Review article
УДК 630.90,338.012
DOI: 10.37482/0536-1036-2025-2-154-171

Analysis of the Timber Industry Complex of Forest-Rich Countries

Olga P. Sushko*✉*, Doctor of Economics, Prof.; *ResearcherID: F-4750-2019, ORCID: https://orcid.org/0000-0003-0865-6621*
Marina V. Efimova, Candidate of Economics, Assoc. Prof.; *ResearcherID: ACH-7887-2022, ORCID: https://orcid.org/0000-0002-1340-8406*
Plekhanov Russian University of Economics, Stremyanny per., 36, Moscow, 115054, Russian Federation; osushko@mail.ru✉, Mishagina.MV@rea.ru

Received on September 17, 2024 / Approved after reviewing on December 11, 2024 / Accepted on December 14, 2024

Abstract. The article presents the results of a comparative analysis of the production of forest products in the world at the present stage. International trade and production of forest products demonstrates consistent growth. Global export volumes are showing steady annual growth rate of 1.8 % compared to the preceding decade. Forecasts indicate that this upward trend is expected to continue, with even stronger growth expected in 2030. In 2022, global forest production remained generally stable compared to the previous year. Nevertheless, a decline was recorded in some product categories, primarily due to a decrease in production and exports from Russia. The year 2023 has become just as difficult for the global timber industry complex. Despite the stability of the balance of supply and demand for forest products on the world market, there are obvious changes that will become development trends. The analysis shows that forest-rich donor countries (Brazil, Canada, Russia) export timber and lumber to recipient countries with high domestic demand for timber (China, India, the Middle East and Central Asia). Consequently, a state's forest resource stock should not be considered as the sole indicator of the success and progress of its forestry sector. Several major forest product producing countries, despite lacking access to their own timber reserves, have a developed woodworking industry, which is renowned for producing high-quality products from imported raw materials. Such a strategy of competition in the timber market has been adopted in some Asian countries.

Keywords: timber industry complex, global production of forest products, export of forest products, dynamics of forest products production

Acknowledgements: The research was supported by a grant from the Russian Science Foundation (project no. 24-28-01250).

For citation: Sushko O.P., Efimova M.V. Analysis of the Timber Industry Complex of Forest-Rich Countries. *Lesnoy Zhurnal* = Russian Forestry Journal, 2025, no. 2, pp. 154–171. (In Russ.). https://doi.org/10.37482/0536-1036-2025-2-154-171

Обзорная статья

Анализ лесного комплекса лесообеспеченных стран

О.П. Сушко*✉*, *д-р экон. наук, проф.; ResearcherID: F-4750-2019, ORCID: https://orcid.org/0000-0003-0865-6621*
М.В. Ефимова, *канд. экон. наук, доц.; ResearcherID: ACH-7887-2022, ORCID: https://orcid.org/0000-0002-1340-8406*

Российский экономический университет им. Г.В. Плеханова, Стремянный пер., д. 36, Москва, Россия, 115054; osushko@mail.ru✉, Mishagina.MV@rea.ru

Поступила в редакцию 17.09.24 / Одобрена после рецензирования 11.12.24 / Принята к печати 14.12.24

Аннотация. Представлены результаты сравнительного анализа производства лесной продукции в мире на современном этапе. Международная торговля и выпуск лесной продукции демонстрируют устойчивый рост: объемы мирового экспорта ежегодно увеличиваются на 1,8 % по сравнению с предыдущим десятилетием. Прогнозы указывают на то, что эта тенденция сохранится и в 2030 г. рост будет еще более уверенным. В 2022 г. мировой объем изготовления лесной продукции в целом оставался на стабильном уровне по сравнению с предыдущим годом. Тем не менее в некоторых категориях был зафиксирован спад, что в первую очередь связано с уменьшением объемов производства в России и экспорта из нашей страны. 2023 г. стал таким же трудным для мирового лесного комплекса. При всей стабильности баланса спроса и предложения лесной продукции на мировом рынке очевидны изменения, которые станут тенденциями развития. Анализ показывает, что богатые лесами страны-доноры (Бразилия, Канада, Россия) экспортируют древесину и пиломатериалы в страны-получатели с высоким внутренним спросом на древесину (Китай, Индия, Ближний Восток и Центральная Азия). Следовательно, запасы лесных ресурсов в государстве неверно рассматривать как единственный показатель успеха и прогресса его лесного сектора. Несколько крупных стран-производителей лесной продукции, несмотря на отсутствие доступа к собственным запасам древесины, обладают развитой деревообрабатывающей промышленностью, которая славится высококачественной продукцией из импортного сырья. Такая стратегия конкуренции на рынке древесины была принята в некоторых странах Азии.

Ключевые слова: лесной комплекс, мировое производство лесной продукции, экспорт лесной продукции, динамика производства лесной продукции

Благодарности: Исследование выполнено за счет гранта РНФ (проект № 24-28-01250).

Для цитирования: Sushko O.P., Efimova M.V. Analysis of the Timber Industry Complex of Forest-Rich Countries // Изв. вузов. Лесн. журн. 2025. № 2. С. 154–171. https://doi.org/10.37482/0536-1036-2025-2-154-171

Projections from the global timber industry complex development model indicate a sustained rise in both the production and consumption of forest products until the year 2050. This positive forecast is also confirmed by the fact that, despite the halt in development or stagnation in some industries over the past decade, the timber industry complex has been and remains stable. Moreover, it is showing rapid recovery after economic crises. The world forecasts of leading analytical institutions also present prospects for the production of new types of forest products, which indicates the existing potential [9, 15–17, 21, 25]. Positive trends and development forecasts are largely due to population growth and human well-being, which is especially noticeable for developing countries. The growth in the volume and quality of consumption leads to a change in the structure of forest product consumption.

Over the past few decades, a discernible change in global demand for forest products has emerged, with Southeast Asia and South America experiencing particularly noticeable shifts which are intrinsically linked to significant changes in lifestyles and a considerable enhancement in both the variety and caliber of consumer prod-

ucts and services. Economic growth, characterized by rising national and individual incomes, strengthens consumer purchasing power. Population growth drives an increase in demand for products and services. Data from Oxford Economics indicates that global population has been growing at an average annual rate of 1.2 % between 2008 and 2022. Over this period, the economy experienced an average yearly growth in GDP per capita of 1.5 %. Projections from Oxford Economics suggest a slightly higher average annual growth rate of 1.8 % for individual income between 2019 and 2028 [15, 16, 19, 20].

Due to the significant size and value of Russia's forested areas, numerous research projects are actively investigating the functioning of these intricate ecosystems [29, 36–46]. E.D. Ivantsova has examined Canada's experience in organizing the timber industry complex and have identified differences in operational conditions compared to Russia [22]. N.V. Lukina [27, 28], D.I. Ushkalova [47] and other researchers [48–51] are studying the diverse aspects of the state of forest ecosystems. A study by V.V. Tsvirkov, L.I. Kasko and M.N. Karashchuk, devoted to the analysis of forestry management systems in North America, the European Union and the CIS countries, has revealed the absence of centralized management structures in most of the studied countries [46]. Research by Russian and foreign scientists confirms that the effectiveness of the development of timber industry complex is largely due to the introduction of an intensive model of forest management, which is successfully applied in countries with large amounts of forest resources. Researcher N.E. Antonova has conducted a study examining the forestry practices of prominent forest-managing nations, including Canada, the United States, Finland, Sweden, Japan, and Germany [2]. Researchers E.I. Shchastyantseva and L.A. Suvorova have examined Finland's and Sweden's practices in forest resource management. Based on the studied experience, a model of forest management has been created for the development of timber industry complex of the Kirov Region [40]. M.A. Bulgakova and P.V. Samolysov have conducted a research on timber industry complex management methods in Canada and have developed strategies for forest management They have highlighted the forest policy tools employed and identified different types of forest users that influence the establishment of a sustainable forestry framework [1, 8]. The work by D.N. Savenya examines the forest policies of prominent foreign countries such as Canada, USA, Finland, and Sweden [37]. These nations, including Russia, Canada, the United States, Germany, and Brazil, share commonalities in their governmental systems [11, 23, 24, 34, 35]. N.M. Shmatkov and E.G. Kulikova have investigated the international forest policy [41]. S. O. Medvedev, Y.F. Chupina, T.G. Ryabova and M.A. Zyryanov have presented foreign experience in the development of timber processing enterprises [29]. Foreign researchers have been actively discussing climate change and adaptation of forests to changes in recent years [3, 6, 32]. A significant part of the world's scientific works and programs are devoted to forest biodiversity [7–9, 26, 30, 31, 33].

According to leading analytical agencies, for the period since 1990 till 2020, forest areas on the planet have been decreasing. Thus, the reduction over 30 years has been from 32.5 to 30.8 %. But at the same time, there is a positive point: since 2010 till 2020, the average rate of forest loss has been slightly lower and amounted to 4.7 mln ha per year. Thus, over the past decade, there has been a significant decrease in the forest area – by 40 % compared to the previous decade. This amounts to 7.8 mln ha annually. It should be emphasized that the degree of forest degradation varies

significantly depending on the region and country (Fig. 1). Thus, China is increasing forest areas due to the successful implementation of the national program. On the contrary, countries such as Brazil and New Zealand are contributing to deforestation with large-scale logging. The maximum absolute forest growth over the recent period has been observed in Asia, Oceania and Europe. For a considerable period, Russia has been experiencing a continuous decrease in forested regions. The reduction of forest resources predominantly takes place in areas housing major timber companies. Therefore, the forested area in central and northwestern Russia has decreased significantly. There is also a low productivity of logging in the richly wooded regions of Russia, being the North, as well as West and East Siberia. More than 62 % of the planet's forest resources are located in 5 countries (Fig. 2).

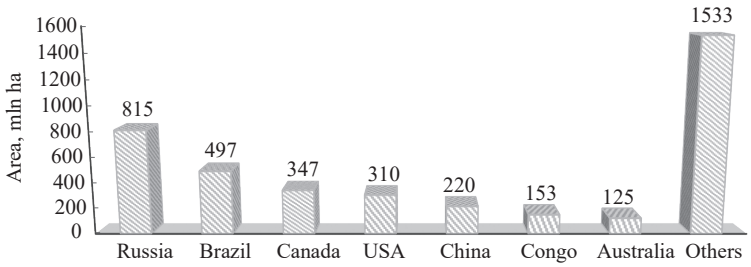

Fig. 1. The global forest area for 2022

Half of the forests and forest resources are located in the northern part of the planet (Russia, Canada, America, Sweden, Finland) [9, 10]. The second half is located in the southern forest belt covering 3 zones: Southeast Asia, the Amazon River area and the Congo River basin. The main tropical forest resources are concentrated in Brazil, China, Congo, Australia, Indonesia, Sudan and India. Eurasia possesses a significant portion of the world's forests, accounting for almost 40 %, and is distinguished by its high-quality wood species diversity. Conversely, Australia exhibits a relatively low level of forest coverage. South America leads globally in terms of forest cover density, measured as the proportion of land area covered by forests.

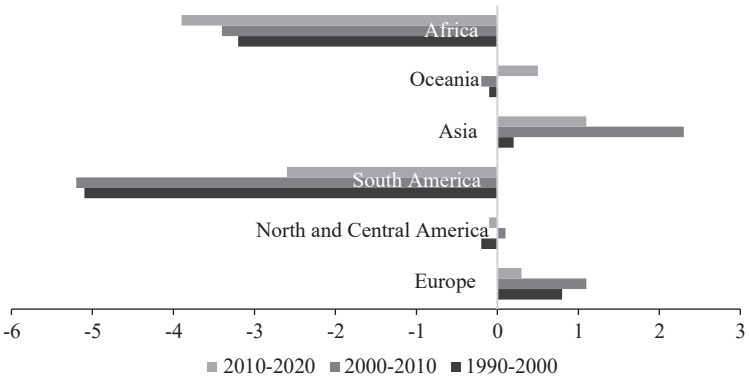

Fig. 2. The change in forest area by macroregions (mln ha/year)

5 countries collectively contain over 50 % of the world's forests. Russia has the most extensive forest coverage with Brazil, Canada, the United States, and China following closely behind, each possessing significant forested areas. 7 countries (Fig. 1) account for more than 62 % of the world's forests [9, 10, 14, 16].

It is important to understand that the availability of forest resources does not guarantee countries innovative development of the timber industry complex and competitiveness in the global market. Furthermore, it is important to consider the global trends in the forest products market. One of them is related to the stabilization of the production of traditional timber, which is due to the life cycle. The second trend is determined by the constant increase in the consumption of forest products due to the growth of the world's population. These trends are the drivers of changes in the global forest products market, which is undergoing transformation under the influence of technological progress and environmental programs. The global timber market has undergone significant changes in volume and composition of product segments over a prolonged period. At the same time, the production technology and the quality characteristics of forest products are being improved. The international timber market is undergoing a gradual transformation driven by the integration of novel biotechnologies and the development of innovative forest-derived products such as nanocellulose and composite materials. Another important activator of the global development of the timber market was the introduction of anti-Russian sanctions in 2022, which radically changed trade flows [3–5]. The Russian timber industry complex has been forced to form new external supply channels for forest products. At the same time, the supply of export forest products to Asia and the CIS countries has increased significantly. In the context of the withdrawal of foreign companies from the Russian timber market, the domestic sector is experiencing significant transformations. This process is associated with a number of challenges, in particular, the growth of transport, logistics and customs costs. Additional difficulties are caused by insufficient transport infrastructure to ensure uninterrupted supplies. Nevertheless, the expansion of the Asian market has created favorable conditions for an increase in Russian timber exports. Concurrently, the evolving landscape of export-import logistics in Asia has resulted in a scarcity of timber resources within the European market. However, despite efforts to diversify exports, enterprises are having difficulty establishing links with foreign buyers, as many of them are afraid of falling under secondary sanctions. This leads to a decrease in supply volumes and, as a result, a decrease in income from trade. In addition, the domestic market is also under pressure due to falling export volumes. A decrease in demand for wood from the outside creates an oversupply within the country, which in turn leads to a drop in prices. These changes have a negative impact on the financial condition of companies operating in the forest industry and threaten jobs in regions that depend on the forest industry.

The interplay of contrasting trends will reshape competitive dynamics within the global forestry sector, ultimately leading to the emergence of a novel international framework for forest management both globally and regionally. With increasing trade restrictions, the geographical structure of forest product trade flows is changing. Markets that have previously been secondary are starting to gain importance. China, as well as East Asian and African countries have become new centers of attention for Russia. The changes will continue and will have a significant impact on the dynamics and structure of the global timber market, creating new opportunities and challenges for both the states and private enterprises seeking to adapt to new conditions. One of the key aspects of these changes will be not only the redistribution of resources, but also the formation of new principles of sustainable forest management. The states, in an effort to protect their forest wealth, may introduce stricter rules,

which in turn will entail the need for adaptation for businesses. Private enterprises, aware of the environmental risks, can begin to introduce innovative technologies that help minimize the negative impact on the environment. Cooperation between public and private initiatives will play an important role in this process, which will create effective models for managing forest resources. The development of carbon credits, support programs for sustainable forest management practices and international agreements on forest protection will be the main tools contributing to an effective response to new challenges.

To ascertain the diverse trajectories of global forestry development in recent times and derive insights into the production and export of conventional forest products, a comprehensive analysis has been deemed necessary. It should be noted that over the last 5-year period, the global production of forest products has generally been stable (Table 1), compared with a longer period when there was an increase in production (Table 2, fig. 3). While the production of most types of forest products in 2022 remained at the same level compared to the previous year, there was a decrease in some types due to a reduction in Russian production and exports, as noted above. Over the last period, world exports, by analogy with production, has been gradually growing (about 1.5–1.8 % per year) [15].

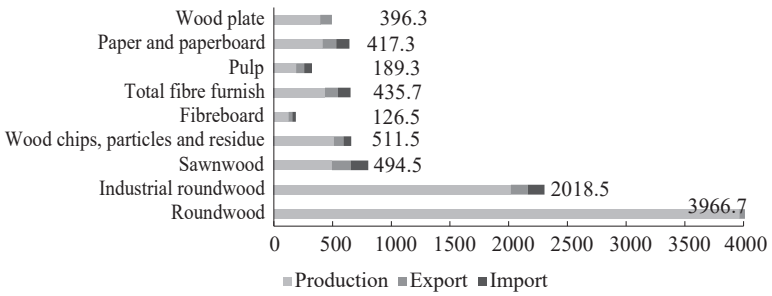

Fig. 3. Production, export and import of forest products in the world for 2022, mln ton [18]

Over the past 5 years, global logging volumes have increased slightly, amounting to 4,050 mln m³ compared to 3,950 mln m³ previously, but it is important to consider this increase in the context of long-term historical trends (Fig. 4). In 2021, the top loggers were the USA (11 %), India and China (9 % each), Brazil (6.8 %), Russia (5.5 %), and Canada (3.4 %). The leading exporters of industrial wood on the global market differ from the top producers. New Zealand (15 %), Czech Republic (12 %), Russia (11 %), Germany (8 %), USA (6 %), and Canada (5 %) maintain the main export positions for industrial wood.

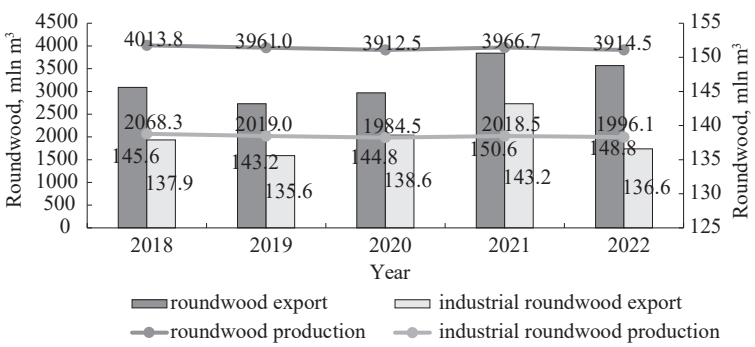

Fig. 4. Production and export of roundwood in kind [18]

Analysis of international trade data reveals that the production of forest products is heavily geared towards exports. Lumber exports constitute a significant portion, representing one-third of total national production. Additionally, a substantial proportion, ranging from 25 to 35 %, of slab wood and plywood produced by these countries are supplied to the global market. Similar shares of pulp, paper and cardboard produced are also supplied to the global market. Consequently, the leading countries producing forest products depend on the conjuncture of the global timber market. The global economic and political transformations taking place in various countries have, to one degree or another, an impact on the parameters of the equilibrium of the global forest products market. The sanctions regime introduced in 2022 due to the difficult geopolitical situation significantly affects the volume of production and price dynamics of timber. Instability in the global socio-economic environment creates uncertainty about the results of production activities and foreign economic transactions with forest products on the global market in the period from 2022 to 2024 (Table 1). At the same time, despite minor changes in global production volumes of forest products, there is a decrease in exports of many of its types. In 2022, exports of round and business timber decreased by 23 and 25 %, respectively, compared to the previous period. Lumber exports fell by 10 % in 2022. A slightly smaller decrease in exports occurred for plywood and slab materials – by 5–8 %. There is also a decrease in exports of paper and cardboard – by 4 %. In 2023 a decrease in production and exports is observed for all types of forest products.

Table 1

Global production and export of forest products [18]

Products	Production	Value of imports, $ mln	Imports, thsnd natural units	Value of exports, $ mln	Exports, thsnd natural units	Share of exports from production, %
Roundwood, mln m³						
2023	3,885.7	15.2	108.2	13.2	103.4	2.6
2022	3,983.3	19.3	124.1	15.4	116.2	2.9
Change in 2022/2021 (%)	100.4	92.4	83.9	90.2	77.2	–0.9
Wood fuel, mln m³						
2023	1,961.1	0.6	5.5	0.7	6.8	0.34
2022	1,967.3	0.6	5.5	0.7	7.6	0.39
Change in 2022/2021 (%)	101.0	135.4	102.1	121.7	102.6	+0.01
Industrial roundwood, mln m³						
2023	1,924.6	14.5	102.6	12.5	96.6	4.9
2022	2,016.0	18.7	118.6	14.7	108.6	5.4
Change in 2022/2021 (%)	99.9	91.5	83.2	89.0	75.8	–1.5
Wood chips, particles and residues, mln m³						
2023	252,403.0	6,895.0	55,278.0	5,603.0	67,436.0	26.7
2022	509.7	8.3	69.9	6.5	83.1	16.3
Change in 2022/2021 (%)	99.7	142.7	102.7	130.4	103.5	–0.6
Sawnwood, mln m³						
2023	444.6	38.3	127.2	37.7	5.9	1.3

End of Table 1

Products	Production	Value of imports, $ mln	Imports, thsnd natural units	Value of exports, $ mln	Exports, thsnd natural units	Share of exports from production, %
2022	481.3	52.5	137.3	51.5	143.1	29.7
Change in 2022/2021 (%)	97.3	96.2	91.8	95.7	89.7	–0.6
Wood-based panels, mln m³						
2023	354.1	40.1	85.1	39.4	89.1	25.3
2022	375.3	45.3	92.9	45.4	94.1	25.1
Change in 2022/2021 (%)	94.7	104.8	91.5	103.4	94.7	–0.7
Fibreboard, thsnd m³						
2023	113.2	11.2	22.7	11.1	24.7	21.2
2022	117.8	12.9	27.9	12.7	28.5	117.8
Change in 2022/2021 (%)	93.2	108.9	91.5	109.0	93.9	+0.2
Pulp for paper, mln tons						
2023	194.7	45.8	65.3	39.5	65.6	33.8
2022	198.6	50.5	62.7	42.8	64.1	32.3
Change in 2022/2021 (%)	105.5	123.8	102.7	115.3	102.1	–1.0
Wood pulp, mln tons						
2023	192.6	51.5	71.3	44.5	71.6	37.3
2022	195.8	55.9	68.2	47.8	69.5	35.5
Change in 2022/2021 (%)	103.4	121.8	101.5	115.2	101.6	–0.7
Paper and paperboard, mln tons						
2023	400.8	106.1	104.1	102.0	103.6	25.7
2022	414.1	121.8	111.5	119.1	111.4	26.9
Change in 2022/2021 (%)	99.0	117.7	97.6	114.3	96.4	–0.7

Globally, lumber production has remained relatively stable over the last 5 years, fluctuating between 485 and 510 mln m³. Concurrently, exports have ranged from 155 to 200 mln m³ (Table 2). Canada dominates the export market, accounting for 28 % of total exports. Following Canada are Sweden (12 %), Germany (11 %), Finland (9 %), and the United States (6 %). The global production of wood slab materials is steadily increasing from 2017 to 2022, with the current volume exceeding 400 million m³. China accounts for over 45 % of the total production, followed by the USA (9 %) and Russia (4 %). In 2022, the volume of wood slab exports surpassed 100 m³, with China leading the way (14 %), followed by Canada (8 %), Germany and Thailand (7 % each), Russia (6 %), and Brazil (4.5 %). Europe and the CIS countries continue to have a trade surplus in wood slabs, while North America faces a deficit.

The growth in the production of forest products is restrained by a decrease in the production of pulp and paper and cardboard products. Since 2017, there has been a downward trend in global pulp production, with the exception of a short-term increase in 2021 caused by the easing of pandemic restrictions. In 2022, production volumes may reach less than 190 million tons. The United States accounts for a quarter of the total pulp volume, making it the largest producer. Other leading pulp

producers include Brazil (12 %), China (10 %), Canada (7.5 %), Sweden (6 %), and Finland (6 %). Approximately one-third of the pulp produced is sold on the global market, which is heavily concentrated. 3 countries (Brazil, Canada, and the United States) account for 50 % of the market, with Brazil supplying a quarter of the export pulp, Canada contributing 12.8 %, and the United States providing 11 %. Other significant exporters include Indonesia (8.1 %), Finland (6.7 %), Chile (6 %), and Sweden (6 %). The expansion of global pulp production is ongoing as new bleached hardwood kraft pulp production facilities are being built and commissioned in Asia and South America. However, these facilities are encountering internal challenges and external resistance from traditional producers and exporters.

The paper and cardboard industry experienced a downturn beginning in 2017, with the exception of a rebound in 2021 following the COVID-19 pandemic. The reduction in the use of forest products can be linked to the increasing reliance on digital technologies within the society. Global production of paper and cardboard amounted to 405 million tons last year. At the same time, China accounts for a third of the volume of paper and cardboard production. Japan and Germany are in the second and third places with the shares of 5.7 % and 5.4 %, respectively. India has a smaller share – 4 %. Approximately 30 % of the paper and cardboard produced is exported to the international market. The leading exporters are Germany (13 %), the USA (9 %), Sweden (8.1 %), Finland (7.3 %), Canada (5.5 %), China (5 %), and Indonesia (4.5 %). Russia exports around 3 % of paper and cardboard.

Table 2

Production of forest products [18]

Country	Year	Round-wood, thsnd m^3	Industrial round-wood, thsnd m^3	Sawlogs and veneer logs, thsnd m^3	Wood chips, particles and residues, thsnd m^3	Sawn-wood, thsnd m^3	Fibre-board, thsnd m^3	Pulp for paper, thsnd tons	Paper and paper-board, thsnd tons
Australia	2000	31,181	24,407	11,442	18,045	4,093	0,621	1,028	2,836
	2010	30,414	25,561	12,155	16,273	5,079	0,598	1,304	3,203
	2020	33,354	29,481	12,569	17,435	4,377	0,530	1,395	3,061
	2022	29,898	25,983	10,660	15,314	4,350	0,595	1,399	3,013
	2022 share in global production, %	0.75	1.29	0.93	3.00	0.90	0.50	0.70	0.73
Brazil	2000	235,402	102,994	49,290	0	21,300	1,001	7,341	7,116
	2010	235,432	128,400	50,574	18,782	17,450	3,416	14,164	9,978
	2020	276,865	154,720	57,782	30,928	10,002	6,230	21,016	10,184
	2022	303,898	170,681	61,245	30,928	10,001	5,480	25,032	11,040
	2022 share in global production, %	7.63	8.47	5.36	6.07	2.08	4.65	12.61	2.67
Canada	2000	201,845	198,918	166,654	85,646	50,465	1,833	26,495	20,921
	2010	142,013	138,802	112,540	84,137	38,667	0,884	18,576	12,755
	2020	142,452	141,068	123,568	223,569	40,394	1,290	13,960	8,665
	2022	145,297	143,811	126,474	224,631	37,257	1,277	13,620	8,994
	2022 share in global production, %	3.65	7.13	11.07	4.41	7.74	1.08	6.86	2.17

End of Table 2

Country	Year	Round-wood, thsnd m³	Industrial round-wood, thsnd m³	Sawlogs and veneer logs, thsnd m³	Wood chips, particles and residues, thsnd m³	Sawn-wood, thsnd m³	Fibre-board, thsnd m³	Pulp for paper, thsnd tons	Paper and paper-board, thsnd tons
China	2000	323,646	96,019	53,221	11,985	6,675	5,181	14,855	35,184
	2010	350,633	161,810	74,417	108,735	37,231	42,499	20,420	96,545
	2020	324,851	167,863	82,534	148,381	77,468	62,300	20,557	117,150
	2022	318,605	167,347	82,018	148,381	79,558	54,560	27,100	128,370
	2022 share in global production, %	8.00	8.30	7.18	29.11	16.53	46.30	13.65	31.00
Russian Federation	2000	158,101	145,575	96,896	3,800	20,000	0,890	5,752	5,310
	2010	175,499	161,595	107,559	15,500	28,870	1,710	7,346	5,606
	2020	218,303	203,194	136,198	24,278	41,797	3,581	8,865	9,527
	2022	197,191	182,082	122,047	21,396	38,000	3,706	8,869	9,293
	2022 share in global production, %	4.95	9.03	10.68	4.20	7.90	3.14	4.47	2.24
United States of America	2000	466,549	420,619	242,698	86,273	91,076	6,990	57,178	86,252
	2010	376,572	336,135	148,119	53,748	60,013	8,195	50,251	75,773
	2020	429,700	369,175	180,237	57,501	79,134	6,058	49,903	66,239
	2022	458,774	382,544	186,157	62,262	81,676	6,058	46,657	65,257
	2022 share in global production, %	11.52	18.97	16.30	12.22	16.97	5.14	23.5	15.76
World	2000	3,482,411	1,687,166	1,051,456	329,970	384,037	34,141	183,496	324,606
	2010	3,587,131	1,723,129	953,559	474,635	375,102	87,668	184,937	392,378
	2020	3,910,124	1,983,576	1,126,496	498,753	479,970	122,123	191,470	400,126
	2022	3,983,336	2,016,041	1,142,343	509,716	481,256	117,846	198,571	414,094

The analysis of the production and export of forest products shows significant regional and country differences. Despite the availability of significant forest resources in a number of exporting countries, such as Brazil, Canada and Russia, the production capacities for processing wood raw materials are limited. In this regard, these countries are forced to export unprocessed wood and lumber to countries with high domestic demand for forest products. Thus, a flow of forestry raw materials is formed from exporting countries to importing countries with increasing industrial processing of wood (China, India, the Middle East and Central Asia).

Anyway, logging and timber trade in the world continues to be a significant process, despite innovations and new technologies. For 50 years, the volume of logging has increased by 1.5 times, and exports by 4 times. Logging and export volumes have remained stable over the past few years.

The ecological and social importance of the timber industry complex does not yet contribute to improving its position in the global economy and industrial production. Despite this, the contribution of the complex to the global economy, according to the UN, is gradually increasing. Thus, in 2015, the direct contribution amounted to more than $ 663 bn. However, this amount represents only a small portion of the overall global income. When considering the total economic impact (direct, indirect, induced), the forestry sector's contribution amounted to $1.5 tn in 2015, which is a significant figure compared to the global national income for the same year.

$111.5 tn is a small value. Pulp and paper production accounts for the largest contribution to the production of benefit of the timber industry complex (30 %).

The remaining branches of the complex account for from 20 to 25 %. The UN states that developed countries have the largest contribution to the gross income from the timber industry complex. Forest ecosystems make a significant contribution to the global economy. This impact is most pronounced in Asian nations, especially those in East Asia, which account for half of the total economic benefits derived from forests worldwide. European nations play a significant role in the global forestry sector, constituting a considerable 27 % of its economic activity. America's contribution is more modest, at around 17 %. Both developing and developed nations demonstrate high levels of proficiency in logging practices. Despite Russia having significant forest resources, its share in the global timber industry complex is only 3 %, and its contribution to GDP is less than 1 %.

Thus, the states with extensive forest resources have a long-term advantage over timber-importing countries. Sustainable forestry practices are essential for maintaining a prominent global standing. While China possesses fewer forest resources than Russia, its strategic approach to timber industry has yielded considerable success. This strategy, aimed at increasing wood imports and developing environmentally friendly logging methods, has allowed China to achieve significant growth rates in the production of various forest products [15, 16].

The trend determinant of the constant growth in demand for wood in connection with the construction of factories has led to an increase in own natural logging and the operation of plantation plantings, which has allowed by 2010 to increase logging to 96 mln m^3, which is almost 70 % of the demand for wood. Today, China accounts for a quarter of the world's wood supplies, and it primarily imports high-quality large-sized wood [3–7]. The Chinese government's strategic approach and deliberate policy initiatives have led to significant success in developing their forest ecosystem. A significant share of the funds allocated from the national budget for forestry is directed to the centralized financing of state forestry enterprises, scientific research and development designed to ensure sustainable forest management, conservation and reproduction. It should be emphasized that a significant part of government spending in China is directed to the implementation of forest restoration programs. Large-scale integrated environmental projects are being implemented in the country, covering all aspects of the use of forest resources. These projects provide for the protection of natural habitats, the mandatory restoration of deforested areas and the creation of effective commercial forest belts in regions specializing in the woodworking industry. Through these concerted efforts, China has efficiently replenished its forest reserves and expanded its forest coverage at a rapid pace. Consequently, China has emerged as a leader globally in terms of forest resource growth rates. Moreover, the judicious siting of primary and ancillary production facilities proximal to consumer hubs enables minimization of logistical expenses. In addition, the rational placement of main and auxiliary production facilities near the consumption centers allows minimizing logistical costs. In the north-east of China, processing facilities are being established in border areas with Russia. As a result of an effective policy and strategy for the development of the timber industry complex, China has increased production of medium and deep processing products by 2023. Thus, sawnwood production has increased 12-fold since 2000 by 2023. Over the same period, the production of fibreboard has increased 10-fold, paper and cardboard – 4-fold, and pulp – twice. Russia handles the initial stages of wood processing, subsequently exporting the raw materials to

various Chinese manufacturing facilities for further refinement. As a result, China's forestry industry outperforms Russia in the production of numerous wood-based products. In addition, a significant difference should be noted in the growth rates of pulp and paper production in China and Russia (Fig. 5, 6). Forecasts for the development of China's industry demonstrate a much more optimistic scenario compared to both Russian forecasts and trends observed in other leading countries of the timber industry. And this is against the background of the fact that the volume of China's own timber harvesting is much smaller. Russia's timber industry continues to focus on the production of lower quality wood products, with limited progress in advanced wood processing techniques. This stagnation is characterized by insufficient investment and a lack of development in large-scale factory infrastructure or the implementation of new production capabilities.

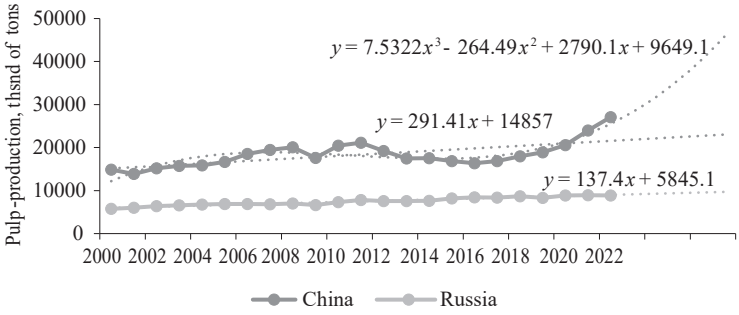

Fig. 5. The pulp-production trends in Russia and China [18]

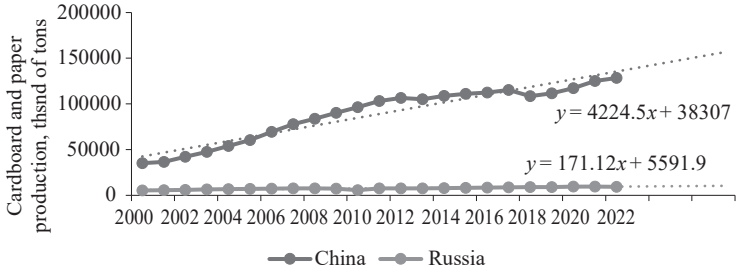

Fig. 6. The dynamics of cardboard and paper production in Russia and China [18]

The construction crisis in China, marked by falling demand for real estate and reduced investment, may have an indirect impact on exports of timber products from Russia. Firstly, a decrease in the demand for building materials and raw materials from Chinese developers will lead to a decrease in purchases of Russian products, including wood. This may cause a drop in prices for these goods, which will negatively affect the incomes of Russian exporters. Secondly, a reduction in construction volumes in China may slow down the dynamics of the country's economy, which, in turn, will reduce the overall demand for Russian energy resources, especially oil and gas. Close connectivity and dependence on the Chinese market may encourage Russia to seek new export destinations by developing economic ties with other countries, which may lead to a more diverse export structure and less vulnerability.

Finland specializes in manufacturing of a wide range of wood products such as lumber and paper, which makes it an important supplier in the global market. The Finnish timber industry complex constitutes about 5.7 % of the country's gross

output. Forest products with 20 % revenue dominate Finland's exports. The volume of wood harvesting in Finland is up to 45 mln m^3 annually. The timber industry complex plays a significant role in Finland's economy, constituting nearly one-fifth of its total industrial output. To effectively manage this vital industry, the Finnish government has collaborated with private enterprises to establish a specialized cluster model. Today, Finland has modern and competitive deep wood processing plants. During the construction of timber enterprises, the introduction of innovative waste-free developments, the creation of lean production and the use of biotechnologies has been a mandatory requirement. The continuous modernization of timber industry complex in Finland has been carried out with the simultaneous improvement of logging and the expansion of transport infrastructure [10–13]. The closure of plywood factories in Finland has become a serious challenge for the country's economy, having a ripple effect on many industries and communities. This process is also associated with global changes in demand for wood materials and increasing competition from international manufacturers. Additional factors contributing to the closure have been environmental initiatives and the transition to sustainable production methods. Finland, as one of the leading countries in the field of forestry, is trying to adapt to new realities, striving to produce more environmentally friendly products. However, despite the positive intentions, the consequences for jobs and the economic well-being of the small towns where these factories are located have a devastating effect.

Forests cover half of Canada's land, making timber industry a key player in the country's economy. The timber industry complex contributes 2.7 % to its GDP. Forestry management in Canada falls under the authority of the Ministry of Natural Resources, with the Forest Service responsible for coordinating forest policy at the national level. In Canada, the forest cluster is supported at all levels of management. The National Council for Development and Research coordinates strategies for the development of the forestry sector. The implementation of cluster policy at the regional level is entrusted to municipal authorities. The Canadian Government supports priority areas for the development of the forestry sector, such as attracting investments, shaping foreign economic policy and promoting Canadian forest products on the world market [11].

Forest certification in Finland and Canada also plays a huge role in the management of the timber industry complex. Both countries have implemented strict standards and criteria to help their forests conserve biodiversity and ecosystem services. In Finland, where forests cover more than 75 % of the country's territory, certification contributes not only to environmental protection, but also to the maintenance of the local economy, responding to the needs of both producers and consumers of environmentally friendly products. Canada, with its vast forest lands, also demonstrates an example of successful application of certification standards, strengthening its position on the international stage as a responsible player in the global forestry sector. Thus, forest certification in these countries is not just a formality, but an important tool that helps to build a balance between economic development and nature protection, which is of critical importance in the context of global climate change.

The Swedish timber industry complex also has optimal development. Despite the fact that there are no large-scale forest resources, unlike in Russia and Canada, the country has introduced an effective model for the development of the timber industry complex, which has ensured its leading position in the economy. In Sweden,

there is a legislative rule for reforestation, which states that the volume of reforestation must exceed logging. The share of the Swedish forestry sector in the country's economy is 10 %, and the volume of timber exports exceeds 15 % [9, 10]. Together with reforestation activities, in Sweden, a certification system for forests and forest products has been implemented.

In the United States, the forest sector has gone through a long period of transformation, which has brought both positive and negative results [9, 10]. Despite the difficulties, this reform has made it possible to develop a paradigm for the sustainable use of forest resources, characterized by minimal environmental risks. The fundamentals of the American forestry industry are based on a multifaceted, multi-level system and various forms of forest ownership. In particular, protected areas are under the jurisdiction of government agencies, while forests used for industrial purposes are privately owned. The US timber industry complex generates a 6 % revenue of GDP. The United States harvests approximately 440 mln m^3 of timber annually from a forested area covering 4.5 mln ha. This represents 6 % of the global timber harvest volume. The USA is the leader in the export of waste paper (34 %) and wood pellets (25 %).

At the same time, the efficiency of development of the forest sector cannot be correlated with the form of ownership of forest resources, which varies significantly across countries, but nevertheless does not reduce development potential. Thus, in Canada, the province or federal government owns most forests. In Sweden and Finland, private individuals own most forests. Private ownership of forests is also used in the United States. In China, forests are publicly owned, with the exception of collective ownership. The timber industry complex of these countries is developing innovatively thanks to 2 approaches to optimization. The initial strategy involves the establishment of clusters that foster innovation in utilization of forest resources through the development of cutting-edge technologies. This endeavor is facilitated by collaborative efforts between territorial associations, trade unions representing enterprises, government agencies, and institutional investors. Through this integrated approach, production processes are streamlined.

The structure of the global timber market is gradually changing, which is associated with different activators. Such drivers are an increase in the quantitative and qualitative increase in the consumption of forest products, the emergence of more equipment that is productive and technologies, the introduction of new energy-saving and waste-free technologies, as well as the development of innovative types of forest products. The Russian timber industry complex has been forced to form new external supply channels for forest products. At the same time, exports of timber products to Asia and the CIS countries have increased significantly.

An analysis of the practice of international timber trade demonstrates that the availability of significant forest resources in the country is not a sufficient condition for effective forestry management and the development of a full cycle of wood processing into competitive products. It is important to note that the state, which is actively developing the logging industry, manages, despite the lack of wood raw materials on the domestic market, to create effective wood processing enterprises. These industries specialize in designing premium-quality goods by utilizing imported raw materials. This enables them to engage successfully in both regional and international trade, leading to a rise in imported goods and an expansion of their own production capacities. A similar competitive approach has been implemented in the countries of the Asian geographical region (China and Vietnam), which has served as a prec-

edent for potential imitation. The effective functioning of the global forest system requires coordinated environmental management and planning of the use of forest resources. This will contribute to the conservation of forests around the world. No less important is the rational and integrated production of final forest products, meeting the growing global needs.

It is important to take into account many factors, such as the level of infrastructure development, the availability of modern recycling technologies, a working management system and compliance with environmental standards. Investments in scientific research and education also play a significant role in improving the efficiency of the timber industry complex and increasing the added value of products. At the same time, the centers of value-added education are shifting precisely to countries where the creation of timber processing facilities is ensured. When choosing the path for the development of timber industry complexes, national security should also be taken into account, since the foreign policy of the countries supplying raw materials (duties, export restrictions, etc.) can significantly affect the stability of the operation of timber processing complexes. Here, a rational combination is needed not only in the provision of timber and raw materials (for Russia, the import of raw materials is of no interest), but also in the volumes of products exported and domestic consumption in order to avoid dependence on the external economic conjuncture of prices and demand. In addition, international agreements and standards aimed at combating illegal deforestation and environmental degradation are becoming increasingly relevant. Countries seeking to integrate into global markets must adapt their practices to these requirements, which will not only preserve natural resources, but also increase their competitiveness in the global arena.

The results of global timber production and the export-import balance of trade flows depend on a variety of general economic and political factors, as well as intra-industry ones. The latter include the state of the infrastructure, the availability of modern recycling technologies, as well as the management system and compliance with environmental standards. Investments in scientific research and education also play a significant role in improving the efficiency of timber industry complex and increasing the added value of products. The global production of the main types of products in future until 2025–2026 is going to change slightly: roundwood – 4,000–4,050 mln m^3, business wood – 2,050 mln m^3, lumber – 4,900 mln m^3, cellulose – no more than 200 mln tons, paper and cardboard – 420–430 mln tons. There is a change in trade flows and the centers of value-added education are going to continue to shift to countries where the creation of timber processing facilities is ensured. When choosing the path for development, forest-rich countries are also going to take into account national security, since the foreign policy of the countries supplying raw materials (duties, export restrictions, etc.) can significantly affect the stability of timber processing complexes. Here, a rational combination is needed not only in the provision of timber and raw materials (for Russia, the import of raw materials is of no interest), but also in the volumes of products exported and domestic consumption in order to avoid dependence on the external economic conjuncture of prices and demand. In addition, international agreements and standards aimed at combating illegal deforestation and environmental degradation are becoming increasingly relevant. Countries seeking to integrate into global markets must adapt their practices to these requirements, which will not only preserve natural resources, but also increase their competitiveness in the global arena.

REFERENCES

1. Aborkina E.O. Causes and Trends in the Development of the Russian Forest Complex. *V tsentre ekonomiki* = In the Center of the Economy, 2022, vol. 3, no. 2, pp. 39–45. (In Russ.).

2. Adiyia M., Ashton W. *Comparative Research*. Brandon University, Rural Development Institute, 2017. 8 p.

3. Ahrends A., Hollingsworth P., Beckschäfer P., Chen H., Zomer R.J., Zhang L., Wang M., Xu J. China's Fight to Halt Tree Cover Loss. *Proceedings of the Royal Society B: Biological Sciences*, 2017, vol. 284, iss. 1854, art. no. 20162559. https://doi.org/10.1098/rspb.2016.2559

4. Antonova N.E. The Relationship between Forest Management Concepts and Forest Policy: Theory and Reality. *Uchenye zapiski* = Scientific Notes: Collection of Articles, 2019, iss. 15, pp. 6–17. (In Russ.).

5. Antonova N.E. Features of the Manifestation of New Internal and External Shocks in the Forest Complex of the Far Eastern Federal District and Their Possible Consequences. *Regionalistica*, 2022, vol. 9, no. 5, pp. 17–31. (In Russ.). https://doi.org/10.14530/reg.2022.5.17

6. Barnosky A.D., Matzke N., Tomiya S., Wogan G.O.U., Swartz B., Quental T.B., Marshall C., McGuire J.L., Lindsey E.L., Maguire K.C., Mersey B., Ferrer E.A. Has the Earth's Sixth Mass Extinction Already Arrived? *Nature*, 2011, vol. 471, pp. 51–57. https://doi.org/10.1038/nature09678

7. Best A.L. The Forestry Outlook in Canada. *The Forestry Chronicle*, 1960. vol. 36, no. 3, pp. 260–264. https://doi.org/10.5558/tfc36260-3

8. Birben Ü., Ünal H.E., Karaca A. Examination of the Perception of Society Related to Forest Resources (Case of Çankırı City Center). *Turkish Journal of Forestry, 2018*, vol. 19, iss. 1, pp. 76–82.

9. Bulgakova M.A., Samolysov P.V. Issues of Interaction between Antitrust and Law Enforcement Agencies during the Investigation of Crimes Related to Restriction of Competition. *Investigative Activity: Present and Future*: Materials of the International Scientific and Practical Conference. Krasnodar, LLC "Periscope-Volga", 2018, pp. 57–62. (In Russ.).

10. Burdakova G.I., Byankin A.S., Meshkov A.S. Study of Regional Demand for Timber Industry Products in the Context of External Sanctions Pressures. *π-Economy*, 2023, vol. 16, iss. 1, pp. 98–113. (In Russ.). https://doi.org/10.18721/JE.16107

11. Çalışkan H., Birben Ü., Özden S. Forest in Comparative Law: Germany, People's Republic of China, Canada, Nigeria, and Türkiye. *Sibirskij lesnoj zhurnal* = Siberian Journal of Forest Science, 2024, no. 2, pp. 103–112. https://doi.org/10.15372/SJFS20240211

12. Davydova G.V., Biryukova A.I., Litvin D.A. Features of the Development of the Forest Industry and Forestry in Russia and Abroad. *Izvestiya Bajkal'skogo gosudarstvennogo universiteta* = Bulletin of Baikal State University, 2022, vol. 32, iss. 2, pp. 325–332. (In Russ.). https://doi.org/10.17150/2500-2759.2022.32(2).325-332

13. Dzhikovich Yu.V., Garkusha A.D. Formation of State Policy in the Field of Forest Relations. *Vestnik nauki i obrazovaniya*, 2022, no. 10-1(130), pp. 104–107. (In Russ.).

14. *FAO. 2020. FAO Yearbook of Forest Products 2018*. Italy, Rome, FAO UN, 2020. 430 p. https://doi.org/10.4060/cb0513m

15. *FAO. 2020. Global Forest Resources Assessment 2020: Main Report*. Italy, Rome, FAO UN, 2020. 184 p. https://doi.org/10.4060/ca9825en

16. *FAO. 2020. Global Forests Resources Assessment 2020: Report. China.* Italy Rome, FAO UN, 2020. 81 p.

17. *FAO. 2020. Global Forest Resources Assessment 2020: Report. Germany*. Italy, Rome, FAO UN, 2020. 74 p.

18. *FAOstat*. Available at: https://www.fao.org/faostat/ (accessed 5.10.24).

19. Gregory P.R., Stuart R.C. *Comparing Economic Systems in the Twenty-First Century*. Houghton Mifflin, 2004. ch. 1–2, pp. 3–36.

20. Huang Z., Liu Z. A Complex Terrain Simulation Approach Using Ensemble Learning of Random Forest Regression. *Journal of the Indian Society of Remote Sensing*, 2022, vol. 50, pp. 2011–2023. https://doi.org/10.1007/s12524-022-01585-w

21. Husa J. Comparative Methodology and Constitutional Change. *Routledge Handbook of Comparative Constitutional Change* (*Routledge 2019*). Helsinki Legal Studies Research Paper, 2019, no. 57. 25 p.

22. Ivantsova E.D. Is Timber Investment Actually the Driver of Logging Growth and Human Welfare? *Zhurnal Sibirskogo Federal'nogo universiteta. Gumanitarnye nauki* = Journal of Siberian Federal University. Humanities & Social Sciences, 2022, vol. 15, no. 7, pp. 955–964. (In Russ.). https://doi.org/10.17516/1997-1370-157-0900

23. Karkhova S.A. Factors Contributing to Global Demand for Forest Products. *Problems of Territory's Development*, 2019, no. 5(103), pp. 91–108. https://doi.org/10.15838/ptd.2019.5.103.6

24. Krivokochenko L.V. World Timber Markets: State and Prospects for Russia's Exports. *Rossijskij vneshneekomicheskij vestnik* = Russian Foreign Economic Bulletin, 2016, no. 2, pp. 71–81. (In Russ.).

25. Latypova V.D. Possible Scenarios for the Development of the Activities of the Irkutsk Region Timber Industry Complex. *Izvestiya Bajkal'skogo gosudarstvennogo universiteta* = Bulletin of Baikal State University, 2023, vol. 33, no. 3, pp. 531–538. (In Russ.). https://doi.org/10.17150/2500-2759.2023.33(3).531-538

26. Lee G.R., Haas L. Comparative Methods in Family Research. *Sourcebook of Family Theories and Methods*. Springer, Boston, MA, 2009, pp. 117–131. https://doi.org/10.1007/978-0-387-85764-0_5

27. Lukina N.V. Global Challenges and Forest Ecosystems. *Vestnik Rossijskoj akademii nauk* = Bulletin of the Russian Academy of Sciences, 2020, vol. 90, no. 6, pp. 528–532. (In Russ.). https://doi.org/10.31857/S0869587320060080

28. Lukina N.V. Global Challenges, Forests and Earth Remote Sensing. *Zemlya i vselennaya*, 2020, no. 6, pp. 18–26. (In Russ.). https://doi.org/10.7868/S004439482006002X

29. Medvedev S.O., Chupina Ya.F., Ryabova T.G., Zyryanov M.A. Some Aspects of Foreign Experience in the Development of Timber Enterprises. *Vektor ekonomiki* = Vectoreconomy, 2023, № 2. (In Russ.). https://doi.org/10.51691/2500-3666_2023_2_1

30. Mochaeva T.V., Chernyakevich L.M. Financial and Economic Mechanism for the Implementation of the National Forest Policy. *Finansovyj biznes*, 2021, no. 2, pp. 37–40. (In Russ.).

31. Muraev I.G., Smetanin A.V., Sushko O.P. Comparative Analysis of Forest Complex Activities in Forest-Rich Countries. *Kreativnaya ekonomika*, 2023. vol. 17, no. 9, pp. 3357–3378. (In Russ.). https://doi.org/10.18334/ce.17.9.118912

32. Nguadi F., Gorbunova O.I. Forests of the Republic of the Congo: Assessment of the State, Problems and Prospects of Use. *Global and Regional Research*, 2020, vol. 2, no. 2, pp. 18–26. (In Russ.).

33. Ogana F.N., Ercanli I. Modelling Height-Diameter Relationships in Complex Tropical Rain Forest Ecosystems Using Deep Learning Algorithm. *Journal of Forestry Research*, 2022, vol. 33, pp. 883–898. https://doi.org/10.1007/s11676-021-01373-1

34. Pronyaeva L.I., Pavlova A.V., Fedotenkova O.A. The Development of the National Forestry Sector: Trends and Prospects. *Natsionalnye interesy. Prioritety i bezopasnost'* = National Interests: Priorities and Security, 2020, vol. 16, iss. 10, pp. 1834–1856. (In Russ.). https://doi.org/10.24891/ni.16.10.1834

35. Rampino M.R., Shen S.-Z. The End-Guadalupian (259.8 Ma) Biodiversity Crisis: the Sixth Major Mass Extinction? Historical Biology, 2021, vol. 33, iss. 5, pp. 716–722. https://doi.org/10.1080/08912963.2019.1658096

36. Rykova I.N., Yurieva A.A., Morina V.A. Review of Certain Foreign Practices in the Field of Forestry Development. *Vestnik Severo-Osetinskogo gosudarstvennogo universiteta imeni K.L. Khetagurova* = Bulletin of North Osetian State University named after K.L. Khetagurov, 2022, no. 2, pp. 130–138. (In Russ.). https://doi.org/10.29025/1994-7720-2022-2-130-138

37. Savenya D.N. Foreign Experience of Development of the Forest Complex in Modern Conditions. *Alleya nauki*, 2018, vol. 2, no. 10(26), pp. 87–90. (In Russ.).

38. Senotrusova S.V.,Tszya B. The Impact of Western Sanctions on Russia's Forest Complex. *Innovatsii i investitsii* = Innovation and Investment, 2023, no. 9, pp. 447–451. (In Russ.).

39. Shalaev V.S., Rykunin S.N., Melekhov V.I. Forecasting Research of "Forest Products". *Lesnoy vestnik* = Forestry Bulletin, 2019, vol. 23, no. 1, pp. 110–117. (In Russ.). https://doi.org/10.18698/2542-1468-2019-1-110-117

40. Shchastyantseva E.I., Suvorova L.A. Comparative Analysis of the Development of the Timber Industry Complex of Foreign Countries. *Obshchestvo. Nauka. Innovatsii* (*NPK-2017*): Collection of Articles of the All-Russian Annual Scientific and Practical Conference. Kirov, Vyatka State University Publ., 2017, pp. 5230–5240. (In Russ.).

41. Shmatkov N.M., Kulikova E.G. International Experience in the Formation of National Forest Policies. *Materials of Non-Governmental Organizations for the Development of the National Forest Policy of the Russian Federation*. Moscow, World Wildlife Fund Publ., 2012, pp. 54–81. (In Russ.).

42. Starikov E.N., Evseeva M.V., Naumov I.V. Industrial Growth and Specialisation: The Impact of the Government Support Tools. *Journal of New Economy*, 2022, vol. 23, no. 3, pp. 86–108. https://doi.org/10.29141/2658-5081-2022-23-3-5

43. Starikov E.N., Pryadilina N.K., Mezenova V.V. Analysis of Structural Changes and Major Trends in the Development of Logging Industry in the Global Market. *Lesotekhnicheskij zhurnal* = Forestry Engineering Journal, 2014, no. 4(16), pp. 231–240. (In Russ.). https://doi.org/10.12737/8481

44. Sushko O.P., Plastinin A.V., Skvortsov D.A. *Methodological Approaches to Assessing the Effectiveness of the Functioning of Timber Industry Institutions*. Moscow, "Pero" Publ. House, 2022. 138 p.

45. Terenteva V.D. Opportunities and Threats to the Potential of the Timber Industry of the Russian Federation in the Conditions of Economic Blockade. *Ekonomika i predprinimatel'stvo*, 2021, no. 12(137), pp. 525–529. (In Russ.). https://doi.org/10.34925/EIP.2021.137.12.101

46. Tsvirkov V.V., Casko L.I., Karashchuk M.N. International Experience in Management Forestry Complex. *Trudy BGTU. Seriya 5: Ekonomika i upravlenie* = Proceedings of BSTU. Series 5: Economics and Management, 2021, no. 1, pp. 130–138. (In Russ.). https://doi.org/10.52065/2520-6877-2021-244-1-130-138

47. Ushkalova D.I. Russia's Foreign Trade under Sanctions Pressure. *Zhurnal novoj ekonomicheskoj assotsiatsii* = Journal of the New Economic Association, 2022, iss. 3(55), pp. 218–226. (In Russ.). https://doi.org/10.31737/2221-2264-2022-55-3-14

48. Vehola A., Malkamäki A., Kosenius A.-K., Hurmekoski E., Toppinen A. Risk Perception and Political Leaning Explain the Preferences of Non-Industrial Private Landowners for Alternative Climate Change Mitigation Strategies in Finnish Forests. *Environmental Science & Policy*, 2022, vol. 137, pp. 228–238. https://doi.org/10.1016/j.envsci.2022.09.003

49. Vertakova Yu.V. Improving the System of State Forest Management Taking into Account Foreign Experience and Russian Practice of Digitalization of Forest Growth and Management. *Izvestiya Yugo-Zapadnogo gosudarstvennogo universiteta. Seriya: Ekonomika. Sotsiologiya. Menedzhment* = Proceedings of the Southwest State University. Series: Economics. Sociology. Management, 2020, vol. 10, no. 2, pp. 46–62. (In Russ.).

50. Yiliyaer A., Aliu A. Contemporary Administrative Law Principles in People's Republic of China. *Journal of Turkish Justice Academy*, 2018. vol. 35, pp. 641–664.

51. Zhang Y., Qin Q., Fan J., Chen K. Comparative Analysis of Forest Conservation and Sustainable Forest Management in China and Germany. *Asian Agricultural Research*, 2013, vol. 5, no. 10, pp. 117–124.

Конфликт интересов: Авторы заявляют об отсутствии конфликта интересов
Conflict of interest: The authors declare that there is no conflict of interest

Вклад авторов: Все авторы в равной доле участвовали в написании статьи
Authors' Contribution: All authors contributed equally to the writing of the article