	52	39
Plywood	112	100	85	56	29	17
Particleboard	97	100	92	85	75	45
Fibreboard	101	100	101	91	74	50
Chemical pulp	104	100	86	73	46	49
Mechanical pulp	..	100	..	58	..	..
Paper	87	100	96	76	49	26
Paperboard	101	100	87	69	51	38

Sources: [1], [28], [30].

3.3 Wood Products Supply and Demand

In the centrally planned economy, distribution of timber and wood products took place under a pricing regime which performed a monitoring role rather than an allocative role. The ability of the consumer to pay and the efficiency of utilisation were linked to the central plan, and not to the individual producer or consumer. The term, "insolvency", only rarely appeared. Consumer demand was virtually always satisfied and fully reflected in consumption. Evident from Table 14, per capita consumption of selected forest products (sawnwood and fibreboard) in the Ukraine was on par with France while that of plywood and particleboard, paper and paperboard were significantly less. Following the break-up of the USSR at the end of 1991, per capita consumption levels collapsed.

Table 14. Consumption of Main Timber Products Per Thousand Inhabitants

Countries	Sawn-wood, <i>m</i> ³	Ply-wood, <i>m</i> ³	Particle board, <i>m</i> ³	Fibre board, <i>m</i> ³	Paper & cardboard, <i>ton</i>
Ukraine, 1989	224	4.0	27.4	4.5	31
Ukraine, 1993	91	1.6	20.6	1.9	10
Finland	459	22.5	50.7	19.7	290
Sweden	330	16.1	73.2	17.3	244
Austria	460	12.3	106.7	7.7	195
Czech Republic	189	7.3	51.4	4.8	61
Bulgaria	25	2.6	14.1	2.8	32
Poland	88	2.5	28.5	10.8	30
Germany	219	11.6	107.3	9.7	200
France	188	9.5	44.3	5.8	155
Italy	124	9.5	43.1	1.5	129
Great Britain	157	19.9	42.0	7.5	169

Sources: [1], [6], [11], [25], [28], [30].

The general economic decline following the collapse of the centrally planned system led to a fall in demand of forest products. The decline in the consumption of forest products was greater than the fall in NMP due to the use of wood products primarily in capital formation activities. The capital stock accumulated during the former regime was sufficiently robust not to need replenishment during the transition at the same level that characterised the old regime. While the decline of NMP from 1989 to 1993 in constant prices was 39.2 percent, consumption of main wood products fell more sharply: sawnwood — by 66 percent, plywood — by 60 percent, particleboard — by 25 percent, fibreboard — by 58 percent, paper and cardboard — by 67 percent.

Self supply (ratio of domestic manufacture to consumption) rose for all of the products manufactured by the forest industry except for the plywood sector. While the decline in output of the domestic forest industry, with the exception of the plywood sector, is similar to that experienced by NMP, the fall in import levels was much greater. Plywood manufacture fell significantly faster than consumption because this sector relied to a large extent on imported roundwood, mainly from Russia. The self supply index for plywood dropped from 91 percent in 1989 to 57 percent in 1993. Due to a large component of pulp consumed in the manufacture of paper and paperboard flowing from waste paper, non-wood fibre, and imported pulp, the self sufficiency ratio of pulp did not change greatly. Ratios for paper and paperboard also increased. Waste paper and imported pulp accounted for 50 percent and 37 percent of the raw material consumed in the paper and paperboard sector.

3.4 Timber Demand and Supply

Ukrainian supply of roundwood in 1985, amounting to approximately 25 million cubic meters, originated primarily from domestic sources (60 percent) and were supplied

mented by imports (40 percent). By 1993, the total amount of consumed raw material dropped to 15 million cubic meters while the share of domestic supply rose to 85 percent. A significant source of wood fibre has been by-product wood wastes, which in 1985 amounted to 4.8 million cubic meters [1]. Almost four-fifths of the waste material was consumed in the manufacture of commercial products. Woodworking, pulp, and paper manufacture, wood consumed in unmanufactured form, and fuel are the main categories of log consumption. Timber consumption by the forest sector is estimated by translating the main kinds of wood products manufacture into roundwood consumed using standard conversion coefficients.

Presented in Table 16, the dynamics of wood fibre supply is shown in physical units while consumption in the different categories are shown as a percent of the total of roundwood supply plus waste wood fibre produced during the manufacturing process. The share of wood used for sawnwood and plywood has decreased since the collapse of the former USSR while consumption in the production of manufacture particleboard and fibreboard manufacture has increased. These changes reflect decreased log imports (which consist almost completely of industrial roundwood). Since a significant part of domestic wood supply originates from intermediate harvest which contains a low share of industrial roundwood, particleboard and fibreboard manufacture, being able to use lower grade wood fibre, have taken an increasing share of the domestic wood supply. Pulp manufacture continued to account for more or less constant part of the wood utilisation as imports declined. While changes have been detectable with solid wood product manufacture and the manufacture of reconstituted wood panels, pulp production, never accounting for a larger share of the consumption, in fact has declined.

Another part of the wood supply is used as pit props in the mining sector⁶. Almost all of the wood for the mining sector before 1990 was imported from Russia. However, recently, possibilities to use Ukrainian timber from intermediate utilisation have been found. Now, approximately one-third of the pit props are supplied from domestic sources. Share of wood use for pit props and for fuel did not change significant and has fluctuated between 16 and 19 percent. Other unidentified uses reflecting the remainder have varied between 15 and 28 percent of the estimated fibre supply.

⁶ More reliable data on consumption of timber for pit props exists only for 1985, 1989 and 1990. For other years figures were estimations based on coal mining.

**Table 15. Dynamics of Main Woodworking and Pulp and Paper Industries
Products Consumption and Supply**

Product, unit	Indices	1985	1989	1990	1991	1992	1993	1994
Sawnwood <i>million m³</i>	Manufacture	7.57	8.29	7.44	6.10	4.70	3.90	1.24
	Imports	4.00	3.45	3.00	2.33	1.43	0.83	..
	Exports	..	0.06	0.01	0.12	0.12	0.00	0.00
	Consumption	..	11.68	10.43	8.31	6.01	4.73	..
	Selfsupply(%)	..	71	71	73	78	83	..
Plywood <i>thousand m³</i>	Manufacture	190.0	187.6	169.0	143.5	94.6	48.8	29.1
	Imports	20.0	38.0	40.0	20.0	28.0	39.8	..
	Exports	..	19.0	22.0	16.4	7.3	3.7	2.3
	Consumption	..	206.6	187.0	147.1	115.3	84.9	..
	Selfsupply(%)	..	91	90	98	82	57	..
Particleboard <i>thousand m³</i>	Manufacture	1075	1191	1187	1087	1012	890	537
	Imports	100	300	209	90	94	192	..
	Exports	..	65	53	36	24	10	14
	Consumption	1175	1426	1343	1141	1082	1072	..
	Selfsupply(%)	..	84	88	95	94	83	..
Fibreboard <i>million m²</i>	Manufacture	25.1	38.3	35.6	36.0	32.5	26.3	17.9
	Imports	32.0	46.0	40.0	16.0	13.0	5.3	..
	Exports	..	10.0	9.0	0.9	1.0	0.3	1.0
	Consumption	..	74.3	66.6	51.1	44.5	31.2	..
	Selfsupply(%)	..	52	53	70	73	84	..
Chemical pulp <i>thousand ton</i>	Manufacture	105	107	104	90	76	48	51
	Imports	300	228	316	268	..	148	..
	Exports	..	21	16	4	5	5	1
	Consumption	405	314	404	354	..	191	..
	Selfsupply(%)	26	34	26	25	..	25	..
Paper <i>thousand ton.</i>	Manufacture	299	353	369	353	279	181	94
	Imports	500	702	655	248	145	95	..
	Exports	..	127	137	129	52	33	7
	Consumption	799	928	887	472	372	243	..
	Selfsupply(%)	37	38	42	75	75	74	..
Cardboard <i>thousand ton.</i>	Manufacture	520	543	543	470	375	276	208
	Imports	300	313	364	194	137	67	..
	Exports	..	143	122	81	39	44	..
	Consumption	820	713	785	583	473	299	..
	Selfsupply(%)	63	76	69	81	79	92	..

Sources: [1], [11], [28], [30].

Table 16. Structural Changes in Log Supply and Consumption

Items		1985	1989	1990	1991	1992	1993
Supply, <i>million m³</i>	Domestic	15.7	15.4	15.4	12.2	12.6	12.7
	Imports	10.5	8.4	7.6	6.0	3.0	2.2
	Total	26.2	23.8	23.0	18.2	15.6	14.9
	Selfsupply (%)	60.0	64.8	66.9	67.1	80.8	85.2
Besides, utilised wood wastes	<i>million m³</i>	3.70	3.90	3.99	3.01	2.31	2.00
	% of supply	14.1	16.4	17.3	16.5	14.8	13.5
Structure of wood demand, (% of supply + utilised wood wastes)	Saw logs	43.2	52.3	48.5	50.2	45.1	39.3
	Plywood logs	1.8	2.0	1.9	2.0	1.5	0.8
	For particleboard	7.0	8.5	8.8	10.1	11.0	10.2
	For fibreboard	0.9	1.5	1.5	1.9	2.0	1.7
	Pulpwood	2.0	2.3	2.3	2.5	2.4	1.6
	Pit props	16.0	17.7	16.1	16.5	18.5	16.8
	For fuelwood	14.9	16.4	14.8	17.6	15.9	16.0
	Others	28.0	15.4	23.6	15.3	18.1	26.8
Exports	0.3	0.3	0.1	0.4	0.3	0.3	

Sources: [1], [3], [27], [28], [30].

3.5 Trade

The contribution of forest products to the total trade of the Ukraine, as the forest sector to NMP, is quite low. Wood and wood product imports accounted for only 3 percent of trade while pulp and paper imports accounted for only one percent of total imports into the Ukraine in 1994. Despite the low contribution to overall trade, a significant share of domestic consumption has been met through imports, amply evident from Tables 15 and 16. Interestingly, wood and wood product imports significantly exceeds their exports, and it is only for final products that these figures are comparable, or even that exports are greater than imports (furniture and parquet).

The amount of imported timber and wood products during the 1970s, most of which came from Russia, amounted to an estimated 32 million cubic meters in terms of roundwood, or 70 percent of the total wood and wood products supply. It decreased to 21 million cubic meters in 1990, the largest parts of which were roundwood (43 percent) and sawnwood (26 percent). Since 1990, the amount of imports has dramatically dropped due to the fall in domestic demand. In 1993, the import of forest products was estimated to be 5.8 million cubic meters including 2.2 million cubic meters of roundwood and 0.8 million cubic meters of sawnwood.

Not unsurprisingly, the largest part of Ukrainian forest product imports took the form of roundwood and sawnwood (see Table 17), which share fluctuated around 65 percent of wood product imports in terms of roundwood equivalents. Pulp, paper and cardboard manufacture accounted for about one-quarter of the fibre while wooden panels represented between two and nine percent of the fibre. Significant structural changes are not observable except growth of particleboard share. The largest wood and

wood products exporter to the Ukraine was Russia in all products except for fibre-board, about half of which were imported from Belorussia in 1993.

Timber product export is less significant in Ukrainian foreign trade structure. Wood and wood products accounted for 0.2 percent and pulp and paper for 1.3 percent of the total Ukrainian export in 1994. Pulp, paper and cardboard dominated forest product exports, accounting for 60 percent (in terms of roundwood). Another significant component of Ukrainian exports has been parquet which significance has increased.

Table 17. Structural Changes in Ukrainian Wood Products Trade (Percent of Wood Products Trade in Terms of Roundwood)

Item	1985	1990		1992		1993	
	Imports	Imports	Exports	Import	Exports	Imports	Exports
Roundwood	47.3	40.5	2.5	39.6	9.6	42.1	13.1
Sawnwood	27.0	23.9	1.3	28.3	3.6	23.6	0.6
Plywood	0.2	0.5	4.6	0.9	4.4	1.9	2.5
Particleboard	0.8	1.9	7.5	2.1	9.8	6.2	4.5
Fibreboard	1.4	2.0	7.1	1.6	2.3	0.9	0.8
Chemical pulp	6.8	8.4	6.7	13.7	6.0	14.1	6.6
Paper	8.3	12.9	42.3	7.1	46.1	6.7	32.4
Cardboard	2.4	3.5	18.3	3.3	16.8	2.3	21.0
Parquet	0.0	0.0	9.6	0.0	1.4	0.0	18.5
Sleepers	1.8	1.7	0.0	0.5	0.0	0.3	0.0

Sources: [1], [30].

To promote exports and open Ukrainian economy up for international trade and competition, the Government undertook several actions in October and November, 1994. The Government committed itself not to impose any quantitative import restrictions, except for the licenses that are currently in place. The import tariff structure was to be modified to maintain low uniform rates. Furthermore, the Government intended to avoid frequent revisions to the tariff structure in order to avoid introducing a large uncertainty to foreign exporter and domestic importer alike. Additionally, the Government has identified a certain number of products which are crucial to the operation of the economy, timber and some kinds of wood products (offset paper, newsprint paper, binders cardboard, paper for corrugating, pulp) being included to the list of so-called "critical import". Located on the list signifies that import of critical amount of these products is guaranteed by the Government.

All export quotas and licenses, with the exception of ferrous and non-ferrous scrap metal, cast iron, coal, grain, and goods subject to voluntary export restraints and other contingent international agreements were abolished at November 1, 1994. Products of the forest sector are not subject to export restrictions because they are not considered strategic ones. However, while not facing export restrictions, the Government has introduced a system of recommended export prices to ensure that the natural wealth of the Ukraine does not unintentionally disappear. Examples of recommended export

prices include oak saw wood (120 – 260 USD/m³), oak sawnwood (330 – 360 USD/m³), beech sawnwood (220 – 250 USD/m³), oak, beech and hornbeam parquet [29].

3.6 Summary

In conditions of the centrally planned economy, the Ukrainian forest resources satisfied 42 percent of the economy's needs for wood and wood products. However, in conditions of general economic decline after 1990, wood and wood products demand fell significantly steeper than net material product.

Table 18. Dynamics of Wood and Wood Products Balance

Items	Unit	1975	1980	1985	1990	1993	1994
NMP	<i>billion krb.</i>	..	..	..	101.6	59.7	43.0
as percent of 1990		..	..	..	100	59	42
Domestic supply	<i>million m³</i>	13.9	14.5	15.7	15.4	12.7	11.9
as percent of 1990		90	94	102	100	82	78
Imports	<i>million m³</i>	31.8	31.3	20.9	17.6	5.1	..
as percent of 1990		181	178	119	100	29	..
Exports	<i>million m³</i>	0.5	0.5	1.5	1.08	0.31	0.09
as percent of 1990		46	46	139	100	28	..
Total resources	<i>million m³</i>	45.7	45.8	36.7	33.0	17.8	..
as percent of 1990		138	139	111	100	54	..

Sources: [1], [23], [26]

Domestic wood supply is limited primarily by forest resource capacity and the forest legislation affecting the rate of cutting. Rising relative tariff rates for transporting timber products relative to general price levels conspired with the legal requirements to harvest a minimum volume of wood from domestic sources to concentrate the fall in demand in the import sector. From 1990 to 1993, the decrease in NMP was 41 percent (see Table 18) while the fall of wood and wood products demand was 46 percent. In the same time period, fellings decreased 18 percent and wood and wood product imports by 71 percent. Self supply index grew from 30 percent in the 1970s to 42 percent in 1985 and 71 percent in 1993.

Per capita consumption of the main wood products became one of the lowest in Europe and comparable with that of former socialist countries. In the structure of wood products manufacture, a slight increase in the import and consumption of panel products can be observed. The largest part of imports remains roundwood.

4. Important Factors Influencing Forest Sector

In addition to the three factors identified in chapter 2, three additional ones can be expected to have a more direct impact on the behaviour of the forest sector. They include forest legislation, changing price and cost structure, and the pace of privatization.

4.1 Forest Legislation

The forest legislation in Ukraine is derived from legislation originating from the Soviet Union. The first forestry law there was the decree of the All-Russian Central Executive Committee, "About Forests", accepted on the 24th of February, 1918. It declared, *inter alia*, that all forests were common national property. The USSR forest legislation was subsequently introduced to the Ukraine on the 26th of February, 1919, after the Ukraine joined the former Soviet Union.

More recently, newer legislation was introduced to the USSR and the Soviet Republics in 1977. Development of Forest Codes for all of the Soviet Republics followed this example with the Forest Code of the Ukrainian Soviet Socialist Republic adopted by the Supreme Soviet of the Ukraine in 1979.

This new legislation did not change the way the forests were being managed, it merely consolidated the practices which were then taking place. The Forest Code of the Ukraine confirmed that all of the forests were the exclusive property of the State, and could only be given for use, identifying two broad administrative divisions for the forest resources. First, forests which fell within the lands of the collective agricultural enterprises were the responsibility of the agriculture organisations. Second, forests of state significance were under the management of the state forest authorities.

As with all Forest Codes of the Soviet Republics, the Ukrainian Forest Code was more or less a copy of the Union level Code, and thus contained some statements which could not be applied to the Ukrainian forests. For example, the Forest Code identified three broad groups of forests, differentiated by the primary use to which each group was dedicated. However, in the Ukraine, there are only two groups, the third category not being represented.⁷

Even though there was a separate Forestry Code for the Ukraine, the main responsibilities in the sphere of management remained the domain of the Soviet Union. These responsibilities included the determination of the main forest management principals, the establishment of annual allowable cuts (AAC), directing the distribution and sale

⁷ Forest identified for inclusion in the first group are dedicated for protection roles, such as water or soil conservation, preservation of natural monuments, and affording recreational opportunities close to inhabited areas. Forests allocated to Group II are oriented towards industrial use, although proximity to populated areas imposes more restrictions on their use. Group III forests, none being located in the Ukraine, are also dedicated to industrial use, but unlike those located in Group II, are situated far from developed regions and thus do not have as onerous restrictions affecting their use.

of timber, establishment of rules for assigning forest lands to certain forest groups and categories of protection, and the establishment of forest inventory system standards.

The less significant responsibilities were attributed to executive authorities of all levels in both the Union and the Republic levels of Government, and to the State authorities which were the Ministry of Forestry and the Ministry of the Forest Industry of the Ukrainian republic. Although nominally allocating power to the central government and the executive branches of government, the real legislative management of these less significant responsibilities was in the hands of state authorities and their local structures. They included state management in the area of utilisation, renewal, and protection of the forests.

As the Ukraine became an independent state, the over riding nature of the forest legislation at the USSR level disappeared. The highest level of authority became the Supreme Soviet of the Ukraine, and the highest executive power became the Council of Ministers of the Ukraine. Necessitating a change, a new Forest Code of the Ukraine was brought into force by the Supreme Soviet on January 21, 1994.

Like the previous codes before it, the new one establishes that all forests on the territory of the Ukraine belong to the State.⁸ Further responsibilities identified in the legislation for the State include those regulating forest relations, those creating and maintaining an inventory of the forest resources, those defining the main directions of state policy in the field of protection, defence, utilisation and renewal of forests, those defining the power of Soviets of People Deputies and state authorities in organisation of protection, defence, utilisation and renewal of forests.

The main responsibilities of the Council of Ministries are the realisation of state control for protection, defence, utilisation, and renewal of forests, the establishment of rules for division of forest to forest groups and categories of protection, the establishment of limits for special utilisation of forest resources of state significance (such as annual limits of final fellings), the establishment of rules and norms for payment for special utilisation of forest resources of state significance.

The power to assign forest plots for permanent and temporary use is given to legislative authorities of lower levels, i.e. the Supreme Soviet of Republic Crimea and also to

⁸ This Forest Code introduces some changes to the system of state forest statistics to make it more close to the world one. Forest roads, cuttings, anti-fire breaks which were counted as non-forest lands accordingly to new Forest Code are counted as forest ones.

Another change introduced by this Forest Code is allowance to conduct forest-renewal cuts in forests where these cuts were prohibited before and only sanitary cuts were allowed. These forests are sanitary zones of resorts and water sources, forest of scientific and historical significance, forest shelter belts, other valuable forests. Forest-renewal cuts can be conducted in these forests in case of protection properties loss.

the Soviets of Oblast, Region, Town and Village.⁹ Forest resources utilisation includes special utilisation (fellings, resin tapping, etc.); use for hunting; providing recreational opportunities; use for scientific needs.¹⁰

Two ministries, the Ministry of Forestry and the Ministry of Natural Protection, play important roles in the management of forests. The Ministry of Forestry is responsible for the organisation of forestry, including division forest for groups, categories of protection and forest management units; the establishment of rotation ages, cut methods and norms of forest resources utilisation. The Ministry of Nature Protection plays more active role in field of forest relations. It implements complex management of protection, defence, and renewal of forests. The decisions of Council of Ministries and Ministry of Forestry such as establishment of final fellings limits have to be confirmed by the Ministry of Nature Protection.

4.2 Changing prices and costs

In the centrally planned economy all prices for forest products up to 1991 were fixed and were kept at relatively low level. Under conditions in which the distribution of almost all forms of forest resources was centralised, prices played mainly monitoring roles and were of limited importance when determining the flow of goods and services within the economy.¹¹

In 1992 all forest products were sold at free contractual prices without restrictions mandating profitability for the enterprises, but in February of that year, a 30 percent profitability level was reintroduced. By July 1992, free contractual prices were in operation for forest products without any limitation were again in *vogue*. In November 1993 the limitation of prices for forest products was reintroduced though the level of profitability was not limited.

Despite this changing regulatory climate, price increases in terms of both domestic currency and in US dollars took place, amply evident in Table 19.

⁹ The forest utilisation rights are divided into two groups: permanent use and temporary use. Temporary use can be short-term (less than 3 years) and long-term (3 – 25 years).

¹⁰ Forest plots can be given for permanent use to specialised forestry enterprises for conducting forestry, for special and other kinds of utilisations. It is allowed to assign forest plots less than 5 hectares to farmers and to citizen with special training (but these conditions make it practically impossible). Plots of forest fund can be given (in agreement with permanent user of forest plot) for temporary use (including lease) to enterprises, organisations, unions of citizens, foreign legislative bodies and citizens for special and other kinds of utilisations.

¹¹ Not only were prices fixed in the centrally planned economy, but profit margins for the enterprises were also regulated, as suggested when in January 1991 contractual prices for timber from hardwood broad-leaved species were introduced with a profitability standard of 30 percent.

Table 19. Dynamics of Prices for Forest Products and Exchange Rates

Items	Units	1990	1992	01.11.93	01.07.95
Roundwood	<i>krb./ m³</i>	30	1430	420000	5700000
	<i>USD/ m³</i>	53.6	2.24	70.35	40.14
Sawnwood	<i>krb./ m³</i>	60	3270	1225000	19950000
	<i>USD/ m³</i>	107	5.13	205.19	140.49
Packaging materials	<i>krb./ m³</i>	100	4500	1368000	13800000
	<i>USD/ m³</i>	179	7.06	229.15	97.18
Particle board	<i>krb./ m²</i>	1.5	70	16400	..
	<i>USD/ m²</i>	2.68	0.11	2.75	..
Parquet	<i>krb./ m²</i>	15	570	150000	1050000
	<i>USD/ m²</i>	26.8	0.89	25.13	7.39
Exchange rates	<i>krb./USD</i>	0.56	637.71	5970	142000
	<i>krb./DM</i>	0.37	393.84	3620	

Source: [1], [26].

While prices in rubles and in dollars¹² reflect a different economic, social and political regime than that existing subsequent to the dissolution of the USSR, events following provide an indication of the evolution from a planned economy to the market economy.

Dramatic fall of national currency in 1992 was due to instability, and low prices of wood products in dollar equivalent show that exchange rate did not reflect real value of national currency. Since 1993 significant level of inflation is observable, but prices in dollar equivalent are more or less stable.

Lower prices than European ones¹³ reflect limited ability of the consumer to pay prices characteristic of the market economy.

The Ukrainian forest sector has taken steps towards a market economy, though as is evident from the following list of costs and prices taken from two Ukrainian enterprises, vestiges of the planned economy still remain. These two examples show calculation of prices for pine saw wood (second sort quality, diameter in the top crosscut is 20 – 24 cm) made in Teterev State Forestry Enterprise (FSE) and Boyarka Forest Experimental Station (FSE), are given in the Table 20.

¹² Exchange rate for 1990 was for a special kind soviet currency — “foreign-currency rouble” that was kept in separate accounts and common rouble could not be converted to dollars.

¹³ Average European import/export prices in 1992 for roundwood were 75 *USD/m³*, for sawnwood — 255 *USD/m³*, [25].

Table 20. Price Calculation of the Cubic Meter of Pine Lumber

Expenditures	Teterev SFE		Boyarka SFE	
	Value, <i>thousand</i> <i>krb.</i>	Share of full costs, %	Value, <i>thousand</i> <i>krb.</i>	Share of full costs, %
Raw materials (stumpage price)	232.6	11	398.8	31
Base salary	150.8	7	47.1	4
Additional salary (14%)	21.1	1	7.1	1
Social measures (51%)	87.9	4	28.2	2
Equipment exploitation	24.8	1	179.4	14
Logging transport and roads	984.0	46	0.0	0
Technological costs	1501.2	71	660.6	51
Shop costs	34.5	2	99.4	8
Plant costs	238.1	11	265.4	21
Other costs	102.3	5	264.7	21
Manufacturing costs	1885.1	89	1290.1	100
Selling costs	236.9	11	0.0	0
Full costs	2122.0	100	1290.1	100
Profit	1904.0	90	387.0	30
Free wholesale price	4026.0	190	1677.1	130
Value-added tax (20%)	805.2	38	335.4	26
Retail price with VAT	4831.2	228	2012.5	156

Teterev SFE is one of the largest in Polesye zone (47.2 thousand ha of forest covered lands) with predominance of second group forests. Annual volume of final fellings is 79 thousand cubic metres and 74 thousand cubic metres of intermediate fellings. Boyarka Forest Experimental Station is the smaller one (16.5 thousand ha of forest covered lands) with 21 thousand cubic metres of main fellings and 26 thousand cubic metres intermediate fellings every year. The last enterprise is located in Kiev's green belt with its resource consisting exclusively of first group forests. The predominant specie for both enterprises is pine.

Average distance from individual felling sites to a railway station is shorter for Boyarka FES. This and also higher cut age (because of first group of forests) and consequently is greater average logs size cause higher stumpage price and lower transportation expenditures.

Not only are the manufacturing costs different, but the allowance for fixed profit (90 percent in the first case and 30 percent in the second case), added to full costs, increase this difference. The fact that higher profit is added to higher expenditures leads to a price for the same good which is twice as high, a vestige of the planned economic system still remaining as the Ukraine passes through its transition period.

While the allowance for enterprises to calculate price independently is a step toward the market system, the practice to add fixed profit and existence of such differ prices

show that market relations, infrastructure and way of thinking are not established yet that can support a market system. This is one of the reasons why even such small amount of produced wood and wood products can't meet market demand in the domestic market and significant stocks in trade gathered in the producers' warehouses despite technological demand is satisfied only by one third.

4.3 Privatisation

Privatisation of state property which takes place in Ukraine now is a significant step toward development of market economy. The State Program of Privatisation, adopted by the Supreme Rada (Council) of Ukraine in 1994, indicated that privatisation depends on the size and significance of the enterprise for the State. Those with high importance for the State were not subject to the privatisation process.

The enterprises of the wood working industry are subject to privatisation first. Enterprises of the pulp and paper industry can be privatised only with the agreement of the Council of Ministers. Enterprises of reforestation, forest growing, forest conservation, and also the Zhidachiv Pulp and Paper Combine are not subject to privatisation. Distinct organisations belonging to the above mentioned enterprises that are not governed by these restrictions can also be privatized.

In Carpathean region, where woodworking industry is highly developed, the privatisation process began earlier than in other parts of the Ukraine. As mentioned before, Carpathean forest combines were involved in both forestry and woodworking, but privatisation in the sphere of forestry was prohibited. Thus, according to the Order of President of Ukraine № 142/95 at 24.02.95, the Ministry of Forestry formed 37 forestry enterprises on the base of former forest combines. Woodworking subdivisions of these forest combines were separated and have been fully privatized at the present time. Although there are no restrictions for the logging industry to be privatized, the Ministry of Forestry would like to keep this sector in the hands of the state forestry enterprises. For the nearest future, logging will be conducted by state forestry enterprises with exception of Zakarpatska oblast¹⁴, where logging sector was privatised earlier.

Enterprises with 77 thousand employees (about 30 percent of people being employed in woodworking industry) were privatised in 1993 [27]. Of the 633 enterprises connected with large scale operations in the forest sector, 233, or one-third were not state ones [28] in 1994. Although privatisation of the woodworking industry enterprises in the Carpathean region is complete, only one-half of Ukrainian wood working industry has been privatised to date the middle of 1995. Most of the enterprises were ransomed by labour collectives without auctions or competitions of investments and are property of these collectives. Others are joint stock companies or property of tenants associations. Although it is significant step toward market economy the term is too short to make any estimates in changes of efficiency in privatised enterprises.

¹⁴ The western oblast of Ukraine.

5. Forecast for the Future — Supply and Demand of Forest Products

Various assumptions have been employed when developing some view of the future.¹⁵ The base year for the forecast is 1993 while the planning horizon spans over 4 five year periods, extending up to the year 2013. The forest products demand and manufacture are tied with the Net Material Product. The outlook for demand of forest products is based on elasticity of demand with respect to growth of Gross National Product, the implicit assumption being that NMP and GNP are similar [5]. This approach accounts for the demand of sawnwood, panel products, and paper products. Pulp demand is predicted through the demand for paper and paperboard manufacture. The contribution of waste paper to the raw material supply for paper and paperboard manufacture is assumed to be the current level of recycling. Timber consumption in unmanufactured form was assumed to be equal to the unaccounted for supply of wood raw material. Future demand levels were calculated based on an elasticity with respect to NMP of 1. The total demand for roundwood and other fibre is determined through meeting of the projected domestic demand for the final products. Not only does domestic demand for forest products increase with increasing NMP, but domestic supply is also assumed to increase as well. It is clear from Table 15, that current level of forest products manufacture is significantly lower than Ukrainian forest industry capacity, so that certain increase of manufacture is available in case of NMP growth. Furthermore, capacity increase is expected in case of economy growth because of new investments possibility. The highest limit of capacity level is assumed to be equal to those identified by the Program of Forestry and Forest Industry Complexes Development.

Domestic timber supply is limited to the AAC plus increases according to two assumptions affecting the intensity of forest management. The base AAC is allowed to increase by 0.5 percent per year. The second assumption is taken on the base of scenario of Council for Study of Productive Forces in [20] which takes into account intensifying of timber resources reproduction and utilisation. It predicts the growth of annual fellings to 17 million cubic metres in 2015 (annual growth 1.5 percent).

The imports for each forest product is determined by the difference between projected demand and projected domestic supply.

There were three tested scenarios for national economy development with NMP annual growth of -5 percent, 2 percent and 5 percent, identified in Table 21. Based on the four scenarios presented, it is only in the most optimistic case that the import of

¹⁵ There are many different approaches which can be used for modelling the forest sector [2]. The degree of model sophistication can vary greatly depending on the available data and analytical capabilities of the analyst. The most basic forest sector models are those of gap variety. This type of model attempts to quantify the difference between the projected consumption and manufacture of different forest products over time. Absence of reliable price and cost data, and a lack of a stable economic, political, and social system dictated the selection of this type of model.

forest products approach pre-collapse levels, and this only in the last half of the first decade in the 21st century.

Table 21. Modelling of Wood and Wood Products Demand and Supply (million m^3)

Growth Rates		Items	Periods				
NMP	Cuts		1993	1998	2003	2008	2013
-5.0%	0.5%	Wood demand	14.8	11.6	9.1	7.2	5.7
		Wood domestic supply	12.7	13.0	13.3	13.7	14.0
		Wood imports	2.2	0.0	0.0	0.0	0.0
		Wood products imports	2.8	1.7	1.1	0.7	0.5
2.0%	0.5%	Wood demand	14.8	16.3	18.0	19.9	21.9
		Wood domestic supply	12.7	13.0	13.3	13.7	14.0
		Wood imports	2.2	3.3	4.7	6.2	7.9
		Wood products imports	2.8	3.1	3.7	4.3	4.9
2.0%	1.5%	Wood demand	14.8	16.3	18.0	19.9	21.9
		Wood domestic supply	12.7	13.7	14.7	15.9	17.1
		Wood imports	2.2	2.7	3.3	4.0	4.8
		Wood products imports	2.8	3.1	3.7	4.3	4.9
5.0%	1.5%	Wood demand	14.8	18.9	24.0	28.4	31.9
		Wood domestic supply	12.7	13.7	14.7	15.9	17.1
		Wood imports	2.2	5.2	9.3	12.6	14.8
		Wood products imports	2.8	4.0	4.1	3.6	5.1

6. Conclusions

1. The economy of the Ukraine has fallen considerably since the collapse of the USSR. In the process, imports of forest products have also fallen, though much faster than domestic production. While still importing forest products under the assumption of a stabilised economy, one that is no longer falling, should the economy continue to decline, the Ukraine could very well become entirely self sufficient in forest products.
2. It is expected that this situation will not continue unevenly and crisis will be overcome. Without structural changes and searching for reserves it is impossible to intensify utilisation of all the resources including wood and wood products. Growth of economy will cause increase of demand for wood products but it will not reach the consumption level of previous years. In case of 2 percent annual growth Ukrainian market of timber can be estimated as 22 million cubic metres in 2013. Domestic wood supply will increase because of Ukrainian forest resources capacity growth and forest growth and exploitation intensification. Share of domestic supply will be 17 million cubic metres and about 5 million cubic metres must be imported from the abroad. Furthermore, nearly 5 million cubic meters of wood products (in terms of roundwood) must be imported also. The main timber export will continue to be Russia, while the import of more manufactured products such as fibreboard and particleboard will originate from other countries, such as Belarus, as well. Not only is the Ukraine a potential market for exporters of forest products as its economy rebounds, but the Ukraine has the capabilities, particularly in the western part of the country, to be an exporter in its own right of more manufactured forest products because of a developed wood working industry and skilled labour forces. The export of forest products will be a significant help to the reconstruction of the wood working industry.
3. The system of economic statistics and especially forest statistics requires improvement. Some indices in Ukrainian forest statistics are incomparable with world ones and inconvenient for long-term planning and forecasts. The first steps have been taken to improve the system through which statistics are collected for the forest sector, although there is still need for further improvement. Economical statistics system worked in centrally managed economy and was not able to gather economic data in case of broad variety of sources. In market economy when number of economy subjects will increase this task becomes more difficult.
4. Improvement is required for Forest legislation, because even new Forest Code is not perfect and does not reflect transition to market relations. Forest resources management, forestry conducting, logging industry and woodworking industry must be separated. Property relations in forest sector require development.

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