Saint Petersburg State University

**Forest management of China and Russia**

Thesis submitted in partial fulfilment of the requirements

for the degree of

Master of Arts 38.03.01 “Economics”

Russia and China in International Finance and Trade

 I hereby certify By Evgeniia A. Borodina

 that this is entirely my own work Signature

 unless otherwise stated

Supervisor

Associate professor Vladimir H. Sherov-Ignatiev

Saint Petersburg

2023

Table of Contents

Introduction3

Chapter 1. Forestry of russia4

* 1. Geography of Forested Areas4
	2. Forest Usage5
	3. Timber Processing Complex6
	4. Legal Regulation10
	5. Reforestation Policy14

Chapter 2. Forestry of China20

 2.1. Geography of Forested Areas20

* 1. Forest Usage21
	2. Timber Processing Complex22
	3. Legal Regulation24
	4. Reforestation Policy28

Chapter 3. The economic aspects of timber production and trade36

3.1. Russia`s Production of Timber and Wood Products36

3.2. Russia`s Trade of Timber and Wood Products40

3.3. China`s Production of Timber and Wood Products48

3.4. China`s Trade of Timber and Wood Products52

3.5. Bilateral Trade of Wood and Wood products between Russia and China59

Conclusion64

References68

# Introduction

The long global development of the economy, aimed at maximizing profits, on the one hand, and minimizing costs, on the other has led to serious degradation of the natural, social and economic sphere. Having analyzed the oncoming problems, a lot of states all over the worlds become to put more efforts for sustainable growth and development, which includes also seeking new ways and means of effective support of ecological environment.

In this work, we will try to analyze the China`s and Russia`s attempts to manage the main renewable resource of both countries – forest. Both countries are considered to be the richest in forest resources, so their policy on forest management and protection have the significant importance for the global forestry and environment. It is necessary to understand what problems and difficulties can be met and, moreover, by what means they can be overcome. We will also focus on the forests` significance for the economy of both countries, how the forested areas are protected and used, what means seem to be more effective for development, reforestation and preventing the further environmental degradation.

**The research aim** of this paper is to compare forest management systems of Russia and China and formulate the recommendations on forest management regulation for Russia on the basis of most effective experience of forest management regulation in China.

Based on the specified aim of the research, the following objectives are set:

* To analyze the structure of forest management in Russia and in China;
* To identify the peculiarities of forest management in both countries;
* To consider the effectiveness of both systems in both countries;
* To analyze the production, export and import structures of wood and wood products in both countries;

**The object** of the research is forest management in Russia and in China; **the subject** is their key features and economic effectiveness.

 Chapter 1. Forestry of Russia

Forests are essential components of any ecosystem. They play an important role in mitigating the climate changes due to the ability to sequestrate carbon and soften temperature changes. Despite their huge usefulness for all the humanity, due to the fact that climatic zones as well as environmental conditions are different in every region, forest heritage is distributed unevenly. More than half (54%) of the world's forests is located in just five countries: the Russian Federation, Brazil, Canada, United States of America and China.[[1]](#footnote-1)

* 1. Geography of Forested Areas

The Russian Federation has 1 187,6 mln ha of forested area, which equals to 20% of the world`s total amount, thus, the country is considered to be the richest in forest resources.

Let us have a closer look at the distribution of forests in the territory of the Russian Federation (Figure 1.1.). According to Rosstat data, the most forested regions are: Far Eastern Federal District (almost 48% of total amount), Siberian Federal District (26%) and Northwestern Federal District (10,2%). It can be explained by rather enabling environment and fertile ground. As for the least forested areas, they are as following: North Caucasus Federal District (0,19%), Southern Federal District (0,31%) and Central Federal District (2%)[[2]](#footnote-2). The reasons explaining those minor amounts include arid climate, mountainous terrain (in case with North and South Caucasus districts) and rapid urbanization and developing infrastructure, that supersede natural environment for the purposes of human activity (in case with Central Federal district).

In Figure 1.1. we can see the geographical position of abovementioned regions.

.

Figure 1.1. Federal Districts of the Russian Federation

Source: Wikipedia. Federal Districts of the Russia Federation <https://clck.ru/hcQe6>

* 1. Forest Usage

For out further research it is necessary to give a definition of the notion “forest”. According to Doronichev D. A, forest – is a “combination of land, woody, shrubby and herbaceous vegetation, animals, microorganisms and other components of the natural environment that are biologically interconnected and influence each other in their development” [[3]](#footnote-3). Forest can be viewed as a multi-level ecological complex[[4]](#footnote-4), that performs various functions: ecological (environmental, water and soil protection, climate control), economical (building materials, timber, fuel, hunting products, herbs), cultural (leisure, recreation, treatment) and spiritual (sacred places, myths, religious rituals).

As it follows from the definition, the notion of forest is rather wide, as well as its usage is. According to official report[[5]](#footnote-5), nowadays, in Russia there are 11 900 specially protected natural areas of federal, regional and local importance, the total area of which is estimated at 242,1 mln ha (or 20,4% of 1 187,6 mln ha of total forested area). The notion of specially protected natural reserves includes the following categories: nature reserves, national parks, state reserves, natural monuments, dendrological parks and botanical gardens. Human activity, such as logging, hunting or picking mushrooms or berries is restricted in those areas. Moreover, there is a special category of forests: intact forests, in which there are no settlements, roads and any economic activity. By various estimates[[6]](#footnote-6), the area of intact forests of Russia is about 255 000 000 ha (21,5% of the total forest area). The intact forests do not have a status of protected areas, so logging can be conducted here.

We can figure out the following types of forest use on the territories, where the human activity is not restricted: logging, turpentine harvesting, collection and harvesting of medicinal plants and food forest resources, implementation of activities in the field of hunting, agriculture, as well as conducting scientific, recreational and religious activities.

In 2021, nearly 237,5 mln ha was leased, of which 57 mln ha was leased on purposes not connected with logging activity: hunting and agriculture, harvesting fruits, cones, nuts, mushrooms, seeds, birch sap, medicinal plants and for purposes of scientific and recreational activities[[7]](#footnote-7). So, logging is still the most widespread type of forest usage in Russia. The allowable cutting volume in 2021 amounted to 730 mln m3, the actual harvesting was nearly 300 mln m3, more than 80% of which was carried out on the leased areas[[8]](#footnote-8). Despite wide range of forest usage, the most popular one is still logging activity, that is, at the same time, the main reason for leasing of forested areas.

* 1. Timber Processing Complex

In this paragraph we will touch upon the issue of forest use, main industries and produced products. Timber processing complex includes the group of industries, the main focuses of which are logging, machining and chemical treatment of wood; the industries use the same feedstock but implement different production technologies and production destinations [[9]](#footnote-9). The complex (Figure 1.2.) includes logging industry, wood processing industry, pulp and paper industry, forest management, wood-chemical industry and homebuilding.



Figure 1.2. The structure of timber processing complex.

Source: Дороничев Д. А. Лесопромышленный комплекс: понятия, проблемы, перспективы.

As we see, forest use is rather diverse and multi-layered. Let us consider every branch closely.

Logging. The organizations belonging to the logging industry are engaged in primary processing and export of timber. They harvest wood that is used in the sawmill, plywood, pulp and paper industries, as well as in the construction and furniture industries.

According to official Russia`s data, wood supply is equal to 143 000 000 m3, on average[[10]](#footnote-10). The regions with the biggest amount of wood resources are: Northwestern Federal District (43% of total amount), Siberian Federal District (28,35%), Volga Federal District (13,7%) and Far Eastern Federal District (10,2%) – in the most forested regions (Far Eastern, Siberian and Northwestern Federal districts) logging industries are the most intensive.

According to official data, there are 6928 official logging organizations with 84 661 workers[[11]](#footnote-11) (the number of workers seems to be very humble, so we can guess that more people work in this sphere not officially). Siberian Federal District takes the leading position in both the number of organizations and the number of workers (1678 and 23358 respectively or 24,2% of total number of organizations and 27,6% of total amount of workers), then goes Northwestern district (with 26,64% of number of organizations, 24,7% of total number of workers), Far Eastern Federal District (14,5% of number of organizations and 23% of total number of workers) and Volga Federal District (11,6% of total number of organizations and 15.5% of total number of workers). The least logging regions are North Caucasus Federal District (0,41% of total number of organizations and 0,07% of total number of workers), Southern Federal District (1,6% of total number of organizations and 0,8% of total number of workers) and Ural Federal District (7,2% of total number of organizations, 4,3% of total number of workers).

As for profitability of abovementioned organizations, we can say that logging is not very profitable industry. According to the data, almost for all regions logging industry costs exceed revenues. Russia lost 1 075 000 000 at the end of 2019, the percentage of non-profit organizations was 42,8%. There are only two federal districts, where the logging organizations` profit exceed the costs – Northwestern (+2079 mln rub) and Southern (+200000 rub). Other forested regions show the impressive losses: Far Eastern district lost 2 079 000 000 rub, Siberian district - 693 000 000 rub, Volga district - 215 000 000 rub.

Summing up, the most forested areas have the biggest logging scope. According to official figures, logging business does not look flourishing, as costs prevail over the revenues (except Northwestern and Southern Districts). Also, there is a tendency of reduction of logging organizations: their number decreased from 20 825 in 2005 to 6928 in 2019, as well as the number of people working in the sphere: from 247 753 in 2005 to 84 661 in 2019. But statistics looks rather improbable, as the number of people and organizations is small. It is possible, that there exists some shadow economy, the indicators of which were not included in the official data.

Wood processing industry can be viewed as a main consumer of timber[[12]](#footnote-12) and includes the following subindustries: saw milling, furniture production, plywood production and fiberboard, particle board production. The industry mainly produces lumber, chipboard, wood fiber board, plywood and furniture.

Saw milling is consumer oriented and performs the primary stage of wood processing. Saw milling industries are located, primarily, in the main centres of logging industries and near the suitable floating waterways.

Plywood productionis a material-intensive production, and, at the same time the most wasteful. Plywood is made mainly from the least scarce hardwood species – birch, alder, linden.

Furniture production is a branch that is also highly consumer-oriented and needs qualified personnel.

Fiberboard and particle boardsare widely used in in the furniture and building materials industry. Both types of boards are sheet material obtained from the wood, which is ground to fiber[[13]](#footnote-13).

Pulp and paper industry. This branch combines the production of pulp, paper, cardboard, wood pulp, as well as products made from paper and cardboard. Production is characterized by high consumption rates of energy, water, raw materials, sophisticated equipment and high-tech production process. Sawmill and mechanical wood processing wastes, as well as lower quality wood of small-leaved species are often used as feedstock for pulp and paper production.

Pulp production. This type of production requires large amounts of heat, electricity and water. The production of artificial fibers and threads (produced from natural raw materials from wood and cellulose) is inextricably linked to it.

Paper production.More than 200 basic types of paper and over 40 types of cardboard are produced in Russia. In addition to various grades of writing paper, printing grades of paper for banknotes, paper is also produced for industrial and technical purposes, for example, capacitor, cable, isolating, etc. From some types of paper, yarn is obtained for the manufacture of twine, whipcord, coarse fabrics.

Cardboard production.Technical grades of cardboard are widely used for the production of corrugated cardboard, book bindings, in the auto and electrical industries for filtering diesel fuel and purifying air from harmful substances.

Wood-chemical industry. This branch combines enterprises that produce charcoal, acetic acid, rosin, turpentine, essential oils, formalin, carbamide, methyl alcohol, fodder yeast, etc.[[14]](#footnote-14) In the process of production raw materials are usually used – sawmill and wood processing waste, sawdust and wood chips. The products are used in the production of synthetic rubber, rubber products, photo and film tapes, varnishes, paints and plastics.[[15]](#footnote-15) They also are used for combating diseases and pests of agricultural crops, developing means of combating weeds. A significant number of wood-chemical industry`s products is consumed by the chemical-pharmaceutical, textile, light and food industries.

In forest management the following aims are set: reforestation, widening of the forested areas, improvement of forests` species composition, increasing forests` productivity and forest reservation[[16]](#footnote-16). In Russia, forest and forested territories are treated in accordance with the constitution of the Russian Federation[[17]](#footnote-17). The jurisdiction involves the adoption of regulatory legal acts in this area, both at the level of the Russian Federation and at the level of the constituent entities.

The forest legislation consists of the Forest Code of the Russian Federation, other federal laws and regulatory legal acts of the constituent entities adopted in accordance with them. In addition, forest relations can also be regulated by decrees of the president, resolutions of the government adopted in accordance with or in pursuance of the Forest Code.

* 1. Legal Regulation

The Forest Code of the Russian Federation is the main regulatory legal act regulating forest relations and issues related to the organizations of state forest management[[18]](#footnote-18). The Forest Code (amended on 1.03.2022) consists of 123 articles (16 chapters), and contains the regulations on conceptual, economic and legal status of forest[[19]](#footnote-19).

Let`s consider the main points of the Code. According to Article 4, part 2, the participants in forest relations are the Russian Federation, constituent entities of the Russian Federation, municipalities, citizens and legal entities.

In accordance with Article 10, forests located on the lands of the forest fund are divided into the following types: protective forests, operational and reserve forests. Depending on the type of forests, there are different purposes for their exploitation.

Protective forestsinclude forests that are natural objects of particular value, and in respect of which a special legal regime is established for the use, protection and reproduction of forests. Protective forests are subject to development in order to preserve the environment forming, water protective, protective, sanitary hygienic, health-improving and other useful functions of forests with the simultaneous use of forests, provided that this use is compatible with the intended purpose of protective forests and the useful functions they perform.

Operational forestsare subject to development in order to obtain sustainable, maximum efficient production of high-quality wood and other forest resources, products of their processing, while ensuring the preservation of the useful functions of forests.

Reserve forestsinclude forests in which it is not planned to harvest timber for twenty years, with the exception of timber harvesting by citizens for their own needs. Reserve forests can only be used for the purpose of harvesting and collecting non-timber forest resources. There are two possible ways of using forests: through leasing agreement or free use[[20]](#footnote-20).

To conclude an agreement for the free use of a forest plot is possible for a period from 1 to 5 years. The largest tenants of forest fund lands, to whom they are transferred free of charge, are representatives of the minor ethnicities of the North. Another popular form of free use of forests is the implementation of religious activities. Temples, courtyards, sketes are located on the allocated sites, religious buildings are being built for non-prohibited sects, spiritual centers of shamans, and charitable missions. Forest territories can be transferred free of charge to organizations engaged in hunting and tourism. In addition, educational institutions, ethno-cultural centers, patriotic education centers, ski bases, children's camps, rehabilitation centers, sanatoriums and zoos can be built in the forests for free. But this type of free rent is available only to a limited list of organizations: state and municipal institutions, state-owned enterprises and the like.

According to the Forest Code, the object of lease can only be forest plots that are in state or municipal ownership and have passed the state cadastral registration, these forest plots can be leased for a period from 10 to 49 years. The choice of an allotment for lease is carried out not by the tenant, but by the owner of the massif - the executive authorities of the federal or municipal formation. It is they, who organize the auction and provide the right to everyone to take part in it. To become a tenant, you must offer the highest fee among the auction participants. The owner of the forest area informs about the date, venue and rules of the auction by submitting an announcement on the website at least 30 days before the start of the auction. If you win, you are given the exclusive right to sign the lease agreement. By participating in the auction, you yourself determine the final price of the lease. Auction participants start from the minimum price set by the organizer of the auction and increase it, step by step increasing the rates. To determine the minimum rent, the Forest Code uses indicators such as the rate of payment per unit area or unit of forest resources if the tenant plans to cut down trees. The amount of the rate is determined by the executive authorities, from municipalities to the government of the Russian Federation, depending on the object of lease. If the procurement of resources is planned, when cutting areas are allocated on the ground, the coordinates are determined and the characteristic points of the boundaries of cutting areas are fixed on the ground, trees intended for felling during selective felling are selected and marked. When assessing a cutting area, the quantitative and qualitative characteristics of forest plantations and the volume of wood to be harvested in the corresponding cutting area are determined. Only in operational and protective forests wood harvesting is allowed to be carried out. It is prohibited to harvest wood in excess of the approved volume of wood removal, as well as in violation of felling ages.

As for individuals, citizens have the right to harvest wood for heating, building construction and other personal needs[[21]](#footnote-21). They harvest timber for their own needs on the basis of contracts for the sale of forest plantations. Persons, who have leased forest areas for felling or other purposes, are obliged to ensure reforestation on an area equal to the area of cut forest plantations.

In Russia, there is a state authority that oversees the fulfillment of obligations in the field of forest management. Officials of federal forest supervision have the right to:

1. carry out systematic patrolling of forests; determine the state of forests and the impact of natural and anthropogenic factors on them;
2. prevent, detect and suppress violations of the requirements of the forest legislation by citizens;
3. to carry out proceedings on cases of administrative offenses related to violations of the requirements of forest legislation, identified in the course of systematic patrolling of forests;
4. send to the relevant state bodies materials on violations of the requirements of forest legislation, identified in the course of systematic patrolling of forests, containing signs of administrative offenses and (or) crimes;
5. bring claims to the court or arbitration court on the facts of violations of the requirements of the forest legislation, revealed in the course of systematic patrolling of forests.

In case of non-compliance with the proper use of forest areas, such measures are applied as: early termination of the lease or sale of forest areas, forced termination of the right to permanent use of forest areas, administrative and criminal liability.

As well as there are regulatory acts on forest use, there are also some controversial points, that make reforestation less effective. The idea to sell the forest "under the hammer" is aimed at attracting investments the environmental sector. The sale of standing timber at forest auctions is the most effective, since the cost of one cubic meter of timber is several times higher than the cost of timber sold at established rates in other forms of sale.

The ways of logging regulation do not seem to be effective; the rate of illegal logging remains relatively high. We see proofs of such suggestion in the statistics, where almost all logging organization are non-profitable officially. The damage on forest is weakly estimated, it is stated, that in case of usage of forest for logging, the amount of cut forest should be restored, but it is not stated who should estimate the original amount of forest. Moreover, the damage on fauna is also not mentioned, but it should be somehow, as forests are natural environment for different species of animals, birds, insects and microorganisms.

The point about subletting or underlease also seems to be doubtful, as it opens the ways for speculation. Who and how should regulate subletters and their forest use?

The ways of state regulation of reforestation after usage are also not clearly stated, who is responsible for monitoring the deforestation and how often the monitoring should take place. Another point which is actually can ruin the forests is the permission on forest cutting for purposes of exploration of mineral and other resources. It is not stated how many and which forest can be cut. Thus, oil-seeking organizations are free to cut as many trees as possible. And exploration usually is conducted in untouched forests, that is also devastating for local flora and fauna. The usual way of selling forested areas on auctions also seems to be not effective, as the state transfer the rights on forest usage on the basis of how much profits the potential lender can guarantee, and not how the forests would be used. The role of the state is also not so relevant in the case when there are renters, and the whole direction of state regulation can be not defined clearly. The state cannot require the renters to develop and reforest areas, as individuals have their own economic plans and expectations.

* 1. Reforestation Policy

Having analyzed the environment and legal framework, we can focus now on the results of conducted policy.

There exist three ways to reproduce forests: artificial, natural and combined. Artificial method of reforestation consists of the preparation of suitable planting material (cleaning and storing seeds for the purpose of further growing seedlings) and tillage with the help of specialized equipment. After that, seedlings are planted and proper care is provided. The natural method of reforestation is the process of formation of the next forest generation without much intervention. In Russia almost 80% of reforestation is accounted for by natural reforestation process[[22]](#footnote-22). As a result, the lower quantity trees (which do not represent a high economic value – birch, alder, aspen) grow on the site of clearings and burnt areas. These territories are out of use for many years – coniferous forest will grow there only after centuries. Reforestation is considered to be sustainable, if the area and volumes of forest restoration are equal to the cut volume.

According to official data, in 2018 62.3% (940 000 ha) of the total area of forest loss was restored in Russia. However, remote monitoring data show that approximately 5 000 000 ha were lost in 2018 (3 700 000 ha due to fires). Less than 20% of the necessary amount was compensated. Let`s have a look at thy dynamics of changes of forest coverage of Russia.



Figure 1.3. Forest Coverage of Russia, 1000 km2.

Source: The World Bank. Forest Area. <https://goo-gl.me/7TQBs>

According to the statistics, the constant growth of forest coverage was in the period from 2000 to 2010[[23]](#footnote-23). It is difficult to say whether Forest Code (2007) influenced the situation significantly, as we do not see any sharp increase or decrease. But the period from 2010 to 2020 can be characterized as stagnating one. The forest coverage stayed approximately on the same level; some increase occurred in 2015 but it cannot be called substantial as well.

We analyzed the role of forest resources in Russia`s context. We analyzed Russia`s, the industries it includes, and the products it manufactures – wood and wood products have a wide range of usage in various industries, from not-highly-processing logging to resource-consuming and highly-processing wood-chemical industry. We found out, that tendency of decreasing both the number of logging organizations and workers hardly reflect the reality – the forest coverage dynamics does not have the trends that would confirm it. Moreover, there are strong hints of existing the shadow economy in this sector: official figures on profits of logging organizations, and number of those organizations do not look natural. In addition, there are some loopholes in the legal basis, regulating the forest treatment, that allow forest felling and illegal renting.

Being the richest country in terms of forest resources, Russia also initiated the federal programme “Forest Preservation”. The programme was launched in 2018, the results of it are supposed to be reviewed in January 2025. The main aim of “Forest Programme” is to achieve a 100% recovery of forests being logged. As for quantitative indicators, the aims are: to expand the area of reforestation to 1 554 000 ha, to increase the stock of seeds for afforestation to 360 tones, decrease the economic damage of forest fires to 12,5 billion rubles (in 2018 the damage equaled 32,3 billion rubles).

The programme was initiated by the Russian government in the framework of the national project “Ecology”[[24]](#footnote-24). We can see the main items of expenditure that have already been invested (for the period 2019-2022) and that are planned to be spent in 2023 and 2024 below. The information is taken from the official passport of federal project.

Table 1.1. Items of expenditure of the “Forest Preservation” programme.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Designation | Sum (2019-2022), mln rubles | Expenditures in 2023, mln rubles | Expenditures in 2024, mln rubles | Total, mln rubles |
| Seed stock formation for reforestation:- Investments from the federal budget: - Non-budget institution investments: | 416.2 | 40.4 | 40.4 | 497 |
| 155.9 | 15.2 | 15.2 | 186.3 |
| 260.3 | 25.2 | 25.2 | 310.7 |
| Updating information on the availability of land not occupied by forest:- Investments from the federal budget:- Non-budget institution investments: | 1279.9 | 326 | 326 | 1931.9 |
| 1279.9 | 326 | 326 | 1931.9 |
| - | - | - | - |
| Increasing of the area of artificial reforestation at the expense of extrabudgetary funds:- Investments from the federal budget:-Non-budget institution investments: | 1200 | 460 | 500 | 2160 |
| - | - | - | - |
| 1200 | 460 | 500 | 2160 |
| Equipping forest fire equipment for specialized institutions of state authorities of Russia:- Investments from the federal budget:- Non-budget institution investments: | 15092 | 3727 | 3724 | 22 543 |
| 15092 | 3727 | 3724 | 22543 |
| - | - | - | - |
| Equipping institutions that carry out activities for reforestation:- Investments from the federal budget:- Non-budget institution investments: | 2627 | 440 | - | 3067 |
| 2627 | 440 | - | 3067 |
| - | - | - |  |
| Increasing of reforestation area, increasing of quality and efficiency of reforestation works:- Investments from the federal budget:- Non-budget institution investments: | 79 826.7 | 20 474.6 | 20 509.6 | 120 810.9 |
| 11 208 | 2858.8 | 2858.8 | 16 925.6 |
| 68 618.7 | 17 615.8 | 17 650.8 | 103 885.3 |
| Total expenses:- From federal budget:- From non-budget institutions: | 100 441.8 | 25 468 | 25 100 | 151 009.8 |
| 30 362.8  | 7 367 | 6 924 | 44 653.8  |
| 70 079 | 18 101 | 18 176 | 106 356 |

Source: Passport of the federal project “Preservation of Forests”. <https://economy.samregion.ru/upload/iblock/4fd/Pasport-FP-Sokhranenie-lesov-_red.-ot-21.12.18_.pdf>

As we see, the most money-consuming item is investments in increasing of reforestation area and quality and efficiency of reforestation work, and the main investors here are non-budget institutions. The least money-consuming item is seed stock formation, for the period from 2019 to 2024 3 497 mln rubles are supposed to be spent on the formation of seed base.

 Federal investments hold the leading role in investments in updating information on the availability of land not occupied by forest, equipping forest fire equipment for specialized institutions and equipping institutions that carry out activities for reforestation, the non-budget institutions do not bear any expenses in those spheres.

Non-budget intuitions have the role of main investors in seed stock formation, increasing of the area of artificial reforestation at the expense of extrabudgetary funds and increasing of reforestation area and quality and efficiency of reforestation work. Federal budget investments are either minor (in the seed stock formation budget investment amounts to 186,3 from total 497 mln rubles) or absent at all (increasing of the area of artificial reforestation at the expense of extrabudgetary funds).

The official information cannot but impress in terms of the size of presupposed investments, though some items seem to be unclear in meaning. For example, updating the information on availability of the land not occupied by forest – State Land cadaster should always contain the relevant information. In this case, the question about how and what the investments were spent on arise. This item needs to be described in more detailed way to exclude misunderstanding and discrepancies.

The item “increasing of reforestation area, increasing of quality and efficiency of reforestation works” also requires some explanations. If there is the list of the instruments that can be used exactly for increasing of efficiency of reforestation work, the document will be clearer. This item is also the most “popular” destination for investment from non-budget institutions, what are exact reasons for such a phenomenon?

It is necessary to say, that there is no special item, the aim of which is to treat the planted seeds. That is a crucial point for survival and cultivating the healthy and sustainable forests.

Another point we should pay attention to is the expectation of the area of reforestation and the area of devastated (as a result of an unpredictable natural phenomenon) forest land. It is expected that devastated area would decrease to 14%, while area of reforestation would increase to 1 554 000 ha.

Table 1.2. The area of reforestation and the percentage of devastated forest area.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Year | 2019 | 2020 | 2021 | 2022 | 2023 | 2024 |
| Area of reforestation, 1000 ha | 1000 | 1100 | 1200 | 1300 | 1425 | 1554 |
| Area of devastated forest land, % | 33 | 25.9 | 21,6 | 18.8 | 16 | 14 |

Source: Passport of the federal project “Preservation of Forests”. <https://economy.samregion.ru/upload/iblock/4fd/Pasport-FP-Sokhranenie-lesov-_red.-ot-21.12.18_.pdf>

From the Table 1.2. we can see that the aim at decreasing the area of forests being devastated by an unpredicted natural phenomenon is set: for the six-year period it is expected that damage caused by natural phenomenon will decrease on 19%, from 33% in 2019 to 14% in 2024 or, taking in numbers, from 330 000 ha in 2019 to 220 000 ha in 2024.

We see that Russia`s programme of forest protection was initiated recently. According to official numbers, main financial support is presupposed to governmental entities, without governmental subsidies attracting local people for reforestation activity. Also, the major role is given to extrabudgetary funds and non-budget institutions. Moreover, some expenditure items seem to be unclear, without exact stating of instruments of reforestation, it leaves the unclear expectations about the expenditures, as well as open questions about the exact methods of conducting the reforestation project. Generally, Russia`s government is eager to support the reforestation activity and prepares a huge budget for these aims and as programme was initiated recently, it is still to early to talk about the sustainable results or prospect of the project.

Chapter 2. Forestry of China

China is one of the five countries, which have the biggest forested area. It has around 220 000 000 ha of forest land, which is 5% of the world`s amount, thus, China is the fifth richest country in forest resources.

 The territory of China, which stretches for 4,000 km from north to south and 5,000 km from west to east, covers several climatic zones – temperate, subtropical and tropical ones. Forests occupy mainly mountainous, sandy and waterlogged land masses unsuitable for agriculture[[25]](#footnote-25).

With the fast development of China`s economy, the demand for timber from construction, papermaking and furniture manufacturing is also rapidly increasing. But as all natural resources are limited and require protective measures, not just using as fuel for economic growth. Moreover, after ratification of Paris Agreements in 2016, the strong course on decarbonization was set and in 2017 China prohibited commercial cuttings of natural forests. All these factors contribute to the strong demand on creation of effective and flexible system of forest management, that would allow expand forest land and response to the domestic needs of the country.

2.1. Geography of Forested Areas

The forest resources of China are located mainly in the northeast of the country – in Heilongjiang, Jilin, Liaoning provinces and partly, in Inner Mongolia; in the southwest - Sichuan and Yunnan provinces; in the south - Anhui, Guangdong, Guangxi, Guizhou, Fujian, Hainan, Hubei, Hunan, Jiangxi and Zhejiang provinces[[26]](#footnote-26). More than a quarter of forests grow in the northeast of China, in which natural plantations predominate.

The natural forests of the Southwestern region are dominated by species characteristic of the temperate and tropical belts[[27]](#footnote-27). The forests of the Southern region are mainly represented by plantations of artificial forests, this is the largest area for commercial timber harvesting.

Let`s now focus on the forest distribution among provinces. According to the National Forest Agency, the most forested provinces are Inner Mongolia, Yunnan, Sichuan, Heilongjiang and Tibet, which have 15,45%, 8,5%, 7,9%, 7,1% and 5,8% of forest cover, respectively (of the total amount of 284 935 600 ha).

The least forested provinces are Tianjin, Qinghai, Guizhou, Jiangsu and Ningxia, which have 0,05%, 0,19%, 0,26%, 0,35% and 0,40% respectively. The least forested area is Shanghai`s territory, which has only 0,007% of forest cover, that can be described by the high urbanization of the territory. Such distribution can be explained by different climate conditions. Forests occupy mainly those land massifs, that are not suitable for agriculture. All forests in China can be divided into two groups: state forests and collectively owned forests.

State forests are estimated to occupy approximately 124 000 000 ha (40% of the total amount), collectively owned are estimated to occupy 186 000 000 ha (60% of the total amount).

2.2. Forest Usage

China has an area of nearly 959 700 000 ha, of 231 mln ha (or 24% of China`s territory) is considered as forest area, according to the data[[28]](#footnote-28). Intact forest area is estimated to be 11, 6 mln ha (6% of the total forest area). Nowadays, China has more than 9 000 protected areas, in this category the following areas are included: wetland, dessert and forest parks, geoparks, scenic spots and nature reserves at national, provincial, municipal and county level, the common area of the mentioned categories is estimated to be 172,7 mln ha[[29]](#footnote-29).

China`s government divides all the forests into two main categories: commercial forests (for conducting an economic activity) and ecological non-commercial forests (for environmental protection, logging is prohibited). Nowadays, the non-commercial forests are estimated to occupy 52,4% of the total forest area of China[[30]](#footnote-30). As for the ownership rights, village collectives and farmers nowadays maintain 47,4% of the total area of non-commercial forests, while individuals can only manage forests, the right to own belongs to state and collectives.

As well as in Russia, China`s forest usage is highly diverse, forest can be used for: recreational, spiritual and scientific purposes, as well as for picking herbs, mushrooms and berries. Logging activity is also conducted, but on the territories of plantations, the area of which reached 79,54 million ha in 2019[[31]](#footnote-31). With the strong emphasis put on the development of plantations, China`s tries to diminish its import dependency to some extent. Nevertheless, growing economy fuels the timber demand, and logging is essential type of forest usage in China.

2.3. Timber Processing Complex

China`s structure of the timber processing complex does not differ from Russia`s one. It includes the same industries and subindustries, such as logging, wood processing, pulp and paper industry, wood chemical industry. Let`s consider every branch closer.

Logging. China divides all the forest in two groups: plantations and natural forests. All the natural forests cannot be rented or bought; they are all non-commercial. As for plantations, they can be both: commercial and non-commercial. In China, Ministry of Natural Resources determines regions in which logging is allowed, as well as logging scope. According to the Ministry, in 2021 logging was allowed in the following regions: Inner Mongolia, Jilin, Changbaishan (the region in Jilin province), Longjiang (the region in Heilongjiang), Yichun (urban district in Heilongjiang), Greater Khingan (the region in Inner Mongolia)[[32]](#footnote-32). Total quota amount is 5 377 000 m3 and is distributed in the following way:

Table 2.1. Logging quota, %.

|  |  |  |  |
| --- | --- | --- | --- |
| Region | Total amount | Plantations | Natural forest |
| Total | Commercial | Non-commercial | Non-commercial |
| Total amount | 100 | 28.6 | 10.7 | 17.8 | 71.4 |
| Inner Mongolia | 35.3 | 8.04 | 2.2 | 5.8 | 27.2 |
| Jilin | 13.1 | 5.7 | 2.5 | 3.2 | 7.4 |
| Changbaishan | 10.5 | 4.4 | 2.7 | 1.7 | 6.1 |
| Longjiang | 17.6 | 6.7 | 2.3 | 4.4 | 10.9 |
| Yichun | 8.6 | 2.6 | 0.4 | 2.2 | 6.0 |
| Greater Khingan | 14.8 | 1.2 | 0.6 | 0.6 | 13.6 |

Source: 中华人民共和国中央人民政府. <https://goo-gl.me/yDnEx>

Inner Mongolia and Heilongjiang are the most forested areas, at the same time they have the biggest amount of wood that is allowed to log: 1 539 000 m3 and 360 000 m3 respectively. We also see, that non-commercial logging prevails in almost every region (except for Changbaishan and Greater Khingan), overall, non- commercial logging exceeds commercial one on 766 000 m3 (1 922 000 m3 non-commercial versus 1156000 m3).

In 2017 Chinese government announced the prohibition on the commercial logging of natural forest, so China`s dependence on imported timber has exceeded more than 50% since that. We can say that China has huge forest reserves, but the logging quota is quite humble. With introduced ban and small quotas, China is under the risk of being heavily dependent on import of wood and wood products.

Let`s talk about the structure of wood processing industry. The wood processing industry includes saw milling, wood-based panel industry, construction and housing sector, furniture production.

Saw milling.Usually, sawmills are located in the most forested areas. The most of sawmills are state-owned, as well as forests. After implementation of the logging ban, a lot of state-owned sawmills were closed due to the lack of the resources. Nevertheless, there are also small sawmills, that are owned by families or individuals and relatively small in scale. No exact statistics on total number of wood processing mills exists[[33]](#footnote-33).

Wood-based panel industry. This industry includes the production of plywood, particleboard and fiberboard. There we see the same situation, non-state-owned enterprises play a more important role in wood panel industry. There are no serious resource shortages in the sphere, as they use fast-growing poplar timber.

Furniture production. China is the biggest furniture producer and exporter. The market was estimated to have 6 557 furniture businesses, most of the producers are of small or middle size[[34]](#footnote-34).

Pulp and paper industry. This industry is one of the most energy consuming. Together with shortages of domestic raw materials and logging ban implementation, China`s pulp and paper industry faces a big challenge. Another challenge for the further growth of the industry is an ecological direction of the Chinese policy: with the increasing demand of paper, on the other hand, there is a need for more environment friendly and energy saving production[[35]](#footnote-35). In 2020 China exported the paper estimated at 20,9 billion USD, which equaled to 13,3 % of world`s total export, thus making China the biggest paper producer[[36]](#footnote-36). Thus, there exist a strong necessity in huge resource amounts.

Wood-chemical industry.This industry can be characterized as one which requires complex technology and equipment. The main products of China are rosin, tannic acid, gallic acid, essential oils and their by-products. The industry seems to have a big potential for development, as non-wood forest resources are renewable natural resources. So, the industry cannot be influenced by resource shortages, it is rather a promising industry under the green renovation course taken by China`s government[[37]](#footnote-37).

The forest management of China includes forest conversation programs (with main aims to prevent floods and desertification), as well as expansion of tree plantations and a ban on logging in primary forests[[38]](#footnote-38). Also, China initiated a range of national programmes, each of them has its own environmental objectives.

Another important aim is promoting the development of an efficient regulatory system to meet the needs and requirements of socialist construction and people`s livelihood. The main law, regulating the forestry issues of China is Forest Law of the People`s Republic of China, which has been revised three times already since its first adaptation in 1984.

2.4. Legal Regulation

The State has a leading role in regulating the forestry: it should adopt and implement target-oriented responsibility and performance evaluation system for the protection and development of forestry. State entities of the higher level should evaluate the performance of state entities of the lower level in achieving the state`s targets and aims.

Forest Law of the People`s Republic of China (revised by the Standing Committee in 2019) consists of 84 articles (9 chapters), regulates the general provisions, legal aspects, supervision activity and moreover, the development of forestry plans[[39]](#footnote-39). Every chapter is devoted to an exact issue, for example, the first chapter considers general provisions of forest management, the second chapter considers forest rights and so on. The law is rather a well-structured document that is easy to follow. Let us take into consideration the points of state-obliged activities, types of forests according their use and right to use forest.

According to Article 8, the right of implementation of more preferential policies for forest protection is possessed by people`s governments of provinces and autonomous regions, but should be implemented only directly under the Central government. The important point is done on the people`s government at the village and township level, according to Article 9, local authorities are allowed to designate relevant institutions or appoint either full-time or part-time personnel for undertaking of work related to forestry work.

Moreover, there is a special type of obligation that all citizens should fulfil, the requirement considers reforestation and forest protection activities that are obligatory for every citizen. Local government, in its turn, is obliged to organize and conduct tree-planting activity. The special day for it is also appointed – Tree Planting Day is on March 12 every year.

According to Chapter 9 of the Forest Law of China, in the notion of forest arbor, bamboo and shrub forests are included. On the basis of forest function, there following classification is determined: protection forest, special-purpose forest, timber and economic forests, and energy forests.

There some prohibitions are clearly stated also, among them are: prohibition on harvest of firewood, discharging sewage containing toxic substances or heavy metals, felling of forest in natural reserves. It is also important, that prohibition on alteration, renting, trading or counterfeiting of felling licenses is also stated, thus, the possibility of illegal felling is decreased. There is also a special instruction for every timber operating or processing enterprise on keeping the special book, where all the information of incoming and outgoing raw materials and wood products. It is not allowed to purchase, process or even transport woods, knowing about the illegal origins of woods. As for felling license itself, it should be noted, that detail information about felling location, forest type, species, volume, method, forest rights and moreover, regeneration measures should be given. The same rule as in Russian Forest Code works in China: the reforestation area should not be less than the felling area.

Chapter 5 of the Forest Law is devoted to the reforestation issue. The organization and coordination of reforestation and greening campaigns, as well as engagement of the citizens into mentioned activities is a state responsibility.

As for forest protection (Chapter 4), the central and local authorities should appropriately allocate funds for the planting, maintenance and protection of public forests, as well as financial compensation to the holders of non-state public forest, and funding flow is solely watched to be used on purpose. Key forest regions should be eligible for policies such as transfer payments for key national ecological areas in accordance with the relevant provisions. The people`s governments at the township or village level may employ forest rangers, whose main duties are to patrol and guard the forests.

Overall, we can say that the main responsibility is on the state at any level and it includes not only policy on protection and reforestation, but also on education (the idea of forest protection should be widespread among people) and scientific works (research works on forests are welcomed and granted).

It is necessary to analyze how the ownership right can be obtained.According to the Forest Law, forest resources are in state ownership, with the exception of those that are in collective ownership. Ownership of state forest is exercised by the State Council on behalf of the state.

The right of ownership and use of forest are registered in a unified manner, formalized and issued by certificates of real estate registration authorities. The authorized body for natural resources of the State Council should keep records of forests of the key state forest areas.

Owners and users of forests are obliged to protect and rationally use forest, there is no possibility for illegal change of forest use.

There is also a possibility to transfer the right on forest use to individuals, the reform appeared only on the last amendment in 2019. In case of leasing the forest of collective and state ownership by an individual, the contractor owns the rights of management of forest lands.

Collective forest lands that are not leased to individuals should be under the common management of a rural collective economic organization. With the consent of more than two-thirds votes of the villager`s committee the right to manage and own forests can be traded through tenders, auctions and public consultations.

To own and manage forest a written agreement is concluded. It should contain the rights and obligations of both parties to the circulation, its term, price and payment methods, the disposal of forests and the main production facilities of forest land, liability for breach of contract.

The amounts of the fine are also noted:

For persons, who changes the use of forest land (without the consent of the competent authorities) should be obliged to restore vegetation and forestry conditions within the prescribed period, and a fine not exceeding three times the cost of reforestation may be imposed;

Individuals illegally cutting forest are obliged to reforest one to five times the illegally cut forest at the original or other place within the prescribed period, and should pay a fine of five to ten times the value of illegally cut wood;

Individuals, who forges, alters, trades and rents logging licenses should be confiscated of the license, and are obliged to pay one to three times amounts of illegal income, in the absence of it a fine not more than 20 000 yuan may be imposed;

Individuals, who purchase, process and transport woods, fully aware of its illegal origin (illegal logging or senseless logging), should be punished by the competent departments. A confiscation of illegally acquired, processed and exported timber may be imposed, as well as a fine not exceeding three times the value of illegally acquired or processed timber;

Individuals, who refuse or obstruct the supervision and inspection by the forestry authorities may be subject to a fine not more than 50 000 yuan, and in serious cases individuals should suspend production for remediation.

We see the similarities with Russian forest legislation: there is a possibility to transfer the rights of forest ownership to individuals; there is also a possibility to conduct an auction on ownership rights; in case of violation of law (some damage to the forest or excessive logging) the perpetrators are obliged to take reforestation measures, and in case of logging, the amount of cut forest should be restored.

There are also some differences: in China`s Forest Law the special chapter on reforestation management is included and in every article the state`s role is mentioned as a main driving force for the implementation of forest control and management.

Moreover, the concrete amounts for violation the law are also mentioned. The special measures on preventing any kind of illegal forest activity are also stated (fake license, illegal or excessive logging, transportation and processing). There are also special points, the main aim of which is to increases the people`s awareness of forest problems and engagement of them into reforestation activity (Tree Planting Day for example). There is a possibility to conduct an auction on forest usage rights, but it should be voted over (not like in Russia, where forests are sold on auctions usually).

The special type of supervision and inspection is also mentioned and any obstruction of them should be punished. Moreover, it is stated, that in place of living of precious or rare animals, logging or any activity that can make damage to forests is prohibited and in case of violation, the individuals should be punished.

2.5. Reforestation Policy

Have China`s government attempts proved to be effective? It is difficult to compare the amount of forest coverage with Russian one, but tendency is clear: the constant growth for 20 years already. The People`s Republic of China continues to work on greening its territories and protecting forests in order to improve the environmental and economic situation.

For the last 10 years, the country has been restoring forest plantations. As a result, the area of Chinese forests has increased by 12% and the timber reserves have increased up to 17 560 000 000 m3 – the largest number of planted forests in the world[[40]](#footnote-40),[[41]](#footnote-41).

Let`s have a look at the dynamics of forest coverage change of China

.

Figure 2.1. Forest Coverage of China, 1000 km2.

Source: The World Bank. Forest Area. <https://goo-gl.me/7TQBs>

From Figure 2.1. we can say that China slowly but surely continues to build up its forest coverage. Since the official policy on tree planting started in 1978 and was primarily aimed at preventing the desertification, China has already learnt some lessons from its experience. Nowadays, reforestation in China is focused on quality not quantity: the tree species are of greater importance, since they are beneficial to wildlife and are suitable for the given soil (meaning that local forest does not seem to die out). So, the environmental context of every region is taken into consideration. Modern mechanism of reforestation combines both artificial reforestation and natural restoration, at the same time adapting them to regional environment. There is a shift from an extensive reforestation to an intensive one.

Reforestation has become one of the key investment fields that has great significance for several factors: social, environmental and economic. Effective afforestation strategy can improve the air condition, increase the amount of carbon sequestrated and mitigate climate change. They play an important role in mitigating the climate changes due to the ability to sequestrate carbon and soften temperature changes.

Forests are necessary for protecting from the sandstorms, that occur every spring in China. Soil erosion caused by destroying of the root systems is the main reason of floodings and worsening of the water quality in rivers. The ability to sequester carbon is also necessary to mitigate climate change and ‘filter’ the air, especially, in China, with its sky-rocketing economic growth and massive emissions. With the fast development of economy, the demand for timber from construction, papermaking and furniture manufacturing is also rapidly increasing – to satisfy the increasing demand, it is a necessity, if not an emergency, to develop effective forest management strategy and increase not only quantity of forests, but quality as well.

To combat deforestation Chinese government initiated several national programmes aimed at expanding forested territories and plantations. We can highlight six major programmes: the Natural Forest Protection Program, the Program for Conversion of Cropland to Forests, Key Shelterbelt Development Programs, the Sandification Combating Program, the Wildlife Conservation and Nature Reserve Development Program, and the Forest Industrial Base Development Programme in a Key Regions with the focus on the Fast-Growing and High-Yielding Timber Plantation.

Table 2.2. China`s Reforestation Programmes.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Programme | Year | Provinces | Main goal | Investments | Results |
| Natural Forest Protection Programme | Initiated in 1998 | 18 provinces, including Heilongjiang, Jilin, Hebei, Yunnan, Hunan and Liaoning; |  Reduction of both commercial logging of the natural forests and harvest level of state forests; | 80,9 billion USD; | Increase of 28,5 mln ha plantation territories; |
| Programme for Conversion of Cropland to Forests | Initiated in 1999  | 25 provinces and municipalities, including Sichuan, Gansu and Shaanxi; | Conversion of the cropland into the forests; | 109,9 billion USD; | Conversion of 5,2 mln ha into forests and grasslands; |
| Key Shelterbelt Development Programme | Initiated in 1978 | 27 provinces and municipalities, Northeast, Northwest and North regions of China; | Protection of the North regions from desertification and sandy winds blowing from the Gobi Desert; | 30,1 billion USD; | Development of the protecting shelterbelt, increase of forest stock 3,33 bln m3; |
| Sandifiication Combating Programme | Initiated in 2001 | 6 provinces and municipalities, including Beijing and Tianjin; | Sandstorm protection; | 13,8 billion USD; | Total amount of afforestation is about 9,03 mln ha; |
| Wildlife Conservation Programme and Nature Reserve Development Programme | Initiated in 2001 | 31 provinces and municipalities, including Tibet, Gansu, Qinghai; | Support the creation of nature reserves and protect wildlife; | 5,3 billion USD; | Increase of the number of reserves, the area of natural reserves reached 125,5 mln ha; |
| Forest Industrial Base Development Programme  | Initiated in 2001 | 18 provinces and municipalities; | Satisfaction of the inner demand for timber; | 240 million USD; | Afforestation of 360 000 ha; |

Source: China’s Key Forestry Ecological Development Programs: Implementation, Environmental Impact and Challenges, <https://www.mdpi.com/1999-4907/12/1/101>;

 China and UN-REDD Programme, what they can do together to move the REDD+ agenda forward? <http://www.unep-iemp.org/file/2019/03/05/1552269610.pdf>

Natural Forest Protection Programme.This programme was initiated as retaliatory measures to a series of massive floodings in China in 1998. The reason of floodings was not only heavy rains fell on the regions of river basins of Yangtze, Songhua and Nenjiang, but also low ability of the soil of water conservancy, caused by over-logging and huge rate of deforestation of the upstream regions[[42]](#footnote-42).

The programme covers 18 provinces: Henan, Heilongjiang, Jilin, Yunnan, Hainan Sichuan, Chongqing, Guizhou, Hubei, Hunan, Qinghai, Xinjiang, Gansu, Ningxia, Inner Mongolia, Shanxi, Shaanxi and Tibet. The total investment amount is near 81 billion USD, 91% of which was provided by the central government.

The main aims of the programme are the reduction of both commercial logging of the natural forests and harvest level of state forests. Moreover, the programme has also social aspect: the special attention was paid to creation of the jobs for timber workers, who lost their jobs as a result of limiting the logging.

Introduced in the framework of the program, ban on the logging of the state natural forests has a positive environmental impact and helps the forest recovery. The total ecological benefits (air condition, carbon sequestration, etc.) increased by 88 USD billion/year in the period between 2001-2015. The natural forest area increased by 28,5 million ha and the stocking volume of natural forest increased by 3,8 billion m3. The programme has a positive impact on preventing the soil and water degradation, it diminishes soil erosion and sand content in rivers.

Program for Conversion of Cropland to Forests**.** The programme also has a character of a retaliatory measures to natural catastrophe happened in China in 1997-1998. As it follows from the program’s name, the main aim of it is to convert the cropland into the forests. The lands at the slope of above 25°, that can be characterized as ones with low level of agricultural productivity are to be converted into the forests. The main aims include not only environmental aspect (preventing the soil erosion), but also social one (poverty reduction on the local levels by providing subsidy support)[[43]](#footnote-43).

The programme covers 25 provinces: Beijing, Tianjin, Anhui, Jiangxi, Henan, Hebei, Shanxi, Inner Mongolia, Liaoning, Jilin, Heilongjiang, Hubei, Hunan, Hainan, Chongqing, Guangxi, Sichuan, Guizhou, Yunnan, Xinjiang, Shaanxi, Gansu, Qinghai, Ningxia and Tibet. The programme is divided into 2 Rounds: 1st one is the period 1999-2014 (with division on phases: 1st phase 1999-2007, 2d phase 2008-2014), 2d Round in period 2014-2020. The main instrument is subsidy support to households to afforest and manage trees on their own land (sloping land). The subsidies are paid annually and the rate does not depend on the type of tree, only the duration of payments differ: from 5 to 8 years (depending on the classification of the forests planted: ecological with 8-year payments and economical – 5 year). The investment base is near 110 billion USD, majority of which (88%) was provided by the central government.

The results show that there is a positive impact of the programme, considering both soil erosion and flood prevention (the effect is mostly concentrated to Shaanxi province). As a result of the programme, the household’s income increased significantly, as well as forest cover. During 1998-2019, 5,2 million ha of cropland was converted into forests and grasslands.

Key Shelterbelt Development Programme.This programme is also called “Three-North” Shelterbelt as it covers main river systems and coastal lines of Northeast, Northwest and North regions of China, all in all – 27 provinces: Beijing, Hebei, Shanxi, Anhui, Fujian, Inner Mongolia, Liaoning, Jilin, Qinghai, Ningxia, Xinjiang, Heilongjiang, Jiangsu, Jiangxi, Shandong, Henan, Hubei, Hunan, Guangdong, Yunnan, Tibet, Guangxi, Hainan, Chongqing, Guizhou, Shaanxi and Gansu. The programme was introduced in 1978 and its main aim was to protect the North regions from desertification and sandy winds blowing from the Gobi Desert, as well as from soil loss and water erosion. The project has also another popular name – “Great Green Wall” – the analogy to the Great Wall, as it lies in parallel with it.

The programme is led by Chinese government, and main instrument of it is a rapid rate of afforestation activity. The local farmers are paid if the planted forests have survived during the 3-year period. It is expected that forest cover will reach 35 000 000 ha to 2050. The investment is equal to 30 billion USD, 56% ow which is contributed by the central government.

 Although, there are some mistakes in conducting the afforestation, in the beginning, only the fast-growing (ex, poplars). It resulted in a massive tree extinction, due to the tree illness. China`s government realized its mistakes so nowadays aim is to cultivate mixed forests. Moreover, there is a certain level of criticism, as planted trees very often are not local and require more water, that can hurt the groundwater and lead to even greater rate of desertification. Nevertheless, there is a positive effect on environment, increase of carbon sequestration ability and volume of living trees increased from 720 million m3 in 1977 to 3,33 billion m3 in 2017.

Sandification Combating Programmeor Beijing – Tianjin Sandstorm Source Control Project. The project was created as a protection measure against frequent sandstorms occurred in the North China (especially in Tianjin and Beijing) in the end of last century. The programme is divided into 2 phases, the 1st implemented in the period 2001-2012, and the 2d one in 2013-2022. The programme covers 138 counties in 6 provinces and investment base is around 14 billion USD (88% is contributed by the central government). Implementation units, responsible for afforestation, are the competent business departments of the regions, where the programme is conducted. The main management branch includes National Forestry and Grassland Administration, Ministry of Water Resources and National Development and Reform commission, that are sponsored by the government of China.

The programme achieved significant results. The duration of sandstorms decreased up to 3 days in recent years from 5-7 days in 90s, the frequency decreased as well – sandstorms occur 2-3 times a year. Total amount of afforestation for 20 years is about 9,03 million ha[[44]](#footnote-44).

Wildlife Conservation Programme and Nature Reserve Development Programme.China is characterized as the country with the great biodiversity, being the home for rare and endangered animal and plant species.The project was launched in 2001, and its main aims were to support the creation of nature reserves and protect wildlife. The aims should be achieved by creation of nature reserves, with involvement of administration over the priorate protected areas, development of ecotourism and wildlife breeding. The project covers 31 provinces and municipalities all over the country: Anhui, Beijing, Chongqing, Fujian, Gansu, Guangdong, Guangxi, Guizhou, Hainan, Hebei, Henan, Heilongjiang, Hubei, Tianjin, Shanxi, Inner Mongolia, Liaoning, Jilin, Shanghai, Jiangsu, Zhejiang, Jiangxi, Shandong, Hunan, Sichuan, Yunnan, Tibet, Shaanxi, Qinghai, Ningxia and Xinjiang. The programme was launched and supported by the central government of China; the investments amounted to 5,3 billion USD (70 % by the central government) during the period 2001-2018.

The result is increasing of the number of nature reserves (from 1740 in 2005 to 2301 in 2015). The area of natural reserves reached 125 500 000 ha[[45]](#footnote-45). The programme plays a major role in the wildlife and biodiversity conservation.

Forest Industrial Base Development Programme in a Key Regions with the focus on the Fast-Growing and High-Yielding Timber Plantation. The programme was introduced in 2002, the main reasons for the launching are economical: with the fast-growing economic development, China faces the expand in demand for timber as well. In order to satisfy the inner demand for timber, the project, that presupposes the creation of plantations with fast-growing and high yielding trees, was launched. It covers 18 provinces and municipalities of eastern part of China.

Initially, the goal was to create 13 000 000 ha of forest plantations in the period between 2001 – 2015. As a result, 130 mln m3 timber should be produced annually, thus, satisfying the domestic demand by relatively 40%. Nevertheless, for the period from 2001 to 2008 only 360 000 ha of plantations was established[[46]](#footnote-46). It can be explained by the unclear plantation ownership and uncertainties over profitability of the plantations made the programme not attractive – and investments are discouraging. There is very few information on implementation of the programme, so we may predict, that China`s aim of becoming more self-sufficient in terms of timber production is not achieved.

Summing up, we can say that all the programs are being launched and promoted by the central government of China. A great number of investments have been already provided with new amounts and plans upcoming. Initially, the programs were created as a retaliatory measure to the devastating nature phenomena: sand and dust storms, floodings and droughts. Nevertheless, with further development of the programs, more and more emphases are held on social and economic benefits, that are crucial for sustainable development. We can say that majority of the projects, with the exception for Forest Base Development Programme, can be characterized as successful, as reforestation rate increase and problems (sandstorms and floodings) being solved.

It can be said that China's forestry administration is entering a new stage of development through the implementation of key reforestation programmes. Large geographical coverage, huge financial support, and flexible reforestation strategies have played a critical role in increasing China's forest cover.

The experience of China is truly unique. Over the past 20 years, there have been decisive measures to prevent floods and curb desertification, to expand forested areas and restrict logging – all this made it possible to significantly increase the area of ​​forest cover, limit soil erosion, reduce the frequency of sandstorms, significantly increase the area of nature reserves – the achievements are impressive in their scope. Moreover, attention was paid not only to the environmental side, but also to the economic ones – household subsidies reduce the level of poverty within the country and lead to further sustainable economic development.

In general, the programs initiated by the Chinese government can be considered successful - reforestation strategies are flexible, taking into account not only quantitative, but also qualitative characteristics of cultivated forests; the rate of reforestation is increasing, problems such as desertification, soil degradation, etc. are being solved. Nevertheless, one challenge is still being relevant for further economic development, the development of timber base. We have seen, that the Forest Industrial Base Development Programme was not developed enough, thus China is losing in terms of satisfying the domestic demand by domestic production. It means, that China is likely to rely on import from other countries, delegating the issue of timber base development to its trading partners. Despite this, the programs have the potential to address global challenges such as climate change and air pollution, and help to conserve biodiversity.

Chapter 3. The Economic Aspects of Timber Production and Trade

In this chapter we will analyze the economic aspects of forest management of Russia and China. We will learn the dynamics and structure of timber and wood articles trade of both countries, their production capacities and changes, and import tariffs imposed on timber products.

3.1. Russia`s Production of Timber and Wood Products

# In this paragraph we will analyze the dynamics of production of wood of Russia, its main trends and changes taken place during the given period.

Figure 3.1. Russia`s production of wood and articles of wood, 1000 m3.

Source: FAOSTAT <https://www.fao.org/faostat/en/#data/FO>

In Figure 3.1. we can see the dynamics and production structure of Russia. Production of industrial roundwood predominates over the whole period. Next biggest produced items are sawnwood and wood chips and particles. In 2021 we see the following volumes of production: wood chips and particles – 24,3 mln m3 (from 15,3 mln m3 in 2003), sawnwood – 41,8 mln m3 (from 20,2 mln m3), wood-based panels – 16 mln m3 (from 6,3 mln m3), wood fuel – 15,1 mln m3 (from 13,8 mln m3), industrial roundwood – 202 mln m3 (from 160,2 mln m3)In general, there is a certain trend of increase of all the categories with minor decreases in the period from 2008 – 2009 as a result of the crisis, that influenced both: the demand for timber and timber articles and the production of the mentioned categories.

Let`s now take into consideration the production dynamics of pulp and paper.

Figure 3.2. Russia`s production of pulp and paper, 1000 tonnes.

Source: FAOSTAT <https://www.fao.org/faostat/en/#data/FO>

In Figure 3.2. we see the dynamics of the production of paper and pulp. We see, that during the whole period the production was quite stable (minor fluctuations in 2009-2010, as a result of the crisis) and production volumes of every category grew as well: in 2021 volume of pulp for paper production was 8,8 mln tonnes (6,6 mln tonnes in 2003), volume of wood pulp production was 8,7 mln tonnes (6,7 mln tonnes in 2003), volume of paper and paperboard production was 9,5 mln tonnes (6,4 mln tonnes in 2003).

Now we will have a look at the export and import quantity of wood and articles of wood.

Figure 3.3. Russia`s production, import and export quantities of wood and articles of wood, 1000 m3.

Source: FAOSTAT <https://www.fao.org/faostat/en/#data/FO>

In Figure 3.3. we see the dynamics of the total wood production of Russia, export and import quantities of wood. As for the dynamics of production, the significant increase took place during the period: production rose from 215,7 mln m3 in 2003 to 299 mln m3 in 2021. The result of crisis of 2008-2009 is evident here also – production decreased significantly and then recovered only in 2014. As for the dynamics of export, we see neither the significant rise nor decline of the exported volume, though during 2003-2007 it gradually grew. Export quantity is quite significant, in 2003 50,6 mln m3 of timber was exported (nearly one fourth of the total production), in 2021 58 mln m3 of timber was exported (almost one fifth of the total production). As for the import quantity, its volume was minor during the whole period, it did not exceed 2,4 mln m3 during the whole period. We can say, that there is a strong trend of increasing of production volume, while increase in export quantity is relatively slow.

Let`s now analyze the dynamics of export and import quantities of pulp and paper.

Figure 3.4. Russia`s pulp and paper production, import and export quantities, 1000 tonnes.

Source: FAOSTAT <https://www.fao.org/faostat/en/#data/FO>

In Figure 3.4. we see both the increase of production of pulp and paper and export quantity. In 2003 there were 19,7 mln tonnes of pulp and paper produced, 6,2 mln of which was exported, in 2021 27,2 mln tonnes were produced and 8,5 mln of them was exported. Import quantity did not fluctuate dramatically, it was increasing from 2003 (865 000 tonnes) up to 2013 (1,9 mln tonnes), and then, it gradually declined to 1,6 mln tonnes in 2021.

It also necessary to mention, that in April, 2022 the EU introduced the fifth sanction package, that includes the prohibition on import of wood products originated or exported from Russia[[47]](#footnote-47). New limitations include also the ban on purchasing and transferring wood from Russia, that will create new challenges for Russia, that yet to be reflected in the statistics. We may expect some fluctuations in the dynamics of Russia`s export of wood and wood products.

Summing up, we see that Russia`s production of wood and wood products is increasing as well as export quantities. Main timber articles being produced are industrial roundwood, sawnwood and wood chips.As for production of pulp and paper, the biggest quantity belongs to paper and paperboard, their export quantities are also rising. Thus, we can say, that Russia satisfies its domestic demand on wood and wood products and increases export of mentioned goods.

3.2. Russia`s Trade of Timber and Wood Products

# In this paragraph we will analyze the dynamics of trade of wood products of Russia, its main trends and changes taken place during the given period.

# Figure 3.5. Russia`s trade of wood products, 1000$.

# Source: Trade Map https://www.trademap.org/Index.aspx

In Figure 3.5. we see the dynamics of trade of wood products of Russia. We see the significant increase of export of wood products – in 2003 export volume was a bit more 5 bln USD, in 2021 it equaled to 16,3 bln USD. As for the import, its volume increased during 2004 – 2014, then it decreased and stayed at almost the same level – in 2003 it was 1,7 bln USD, in 2021 – 3,8 bln USD. Export significantly exceeding import results in a positive trade balance, that was evident during the whole period. Russia can be considered as an export-oriented country in trade of wood products.

# Let`s now analyze Russia`s import of wood products in more detailed way.

# Figure 3.6. Russia`s import of wood products,1000$.

# Source: Trade Map https://www.trademap.org/Index.aspx

In Figure 3.6. we can see the dynamics of import of wood products. The major importing category is paper and paperboard, its import volume exceeds several times all the others`. The maximum amount was in 2011, import volume was 4,3 bln USD, then, the volume was decreasing and in 2021 it amounted to 2,7 bln USD. The second biggest group is wood and charcoal, though its volume is far not so big: in 2003 it was 243mln USD and in 2021 – 806 mln USD.

Let`s have a look at the structure of import-resources countries of Russia.

# Figure 3.7. Russia`s import of paper and paperboard; articles of paper pulp, of paper or of paperboard, 1000$

# Source: Trade Map https://www.trademap.org/Index.aspx

# In Figure 3.7. we see the dynamics of import of paper and paperboard. In 2021 main exporters were Finland (464 mln USD), Germany (448 mln USD) and China (345 mln USD). China, being one of the minor import source countries in the beginning, became one of the significant exporters of paper and paperboard in the end of the period.

# Figure 3.8. Russia`s import of wood and articles of wood; charcoal, 1000$.

# Source: Trade Map https://www.trademap.org/Index.aspx

In Figure 3.8. we see the dynamics of import of wood and charcoal. There were several decreases in volume: in 2009 and 2015; the maximum amount was achieved in 2013, but after decrease in 2015 it did not recover. In 2021 main import sources of Russia were: Belarus (298 mln USD), China (141 mln USD) and Germany (69 mln USD).

Having analyzed the dynamics and main resource-countries of wood products of Russia, we may conclude, that Russia has a surplus in trade of wood products: export is significantly bigger, than export. As for the imported commodities, the biggest share is occupied by such highly-processed goods as paper and paperboard. Main import source countries are Finland, Germany, Belarus and China, that occupied an important role in the structure of Russia`s trade.

# Now we will pay attention to Russia`s export structure of timber products and its dynamics.

# Figure 3.9. Russia`s export of wood products, 1000$.

# Source: Trade Map https://www.trademap.org/Index.aspx

# In Figure 3.9. we see that main exported group is wood and charcoal, paper and paperboard and pulp. As for the first group, we see the considerable increase in volume: from 3,5 bln USD in 2003 to 11,7 bln USD in 2021. As for paper and pulp, their export volume increased as well, but not so substantially: export of paper rose from 970 mln USD in 2003 to 3,2 bln USD, export of wood pulp rose from 625 mln USD in 2003 to 1,4 bln USD in 2021. Overall, we the growth of export volume of all the good categories.

# Let`s have a look at the dynamics of Russia`s export of wood and articles of wood.

# Figure 3.10. Russia`s export of wood and articles of wood; wood charcoal, 1000$.

# Source: Trade Map https://www.trademap.org/Index.aspx

According to Figure 3.10., main export destinations of wood and charcoal are China, Finland and Japan, their exported volumes in 2021 were equal to 3,6 bln USD, 660 mln USD and 586 mln USD respectively. During the whole period China was the biggest importer of Russian wood and charcoal. Its export increased almost 5 times: from 790 mln USD in 2003 to 3,6 bln USD in 2021.

Now we will analyze Russia`s export of paper and paperboard.

# Figure 3.11. Russia`s export of Paper and paperboard; articles of paper pulp, of paper or of paperboard, 1000$.

# Source: Trade Map https://www.trademap.org/Index.aspx

# In Figure 3.11. we can see the dynamics of Russia`s export of paper. In 2021 main export destinations countries became China (507 mln USD), Belarus (341 mln USD) and Kazakhstan (333 mln USD). Overall, total export volume increased substantially during the given period.

# Let`s now analyze export of pulp of wood of Russia.

Figure 3.12. Russia`s export of pulp of wood or of other fibrous cellulosic material; recovered (waste and scrap) paper, 1000$.

# Source: Trade Map https://www.trademap.org/Index.aspx

# According to Figure 3.12., in 2021 main destinations countries were China (908 mln USD), Republic of Korea (97 mln USD) and Poland (68 mln USD). China was the leading export destination country, that kept this status during the whole period.

# Having analyzed dynamics and structure of export of wood products of Russia, we can conclude that Russia`s main exported category is wood and charcoal, the volume of trade of this category exceeds all the other substantially. As for the main destination countries, the list includes Finland, Japan, Belarus, Kazakhstan, Republic of Korea, Poland and China, that was the main export destination country for all the wood products.

# Nevertheless, under the new sanctions package, that presupposes the ban on import, purchasing and transferring wood, pulp, paper and paperboard from Russia to the EU, we may expect the serious changes in the structure of main export-destinations countries: most probably, Russia`s main export volumes would be redirected into Asian countries and China is the most likely partner to occupy the vacant niche.

# 3.3. China`s Production of Timber and Wood Products

# In this paragraph we will analyze production volume and structure of wood of China.

Figure 3.13. China`s production of wood and articles of wood, 1000 m3.

Source: FAOSTAT <https://www.fao.org/faostat/en/#data/FO>

In Figure 3.13. we see the dynamics of China`s production of wood and articles of wood. Generally, we see the substantial growth of all the categories, in 2021 China produced 148 mln m3 of wood chips and particles (the produced volume in 2003 was 36,7 mln m3), 84 mln m3 of sawnwood (in 2003 volume was 11,4 mln m3), 178,7 mln m3 of wood-based panels (in 2003 volume was 48 mln m3), 155,8 mln m3 of wood fuel (in 2003 volume was 215,2 mln m3) and 181,7 mln m3 of industrial roundwood (94,6 mln m3 was produced in 2003). The stable growth of production is evident during the whole period, no major fluctuations happened. Also, we see that in the beginning of the period, wood fuel production occupied the biggest share of total wood production, in the end of the period, though wood fuel production increased, it does not occupy the biggest production share, giving its position to industrial roundwood and wood-based panels production.

Let`s now have a look at China`s production dynamics of pulp and paper.

Figure 3.14. China`s production of pulp and paper, 1000 tonnes.

Source: FAOSTAT <https://www.fao.org/faostat/en/#data/FO>

In Figure 3.14. we can see the dynamics of China`s pulp and paper production. The trend of increasing of production of all the categories can also be seen here clearly. Production volume of pulp for paper increased from 15,7 mln tonnes in 2003 to 18,5 mln tonnes in 2021, production volume of wood pulp increased from 4 mln tonnes to 14,8 mln tonnes, production volume of paper and paperboard exceeds all the other categories significantly: in 2003 it was 47,4 mln tonnes, in 2021 it reached 125 mln tonnes.

Let`s now analyze the export and import quantities of wood and articles of wood.

# Figure 3.15. China`s production, import and export quantities of wood and articles of wood, 1000 m3.

# Source: FAOSTAT <https://www.fao.org/faostat/en/#data/FO>

# In Figure 3.15. we can see the dynamics of produced, imported and exported quantities of wood and wood articles of China. We see overall increasing of volume production with proportional increasing of import of wood. Production increased from 406 mln m3 in 2003 to 748,7 mln m3, while import increased from 42,5 mln m3 in 2003 to 118,2 mln m3 in 2021. Export quantity of wood also increased, but the growth was not so substantial: from 5,7 mln m3 in 2003 to 14,3 mln m3 in 2021. Thus, major production volumes of wood are presupposed for the domestic demand.

# Let`s consider total production of pulp and paper, and their import and export quantities.

# Figure 3.16. China`s pulp and paper production, import and export quantities, 1000 tonnes.

# Source: FAOSTAT <https://www.fao.org/faostat/en/#data/FO>

# In Figure 3.16. we see the dynamics of China`s production, import and export quantities of pulp and paper. During the period we see the substantial growth of both production and import of pulp and paper: in 2003 67,3 mln tonnes of pulp and paper was produced, and 22,7 mln tonnes was imported, in 2021 production volume grew to 158,6 mln tonnes, import grew to 65,8 mln tonnes. As for export quantity, it increased as well: from 3,6 mln tonnes in 2003 to 6,3 mln tonnes in 2021. We may conclude, that major part of pulp and paper produced are used for satisfying the domestic demand of China.

# Comparing the dynamics of production and export quantity of both countries, we may say that China`s production capacities overcome Russia`s ones significantly. In 2021 China produced 748,6 mln m3 of wood and articles of wood (biggest ones are: industrial roundwood, wood-based panels and wood fuel), 14,3 mln m3 of which China exported. Russia produced 516 mln m3 of wood (main articles were: industrial roundwood, sawnwood and wood chips) in the same year, but exported 58 mln m3. Thus, China produced one and a half times more wood and articles of wood than Russia did, but exported four times less than Russia. In 2021 China produced mainly paper and paperboard, and pulp for paper – 125 mln tonnes and 18,5 mln tonnes, respectively – exceeding Russia`s produced amount of the same goods: 9,5 mln tonnes of paper and paperboard, and 8,8 mln tonnes of pulp for paper. Figures seem incomparable, until we compare exported quantity. Despite the advantage in the produced amount China exported 5,7 mln tonnes of paper and paperboard, and 308 000 tonnes of pulp for paper, while Russia exported 3,6 mln tonnes of paper and 2,4 mln tonnes of pulp for paper.

# Summing up, we can say that in China there is a strong demand on wood, wood articles and wood products, that cannot allow China`s export quantity to grow proportionally to its production. The contrary situation takes place in Russia: considerable part of production is supposed to be exported, and its amount exceeds China`s ones despite its bigger produced amounts.

# 3.4. China`s Trade of Timber and Wood Products

# In this paragraph we will analyze the dynamics of trade of wood products of China, its main trends and changes taken place during the given period.

# Figure 3.17. China`s trade of wood products, 1000$.

# Source: Trade Map https://www.trademap.org/Index.aspx

# In Figure 3.17. we see the dynamics of trade of wood products of China. Firstly, we see the significant increase of both export and import: import volume from 2003 to 2022 increased almost 4 times (from roughly 13 billion USD to 51 billion USD); export volume increased significantly as well (from 7 billion USD in 2003 to 52 billion USD), the increase that resulted in positive trade balance in 2022. We see rather a major change in China`s trade of wood products – from importing country China transforms gradually in exporting one, thus, China decreases its dependency on import of wood products from other countries.

# Let`s now analyze China`s import of wood products in more detailed way.

# Figure 3.18. China`s import of wood products,1000$.

# Source: Source: Trade Map https://www.trademap.org/Index.aspx

# In Figure 3.18. we can see the dynamics of import of wood products. During the whole period there is a strong tendency of import increase. The biggest imported products are wood and product from it, charcoal, pulp of wood and paper and paperboard, while import of cork remaining insignificant. We also see the common decline for the biggest imported categories, taken place in 2018-2019, the reason of that can be COVID-19 influence. In these years, we see also that import volume of wood exceeded import volume of paper, and the situation has not changed to the end of 2021.

# Let`s consider the structure of import-source countries of wood and articles from wood.

# Figure 3.19. China`s import of wood and articles of wood; wood charcoal, 1000$.

# Source: Trade Map https://www.trademap.org/Index.aspx

# During the whole period from 2004 to 2020, Russia was the main exporter of wood and product from it, charcoal. Import from Russia increased from 1,4 bln USD in 2004 to 3,7 bln USD in 2020. In 2021 import from the EU was equal to 4,4 bln USD, thus exceeding import from Russia – 4 bln USD. The change that can be explained by economic slowing down as the consequence of COVID-19 (in 2020 export from Russia reduced and did not recover to pre-pandemic level). Nevertheless, Russia may be considered as one of the major resources of wood and charcoal for China. Moreover, as China`s main imported commodity is wood and wood charcoal, the goods, that are under ban of import to the EU from Russia – there is a high possibility that Russia would redirect its export to China`s side, as the EU`s market became inaccessible nowadays, and become a main exporter of wood in China.

# Now, let`s move to considering the structure of import source countries of pulp of wood.

# Figure 3.20. China`s import of pulp of wood or of other fibrous cellulosic material; recovered (waste and scrap) paper, 1000$.

# Source: Trade Map https://www.trademap.org/Index.aspx

# We can say that China`s import of wood pulp or other fibrous cellulosic materials; recycled paper or cardboard (waste paper and waste) is very diversified: there are a lot of exporting countries without the leading role belonging to 1-2 biggest exporters. Russia`s role in export wood pulp to China is not so significant, it became the eighth biggest exporter in 2021 coming after Brazil (4,3 bln USD), Indonesia (3,2 bln USD), Canada (2,8 bln USD), the EU (2,6 bln USD), Chile (1,8 bln USD), USA (1,7 bln USD), and Finland (1,6 bln USD). We see, that there is a strong trend of increasing of import volume of wood pulp.

# Now let`s take into consideration the structure of import-sources of paper and paperboard.

# Figure 3.21. China`s import of paper and paperboard; articles of paper pulp, of paper or of paperboard, 1000$.

# Source: Trade Map https://www.trademap.org/Index.aspx

# From Figure 3.21 we may conclude, that China`s import of paper and cardboard is also very diversified. In 2021 Russia (620 mln USD) was the sixth biggest exporter of paper and cardboard, coming after the EU (1,6 bln USD), Indonesia (1 bln USD), Japan (874 mln USD), USA (800 mln USD) and Sweden (645 mln USD). So, Russia`s role in China`s structure of import of paper and cardboard can be received as quite significant.

# We may conclude, that China increased the volume of import of wood products and is likely to continue to do it in the nearest future: the import volume of main wood products increased during the period from 2004 to 2021. So, despite China`s plan to satisfy domestic demand for wood products by the domestic production, the tendency showed, that China is still dependent on the export from other countries.

# Russia plays a major role in providing China with wood and product from it, charcoal. We can say that there is a certain dependency on Russia`s export of mentioned products. Nevertheless, China`s import of wood pulp, paper and cardboard is diversified and Russia`s role in trade of highly-processed products cannot be called significant. Nevertheless, volume of import from Russia increased in all major categories and is likely to continue to grow substantially, under new restrictions that Russia faces from its European partners, so China still relies and is most likely to continue to rely on Russia`s export of wood products.

# Let`s now analyze the dynamics and structure of export and export destination countries of China.

# Figure 3.22. China`s export of wood products, 1000$.

# Source: Trade Map https://www.trademap.org/Index.aspx

# In Figure 3.22 we see the dynamics of export of wood products. The biggest export volume belongs to the following product groups: wood and product from it, charcoal, and paper and cardboard. During the whole period we see the tendency of increasing of export of the abovementioned groups.

# Let`s have a look at the structure of export-destination countries of China.

# Figure 3.23. China`s export of wood and articles of wood; wood charcoal, 1000$.

# Source: Trade Map https://www.trademap.org/Index.aspx

# The main export destinations in 2021 were the following countries: USA (3,9 bln USD), the EU (2,7 bln USD), Japan (1,4 bln USD), the UK (1 bln USD) and Vietnam (920 mln USD). Russia is not included in top-twenty biggest export destinations, export from China in 2021 was 132 mln USD. It can be explained by not high demand in wood and charcoal from the Russian side, as the country itself is exporting the mentioned products.

# Figure 3.24. China`s export of paper and paperboard; articles of paper pulp, of paper or of paperboard, 1000$.

# Source: Trade Map https://www.trademap.org/Index.aspx

# From Figure 3.24. we can see the strong tendency of export increasing, that is likely to continue in the nearest future. Main export destinations in 2021 were USA (3,7 bln USD), the EU (2,5 bln USD) and Vietnam (1,8 bln USD). Export to Russia in 2021 was equal to 312 mln USD, again, Russia is far from becoming major export destination of China`s wood products.

# Having analyzed the structure of export destination countries, we may conclude, that Russia is still far from becoming major partner of China in trade of wood products. Main partners of China are the EU, the US, the UK, Japan and Vietnam. Export volume to those countries is by far higher than to Russia. Nevertheless, there we see the tendency of increasing the export volume during the whole period to all the major destinations.

# 3.5. Bilateral Trade of Wood and Wood Products between Russia and China

# In this chapter we will pay attention to the trade flow of wood and wood products between Russia and China. We will analyze the dynamics, trends and main changes, taken place in the given period.

# Figure 3.25. Bilateral trade of wood products between Russia and China, 1000$.

# Source: Trade Map https://www.trademap.org/Index.aspx

# In Figure 3.25. we see the dynamics of bilateral trade of wood products between Russia and China. We see, that during the period from 2003 to 2022 there is a significant increase of import from Russia – from 1,5 bln USD in the beginning to 5,7 bln USD in the end of the period. China`s export to Russia remains unsignificant, import volume exceeding export volume several times, that results in China`s negative trade balance. Trade deficit increased from 1,5 bln USD in 2003 to 4,6 bln USD in 2022. In addition, the EU`s ban on import of wood, pulp and paperboard would be make Russia to increase its wood export, first of all, to China, the consequences of which would result in a growth of trade deficit from China`s side. We may conclude, that Russia serves as the import source of wood products for China.

# Now let`s consider the dynamics of China`s import from Russia.

# Figure 3.26. China`s import of wood products from Russia, 1000$.

# Source: Trade Map https://www.trademap.org/Index.aspx

# In Figure 3.26. we can see the dynamics of China`s import of wood products from Russia. Main imported category is wood and wood charcoal, the import volume of which exceed all other many times and can be considered as the main category of goods. Generally, there is a tendency of increase of import volume, especially of wood and charcoal. In the dynamics of import of this product we see the decreases happened in 2009, 2013 and 2020. Nevertheless, we see the significant growth: in 2004 China import from Russia was 1,4 bln USD, in 2021 import volume was 4 bln USD. As for the import volume of wood pulp and paper and paperboard, there are increases as well, but not so significant as in case with wood and charcoal – in 2004 import volumes of wood pulp and paper and paperboard were 435 mln USD and 106 mln USD respectively. In 2021 the import volumes of those groups were 1,3 bln USD and 622 mln USD respectively. Import volume of cork has not exceeded 8 mln USD for the whole period.

# Nevertheless, China plans to satisfy its domestic demand by the domestic production of wood, the tendency we have seen cannot confirm it. We see certain trends of increasing import from Russia (wood and charcoal, wood pulp, paper and paperboard) that show that still it is too early to speak about the full independency of China in terms of production of those products only by domestic productions. Giving that, with more and more restrictions in logging in China, restrictions of Russia`s export to the countries of the EU, with its aims to expand protected forest areas, we can predict that China would become gradually dependent on import mainly from Russia.

# We should also consider the import tariffs imposed on wood and wood products when crossing the border of one or that country. The tariff analysis is important as it helps to understand what measures are undertaken by countries to ither restrict or promote the trade of wood. In Table 3.1., we can see China`s applied simple average ad valorem duty (AT) and bound simple average ad valorem duty (BT).

# Table 3.1. China`s import tariffs on wood products, %.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Tariff | 2001 | 2005 | 2009 | 2013 | 2017 | 2021 |
| AT on wood and wood charcoal; | 9,4 | 4,4 | 3,8 | 3,8 | 2,9 | 2,3 |
| BT on wood and wood charcoal; | 4,9 | 4,9 | 4,9 | 4,9 | 4,9 | 4,9 |
| AT on cork and articles of cork | 8,1 | 5,8 | 5,8 | 5,8 | 5,8 | 5,4 |
| BT on cork and articles of cork | 5,9 | 5,9 | 5,9 | 5,9 | 5,9 | 5,9 |
| AT on pulp of wood | 0 | 0 | 0 | 0 | 0 | 0 |
| BT on pulp of wood; | 0,2 | 0,2 | 0,2 | 0,2 | 0,2 | 0,2 |
| AT on articles of pulp and paper; | 17,2 | 9,4 | 6,7 | 6,6 | 6,6 | 5,4 |
| BT on articles of pulp and paper; | 6,7 | 6,7 | 6,7 | 6,7 | 6,7 | 6,7 |

# Source: WTO Stats <https://stats.wto.org/>

# We see that applied and bound tariff rates were relatively low in 2001 and became gradually less to 2021. The highest tariffs are imposed on articles of pulp and paper (5,4%), and cork (5,4%). The lowest ones imposed on pulp of wood (0%) and wood and wood charcoal (2,3%). Low tariffs promote import and contribute to wood supply satisfy domestic demand.

# Let`s now compare China`s tariffs with Russia`s ones.

# Table 3.2. Russia`s import tariffs on wood products, %.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Tariff | 2001 | 2010 | 2016 | 2021 |
| AT on wood and wood charcoal; | 15,4 | 15,5 | 9,5 | 8,8 |
| BT on wood and wood charcoal; | 8,5 | 8,5 | 8,5 | 8,5 |
| AT on cork and articles of cork | 5 | 5 | 5 | 5 |
| BT on cork and articles of cork | 5 | 5 | 5 | 5 |
| AT on pulp of wood | 15 | 7,4 | 7,3 | 6,5 |
| BT on pulp of wood; | 9,2 | 9,2 | 9,2 | 9,2 |
| AT on articles of pulp and paper; | 13,3 | 13,6 | 8,8 | 7,8 |
| BT on articles of pulp and paper; | 7,8 | 7,8 | 7,8 | 7,8 |

# Source: WTO Stats <https://stats.wto.org/>

# We see that Russia`s tariffs are higher than that of China, though they decreased during the period from 2001 – 2021. Higher tariffs help to protect domestic producers and market. As we have seen, Russia can satisfy its own demand on wood, tariffs contribute to the flourishing production of wood and its export.

# Conclusion

# Having analyzed the features of forest management of both countries: Russia and China, we would like to mention the main peculiarities of the systems of both countries and make final concluding remarks.

# In both countries, forest distribution is uneven, as it depends on the urbanization of the areas and the geographical peculiarities of this or that region. The most forested areas of the Russian Federation are Far Eastern, Siberian and Northwestern Federal Districts, which have 84,2% of total amount of forests. The most forested areas of People`s Republic of China are Inner Mongolia, Yunnan and Sichuan, which have almost 32% of total amount of forests of the country. Logging industries of both countries are concentrated in the most forested areas.

# As for the regulation on forest activity, both countries have different approaches. China`s government sets the allowed amount of logging for particular regions, quotas restrict the logging scale and are being updated annually, thus logging activity is strictly regulated. As for Russia, government does not set any limitations in terms of allowed logging amount. Moreover, according to official statistics, almost all Russian logging organizations are not profitable, number of workers being quite moderate – the facts, that raise suspicions about the shadow economy.

# As for the structures of timber processing complex of both countries, they do not have drastic differences: timber processing complexes of Russia and China include logging industry, wood processing industry, pulp and paper industry and wood-chemical industry. The industries use the same feedstock, but through implementing different technologies they produce a wide range of products, so production destinations are also diversified.

# As for the forest management aims of Russia and China, they are as following: reforestation, widening of the forested areas, improvement of forest species` composition, increasing of forests` productivity and forest reservation. Main legislation acts, in accordance to which the forest areas are treated in Russia, include Constitution of the Russian Federation and the Forest Code of the Russian Federation. The main forest regulatory act of China is Forest Law of People`s Republic of China. According to regulatory acts of both countries, individuals may obtain the right of forest ownership. In case of China, where all the forests are either collectively or state owned, nevertheless, in China that obtainment by individual should be voted over by local villager committee. In Russia, the right of forest usage right is transferred to the individual as a result of the auction. Auctions are conducted with the aims with increasing investment flows in the environmental sphere. Another common point of both countries is the obligation of forest restoration in case of logging: the amount of cut forest should be equal to that one restored. What makes the two acts contrast is the point of China`s Forest Law, which aims at people`s engagement into reforestation activity: Tree Planting Day. Thus, China government puts a strong emphasis on acquiring its citizens with environmental issues, that will positively impact further reforestation policy conducting.

# As for practical side of increasing forest coverage, the common instrument of both countries is national reforestation programmes. China initiated six national programmes: Natural Forest Protection, Conversion of Cropland to Forests, Key Shelterbelt Development, Sandification Combating, Wildlife Conservation and Nature Reserve Development, and Forest Industrial Base Development programmes. The programmes have different aims: forest protection, increasing forest plantation areas, prevent sandstorms and floodings, protect biodiversity. One of the main instruments is subsidies to local population, the conditions of payments include the sustainability of planted areas (planted trees should sustainably grow 3-5 years). Thus, China, on the one hand, effectively achieve the reforestation aims, and, on the other, improve its citizens` living conditions and reduce poverty. The factors, that make China`s reforestation policy sustainable. There was only one unsuccessful programme: Forest Base Development Programme (2001-2008), the aim of which was to create China`s timber base, thus, decreasing China`s dependance on timber import. The reason of failure can be unclearly stated ownership status of the supposed plantations, thus, programme turned to be unattractive for the locals. Nevertheless, due to the national programmes China increased its forest coverage on more than 35 mln ha, increased the number of nature reserves, and, due to the development of shelterbelt, decreased the frequency of sandstorms and floodings. Russia also initiated national programme: Forest Preservation, main instrument of which is federal investments, presupposed mainly for equipping the institutions with necessary equipment and preventing the fires. The subsidies for the local citizens are not presupposed, so the social aspect of the programme is not so significant, as in case with China`s reforestation programmes.

# For both countries, trade of timber and wood products takes a significant part in the trade structure. Russia`s timber trade balance remained positive during the whole period: its export exceeded its import. As for China, its import exceeded the import, that resulted in a negative timber trade balance up to 2022, when wood export exceeded import. As for production side of both countries, China`s production volume of wood exceeds Russia`s one: in 2021 China produced 748,7 mln m3, 118,2 mln m3 of which it exported, and import was 14,3 mln m3, while Russia produced 299 mln m3, 58 mln m3 of which it exported, import volume was 2,1 mln m3. As for pulp and paper production and trade, China`s production and import volumes exceeds Russia`s ones as well: in 2021 China produced 158, 6 mln tonnes, imported 65,8 mln tonnes, while Russia produced 27,2 mln tonnes and imported 1,6 mln tonnes. As for the export side, Russia`s export is bigger than China`s one: 8,5 mln tonnes of Russia and 6,3 mln tonnes of China. We may say, that there is higher demand on wood, pulp and paper in China, that cannot allow China to become an export-oriented country in terms of wood trade. Moreover, import tariffs of China are lower than those ones of Russia, thus China promotes wood import to satisfy its inner wood demand, while Russia`s wood supply is mainly satisfied, and the necessity of wood import is not so significant. As for main export destinations and import sources of both countries, we can say that China can be considered as the major export destination country of wood and paper of Russia: China has a leading position in Russia`s export of wood and charcoal, paper and paperboard, and pulp of wood, overtaking even European countries (Poland and Finland) and CIS countries (Belarus and Kazakhstan). As for import-source country, China also has a significant role, being the 3d main importer of wood and charcoal and paper to Russia, being overtaken by Finland, Germany and Belarus. Moreover, we should bear in mind the changing situation in Russia`s trade of wood and wood products: as the EU introduced the ban on purchasing, import and transferring wood, pulp and paper of Russia origin or exported from Russia, that creates serious challenges for Russia and only pushes Russia to expand its export to China with its high demand and low import tariffs.

# As for Russia`s role in China`s export destinations structure, it cannot be called significant – main partners here are the US and the EU. As for China`s import of wood and wood products, Russia was the first biggest exporter of wood and wood charcoal up to 2021, when the EU overtook Russia, though the situation is likely to change these years. In China`s import-sources of wood pulp and paper and paperboard, Russia`s role is not so significant – it can be considered only the 6th-8th biggest exporter. So, China`s role in wood trade for Russia is dramatically more significant, than Russia`s role is for China.

# Summing up, we may say that China`s forest management seems to be more effective and multidirectional: on the one hand, we see the increase of forest coverage, that contributes to the overall improvement of the environment, and, on the other hand, we see the measures aimed at poverty reduction, by means of subsidies for the engagement of local population in reforestation activity. Nevertheless, problem of China`s dependency on import of wood is still significant, despite the achieved positive trade balance, we see the tendency of increasing of import volume. As for Russia, we see, that main burden of reforestation is put on the federal budget without attracting local population in the activity. There is also a strong necessity of decriminalization of the logging industry, that can be done through implementation of more effective regulating acts and monitoring activities. Despite the gradual forest coverage increase, the question of the sustainability of undertaken measures is still open: as main focus is given to the fight with the consequences of the ineffective forest management (fires and illegal logging), while it is better to pay attention to the reasons of poor forest management: raising of people`s awareness of environmental issues and tightening the laws to prevent illegal activity.

References

1. Statistical information base. WTO Stats [Электронный ресурс]. – Режим доступа: WTO Stats <https://stats.wto.org/> (дата обращения: 24.04.2023).
2. Statistical information base. FAO STAT [Электронный ресурс]. – Режим доступа: WTO Stats <https://www.fao.org/faostat/en/#data/FO> (дата обращения: 24.04.2023).
3. Statistical information base. Trade Map [Электронный ресурс]. – Режим доступа: <https://www.trademap.org/Index.aspx> (дата обращения: 24.04.2023).
4. Statistical information base. The World Bank. Forest Area – Russian Federation. [Электронный ресурс]. – Режим доступа: https://ecosphere.press/2021/12/24/srubit-i-posadit-kak- ustroeno-lesovosstanovlenie-v-rossii/ (дата обращения: 19.05.2022).
5. Plan targets protection of natural forest [Электронный ресурс]. – Режим доступа: – Режим доступа: https://www.timbertradeportal.com/en/china/28/country-context (дата обращения: 20.04.2022).

# Administrative map of China. [Электронный ресурс]. – Режим доступа: <https://www.nationsonline.org/oneworld/map/china_administrative_map.htm> (дата обращения: 13.04.2022).

# Bioeconomy BW. Wood as raw material for platform chemical. [Электронный ресурс]. – Режим доступа: [https://www.biooekonomie-](https://www.biooekonomie-bw.de/en/articles/news/wood-as-raw-material-for-platform-chemicals) [bw.de/en/articles/news/wood-as-raw-material-for-platform-chemicals](https://www.biooekonomie-bw.de/en/articles/news/wood-as-raw-material-for-platform-chemicals) (дата обращения: 28.04.2022).

# Britannica. Chemical products. [Электронный ресурс]. – Режим доступа: https://www.britannica.com/science/wood-plant-tissue/Chemical-products (дата обращения 28.04.2022).

# CEIC. China Export: Paper & Paperboard. [Электронный ресурс]. – Режим доступа: https://www.ceicdata.com/en/china/usd-export-by-major-commodity-value/export- paper--paperboard (дата обращения: 4.05.2022).

# China Daily. Plan targets protection of natural forest [Электронный ресурс]. – Режим доступа:<http://global.chinadaily.com.cn/a/201908/07/WS5d4a2467a310cf3e35564421.html> (дата обращения: 24.04.2023).

# Fair Planet. Is China`s Reforestation Plan Realistic? [Электронный ресурс]. – Режим доступа: https://www.fairplanet.org/story/is-chinas-reforestation-plan- realistic/ (дата обращения: 19.05.2022).

# Farooq TH, Shakoor A, Wu X, Li Y, Rashid MHU, Zhang X, Gilani MM, Kumar U, Chen X, Yan W (2021). Perspectives of plantation forests in the sustainable forest development of China. iForest 14: 166-174. - doi: 10.3832/ifor3551-014.

# Food and Agriculture Organization of the United Nations. Natural Forest Management. [Электронный ресурс]. – Режим доступа: https://www.fao.org/forestry/sfm/85084/en/ (дата обращения: 6.04.2022).

# Forest Complex.ru. Руби — не хочу: сколько леса в России доступно для заготовки? . [Электронный ресурс]. – Режим доступа: https://clck.ru/34Km7a (Дата обращения: 04.05.2023).

# Forest ecosystem products and services. [Электронный ресурс]. – Режим доступа: https://www.nrcan.gc.ca/our-natural-resources/forests-and-forestry/sustainable- forest-management/forest-ecosystem-products-services/13177 (Дата обращения: 7.05.2022).

# G. Ren, S.S. Young, L. Wang. Effectiveness of China’s national forest protection program and nature reserves. [Электронный ресурс]. – Режим доступа: https://ueaeprints.uea.ac.uk/id/eprint/56325/1/2015\_Ren\_China\_PA\_effectiveness\_Cons\_Bio.pdf (дата обращения: 21.04.2022).

# Guide to Chinese Climate Policy. Forestry. [Электронный ресурс]. – Режим доступа: https://chineseclimatepolicy.energypolicy.columbia.edu/en/forestry (дата обращения: 4.05.2022).

# H. Yang. China’s Natural Forest Protection Program: Progress and impacts. 2017, VOL. 93, No 2 — THE FORESTRY CHRONICLE. [Электронный ресурс]. – Режим доступа: <https://pubs.cif-ifc.org/doi/pdf/10.5558/tfc2017-017> (дата обращения: 21.04.2022).

# <http://global.chinadaily.com.cn/a/201908/07/WS5d4a2467a310cf3e35564421.html> (дата обращения: 24.04.2023).

# K. Zhang, Y. Artati, L. Putzel. International Forestry Review Vol.19(S4), 2017 China’s Conversion of Cropland to Forest Program as a national PES scheme: Institutional structure, voluntarism and conditionality of PES. [Электронный ресурс]. – Режим доступа: https://www.cifor.org/publications/pdf\_files/articles/AArtati1701.pdf (дата обращения: 23.04.2022).

# L. Rodriguez, N. J. Hogarth, W. Zhou. China’s conversion of cropland to forest program: a systematic review of the environmental and socioeconomic effects. Environ Evid 5, 21 (2016). <https://doi.org/10.1186/s13750-016-0071-x>.

# Liu, Shirong & Lin, Yong & Zhang, Yuandong & Guo, Zhihua & Zhang, Lei & Li, Chao & Wang, Jingxin. (2011). Landscape Ecology Contributions to Forestry and Forest Management in China: Progresses and Research Needs. DOI:10.1007/978-3-642-1275.

# Liu, Shirong & Shuirong, Wu & Wang, Hui. (2014). Managing planted forests for multiple uses under a changing environment in China. New Zealand Journal of Forestry Science. 44. 10.1186/1179-5395-44-S1-S3.

# M. Shi, J. Qi, R. Yin. Has China’s Natural Forest Protection Program Protected Forests?—Heilongjiang’s Experience. [Электронный ресурс]. – Режим доступа: Forests 2016, 7(10), 218; https://doi.org/10.3390/f7100218 (дата обращения: 21.04.2022).

# M. T. Bennet, C. Xie, N.J. Hogarth. China's Conversion of Cropland to Forest Program for Household Delivery of Ecosystem Services: How Important is a Local Implementation Regime to Survival Rate Outcomes? Forests, 2014 5(9):2345-2376 DOI:10.3390/f5092345.

# Rapid Transition Alliance. How China brought its forests back to life in a decade. [Электронный ресурс]. – Режим доступа: <https://www.rapidtransition.org/stories/how-china-brought-its-forests-back-to-life-in-a-decade/> (дата обращения: 20.04.2022).

# SGTN. Counties benefit from Beijing-Tianjin sandstorm source control project. [Электронный ресурс]. – Режим доступа: https://news.cgtn.com/news/2020-09-27/Counties-benefit-from-Beijing-Tianjin-sandstorm-source-control-project-U7wvmur4Zy/index.html (дата обращения: 23.04.2022).

# South China Morning Post. Climate Change: China has a new carbon-storage tool from decades of frenzied tree planting to avert hillside erosion and prevent floods. [Электронный ресурс]. – Режим доступа: https://www.scmp.com/business/article/3175189/climate-change-china-has-new- carbon-storage-tool-decades-frenzied-tree (дата обращения: 19.05.2022).

# The London P&I Club. Ukraine - EU and UK Sanctions – Update & Fifth and Sixth Packages. [Электронный ресурс]. – Режим доступа: https://www.londonpandi.com/knowledge/news-alerts/ukraine-eu-and-uk-sanctions-update-fifth-and-sixth-packages/ (дата обращения: 03.05.2023).

# The Science Times. Mega Sandstorm in China Momentarily Erases A Silk Road Outpost, Country Announces to Build 'Great Green Wall' [Электронный ресурс]. – Режим доступа: <https://clck.ru/33KSEy> (дата обращения: 20.04.2022).

# The Word Forest Organisation. Assessing China`s “Green Wall”: Lessons to the World on Afforestation. [Электронный ресурс]. – Режим доступа: https://www.wordforest.org/2022/03/11/assessing-chinas-green-wall-lessons-to-the- world-on-afforestation/ (дата обращения: 19.05.2022).

# Timber Trade Portal. Forest resources and context of China. [Электронный ресурс].

# Timber Trade Portal. Forest resourses and context of China. [Электронный ресурс]. – Режим доступа: <https://www.timbertradeportal.com/en/china/28/country-context> (дата обращения: 20.04.2022).

# Trend Economy. Annual International Trade Statistics by Country (HS). [Электронный ресурс]. – Режим доступа: https://trendeconomy.com/data/h2/China/4412 (дата обращения: 20.04.2022).

# Ukraine - EU and UK Sanctions – Update & Fifth and Sixth Packages. [Электронный ресурс]. – Режим доступа: https://www.londonpandi.com/knowledge/news-alerts/ukraine-eu-and-uk-sanctions-update-fifth-and-sixth-packages/ (дата обращения: 03.05.2023).

# Wang Y, Zhang Q, Bilsborrow R. Effects of payments for ecosystem services programs in China on rural household labor allocation and land use: Identifying complex pathways. Land use policy. 2020;99:105024. doi: 10.1016/j.landusepol.2020.105024.

# WANG, G., J.L. INNES, S.W. WU, and S. DAI. “Towards a New Paradigm: The Development of China’s Forestry in the 21st Century.” The International Forestry Review 10, no. 4 (2008): 619–31. <http://www.jstor.org/stable/43740361>.

# Wang, Hui & He, Mengyu & Ran, Nan & Xie, Dong & Wang, Qiang & Teng, Mingjun & Wang, Pengcheng. (2021). China’s Key Forestry Ecological Development Programs: Implementation, Environmental Impact and Challenges. Forests. 12. 101. 10.3390/f12010101.

# WWF: из-за рубок Россия теряет полмиллиона гектаров первозданных лесов в год. [Электронный ресурс]. – Режим доступа: https://clck.ru/34KhSe (Дата обращения: 04.05.2023).

# XINHUANET. China to continue promoting afforestation, protecting forests: official. [Электронный ресурс]. – Режим доступа: http://www.news.cn/english/2021- 03/11/c\_139803370.htm (дата обращения: 20.05.2022).

# Y. Cui, X. Gu, Z. Liu. Input–Output Efficiency of the Beijing–Tianjin Sandstorm Source Control Project and Influencing Factors. Sustainability 2022, 14, 8266. https://doi.org/10.3390/su14148266

# Дороничев Д.А. Лесопромышленный комплекс: понятия, проблемы, перспективы – М; Статистика России, 2005. – С. 12.

# Конституция Российской Федерации. [Электронный ресурс]. – Режим доступа: http://www.constitution.ru/ (дата обращения: 6.05.2022).

# Лесной кодекс Российской Федерации. [Электронный ресурс]. – Режим доступа: <https://rulaws.ru/Lesnoy-kodeks/>(дата обращения: 29.04.2022).

# Леспром. Государственное и муниципальное управление лесами Китая. [Электронный ресурс]. – Режим доступа: <https://lesprominform.ru/jarticles.html?id=4302>(дата обращения: 15.04.2022).

# Нормативно-правовая база. [Электронный ресурс]. – Режим доступа: https://klh.mosreg.ru/deyatelnost/vosproizvodstvo-lesov-i- lesorazvedenie/lesovosstanovitelnye-meropriyatiya/12-09-2016-16-59-28- normativno-pravovaya-baza (дата обращения: 6.04.2022).

# Правовед. Как взять лес в аренду. [Электронный ресурс]. – Режим доступа: https://pravoved.ru/journal/kak-vzyat-les-v-arendu/ (дата обращения: 28.04.2022).

# Продовольственная и сельскохозяйственная организация Объединённых наций [Электронный ресурс]. – Режим доступа: [https://www.fao.org/forest-](https://www.fao.org/forest-resources-assessment/2020/ru) [resources-assessment/2020/ru](https://www.fao.org/forest-resources-assessment/2020/ru) (Дата обращения: 12.04.2022).

# Продовольственная и сельскохозяйственная организация объединённых наций. Потребление и производство лесной продукции. [Электронный ресурс]. – Режим доступа: [https://www.fao.org/forestry/statistics/80938@180723/ru/](https://www.fao.org/forestry/statistics/80938%40180723/ru/) (дата обращения: 20.04.2022).

# Производство ДВП.[ Электронный ресурс]. – Режим доступа: https://mir- fanera.ru/stati/proizvodstvo\_dvp (дата обращения: 6.04.2022).

# РосЛесИнфОрг. За 10 лет площадь лесов России увеличилась на 4,3 млн гектаров. [Электронный ресурс]. – Режим доступа: https://clck.ru/34KkU2 (Дата обращения: 04.05.2023).

# Российская газета. Кто в лесу живёт бесплатно. [Электронный ресурс]. – Режим доступа: <https://pravoved.ru/journal/kak-vzyat-les-v-arendu/> (дата обращения: 3.05.2022).

# Срубить и посадить. Как устроено лесовосстановление в России. [Электронный ресурс]. – Режим доступа: [https://ecosphere.press/2021/12/24/srubit-i-posadit-kak-](https://ecosphere.press/2021/12/24/srubit-i-posadit-kak-ustroeno-lesovosstanovlenie-v-rossii/) [ustroeno-lesovosstanovlenie-v-rossii/](https://ecosphere.press/2021/12/24/srubit-i-posadit-kak-ustroeno-lesovosstanovlenie-v-rossii/) (дата обращения: 19.05.2022).

# Федеральная служба государственной статистики. Регионы России. Социально-экономические показатели – 2020г. [Электронный ресурс]. – Режим доступа: https://www.gks.ru/bgd/regl/b20\_14p/Main.htm (дата обращения: 10.04.2022).

# Федеральное агентство лесного хозяйства. Лесные ресурсы. [Электронный ресурс]. – Режим доступа: https://rosleshoz.gov.ru/ (дата обращения: 27.05.2022).

# Федеральное агентство лесного хозяйства. Основные показатели по виду деятельности «Лесозаготовки». [Электронный ресурс]. – Режим доступа: https://rosleshoz.gov.ru/ (дата обращения: 27.05.2022).

# 中华人民共和国中央人民政府。国务院办公厅关于重点林区“十四五”期间年森林采伐限 额 的 复 函 。 [Электронный ресурс]. – Режим доступа: http://www.gov.cn/zhengce/content/2021-02/09/content\_5586306.htm (дата обращения: 2.05.2022).

# 中华人民共和国海关总署 [Электронный ресурс]. – Режим доступа: <http://www.customs.gov.cn/> (дата обращения: 23.04.2023).

# 中国“绿色长城”让世界惊叹 外媒：阻止沙漠推进 [Электронный ресурс]. – Режим доступа: https://news.sina.cn/gn/2019-11-25/detail-iihnzahi3223136.d.html.

# 京津风沙源治理工程实施20年成效显著 [Электронный ресурс]. – Режим доступа: <http://www.forestry.gov.cn/main/414/20201001/103528611294640.html> (дата обращения: 20.04.2023).

# 共建地球生命共同体：中国在行动[Электронный ресурс]. – Режим доступа: <https://www.mfa.gov.cn/web/ziliao_674904/1179_674909/202009/t20200921_7947968.shtml> (дата обращения: 18.05.2022).

# 国家林业和草原局政府网. 中国自然保护地. [Электронный ресурс]. – Режим доступа: https://inlnk.ru/ZZN0AJ (Дата обращения: 04.05.2023).

# 国际木材贸易门户网. 中国的森林资源和背景. [Электронный ресурс]. – Режим доступа: <https://goo.su/g0rzzW> (дата обращения: 3.05.2022).

# 數據及概況 - 中國內地行業資訊. 中國家具市場概況 [Электронный ресурс]. – Режим доступа: https://research.hktdc.com/tc/article/MzA3ODY3OTk5 (дата обращения: 3.05.2022).

# 新华网。 我国森林面积达2.31亿公顷 [Электронный ресурс]. – Режим доступа: http://www.news.cn/2023-03/12/c\_1129428209.htm (Дата обращения: 04.05.2023).

# 植树节[Электронный ресурс]. – Режим доступа: <https://baike.sogou.com/v50840.htm> (дата обращения: 17.04.2023).

1. Продовольственная и сельскохозяйственная организация Объединённых наций [Электронный ресурс]. – Режим доступа: <https://www.fao.org/forest-resources-assessment/2020/ru>(Дата обращения: 12.04.2022). [↑](#footnote-ref-1)
2. Федеральная служба государственной статистики. Регионы России. Социально-экономические показатели – 2020г. [Электронный ресурс]. – Режим доступа: <https://www.gks.ru/bgd/regl/b20_14p/Main.htm>(Дата обращения: 10.04.2022). [↑](#footnote-ref-2)
3. Дороничев Д.А. Лесопромышленный комплекс: понятия, проблемы, перспективы – М; Статистика России, 2005. – С. 12. [↑](#footnote-ref-3)
4. Forest ecosystem products and services. [Электронный ресурс]. – Режим доступа: [https://www.nrcan.gc.ca/our-natural-](https://www.nrcan.gc.ca/our-natural-resources/forests-and-forestry/sustainable-forest-management/forest-ecosystem-products-services/13177) [resources/forests-and-forestry/sustainable-forest-management/forest-ecosystem-products-services/13177](https://www.nrcan.gc.ca/our-natural-resources/forests-and-forestry/sustainable-forest-management/forest-ecosystem-products-services/13177)(Дата обращения: 7.05.2022). [↑](#footnote-ref-4)
5. Министерство природных ресурсов и экологии Российской Федерации. Государственный доклад о состоянии и об охране окружающей среды Российской Федерации. [Электронный ресурс]. – Режим доступа: [https://www.mnr.gov.ru/docs/gosudarstvennye\_doklady/?PAGEN\_2=2 (Дата](https://www.mnr.gov.ru/docs/gosudarstvennye_doklady/?PAGEN_2=2%20(Дата) обращения: 4.05.2023). [↑](#footnote-ref-5)
6. WWF: из-за рубок Россия теряет полмиллиона гектаров первозданных лесов в год. [Электронный ресурс]. – Режим доступа: <https://clck.ru/34KhSe> (Дата обращения: 04.05.2023). [↑](#footnote-ref-6)
7. РосЛесИнфОрг. За 10 лет площадь лесов России увеличилась на 4,3 млн гектаров. [Электронный ресурс]. – Режим доступа: <https://clck.ru/34KkU2> (Дата обращения: 04.05.2023). [↑](#footnote-ref-7)
8. Forest Complex.ru. Руби — не хочу: сколько леса в России доступно для заготовки? . [Электронный ресурс]. – Режим доступа: <https://clck.ru/34Km7a> (Дата обращения: 04.05.2023). [↑](#footnote-ref-8)
9. Дороничев Д.А. Лесопромышленный комплекс: понятия, проблемы, перспективы – М; Статистика России, 2005. – С. 16 [↑](#footnote-ref-9)
10. Федеральное агентство лесного хозяйства. Лесные ресурсы. [Электронный ресурс]. – Режим доступа: <https://rosleshoz.gov.ru/>(дата обращения: 27.05.2022). [↑](#footnote-ref-10)
11. Федеральное агентство лесного хозяйства. Основные показатели по виду деятельности «Лесозаготовки»**.** [Электронный ресурс]. – Режим доступа: <https://rosleshoz.gov.ru/>(дата обращения: 27.05.2022). [↑](#footnote-ref-11)
12. Дороничев Д.А. Лесопромышленный комплекс: понятия, проблемы, перспективы – М; Статистика России, 2005. – С. 22. [↑](#footnote-ref-12)
13. Производство ДВП. [Электронный ресурс]. – Режим доступа: <https://mir-fanera.ru/stati/proizvodstvo_dvp> (дата обращения: 6.04.2022). [↑](#footnote-ref-13)
14. Britannica. Chemical products. [Электронный ресурс]. – Режим доступа: [https://www.britannica.com/science/wood-](https://www.britannica.com/science/wood-plant-tissue/Chemical-products) [plant-tissue/Chemical-products](https://www.britannica.com/science/wood-plant-tissue/Chemical-products) (дата обращения 28.04.2022). [↑](#footnote-ref-14)
15. Bioeconomy BW. Wood as raw material for platform chemical. [Электронный ресурс]. – Режим доступа: <https://www.biooekonomie-bw.de/en/articles/news/wood-as-raw-material-for-platform-chemicals> (дата обращения: 28.04.2022). [↑](#footnote-ref-15)
16. Food and Agriculture Organization of the United Nations. Natural Forest Management. [Электронный ресурс]. – Режим доступа: <https://www.fao.org/forestry/sfm/85084/en/>(дата обращения: 6.04.2022). [↑](#footnote-ref-16)
17. Конституция Российской Федерации. [Электронный ресурс]. – Режим доступа: <http://www.constitution.ru/> (дата обращения: 6.05.2022). [↑](#footnote-ref-17)
18. Нормативно-правовая база. [Электронный ресурс]. – Режим доступа: <https://klh.mosreg.ru/deyatelnost/vosproizvodstvo-lesov-i-lesorazvedenie/lesovosstanovitelnye-meropriyatiya/12-09-> [2016-16-59-28-normativno-pravovaya-baza](https://klh.mosreg.ru/deyatelnost/vosproizvodstvo-lesov-i-lesorazvedenie/lesovosstanovitelnye-meropriyatiya/12-09-2016-16-59-28-normativno-pravovaya-baza) (дата обращения: 6.04.2022). [↑](#footnote-ref-18)
19. Лесной кодекс Российской Федерации. [Электронный ресурс]. – Режим доступа: <https://rulaws.ru/Lesnoy-kodeks/> (дата обращения: 29.04.2022). [↑](#footnote-ref-19)
20. Правовед. Как взять лес в аренду. [Электронный ресурс]. – Режим доступа: [https://pravoved.ru/journal/kak-vzyat-](https://pravoved.ru/journal/kak-vzyat-les-v-arendu/) [les-v-arendu/](https://pravoved.ru/journal/kak-vzyat-les-v-arendu/) (дата обращения: 28.04.2022). [↑](#footnote-ref-20)
21. Российская газета. Кто в лесу живёт бесплатно. [Электронный ресурс]. – Режим доступа: [https://pravoved.ru/journal/kak-vzyat-les-v-arendu/](https://pravoved.ru/journal/kak-vzyat-les-v-arendu/%20) (дата обращения: 3.05.2022). [↑](#footnote-ref-21)
22. Срубить и посадить. Как устроено лесовосстановление в России. [Электронный ресурс]. – Режим доступа: <https://ecosphere.press/2021/12/24/srubit-i-posadit-kak-ustroeno-lesovosstanovlenie-v-rossii/> (дата обращения: 19.05.2022). [↑](#footnote-ref-22)
23. The World Bank. Statistics. Forest Area – Russian Federation. [Электронный ресурс]. – Режим доступа: <https://data.worldbank.org/indicator/AG.LND.FRST.ZS?locations=RU>(дата обращения: 19.05.2022). [↑](#footnote-ref-23)
24. Федеральный проект «Сохранение лесов» национального проекта «Экология» [Электронный ресурс]. – Режим доступа: <https://clck.ru/33jXZD> (дата обращения: 24.04.2023). [↑](#footnote-ref-24)
25. TimberTradePortal. Forest resources and context of China. [Электронный ресурс]. – Режим доступа: <https://www.timbertradeportal.com/en/china/28/country-context>(дата обращения: 20.04.2022). [↑](#footnote-ref-25)
26. Administrative map of China. [Электронный ресурс]. – Режим доступа: <https://www.nationsonline.org/oneworld/map/china_administrative_map.htm>(дата обращения: 13.04.2022). [↑](#footnote-ref-26)
27. Леспроминформ. Государственное и муниципальное управление лесами Китая. [Электронный ресурс]. – Режим доступа: <https://lesprominform.ru/jarticles.html?id=4302>(дата обращения: 15.04.2022). [↑](#footnote-ref-27)
28. 新华网。 我国森林面积达2.31亿公顷 [Электронный ресурс]. – Режим доступа: http://www.news.cn/2023-03/12/c\_1129428209.htm (Дата обращения: 04.05.2023). [↑](#footnote-ref-28)
29. 国家林业和草原局政府网. 中国自然保护地. [Электронный ресурс]. – Режим доступа: <https://inlnk.ru/ZZN0AJ> (Дата обращения: 04.05.2023). [↑](#footnote-ref-29)
30. Zhao, L.; Zhang, J.; Duan, R.; Xu, C. Development and Challenges of China’s Ecological Non-Commercial Forest Certification Policy. Forests 2023, 14, 214. https://doi.org/10.3390/f14020214. [↑](#footnote-ref-30)
31. Farooq TH, Shakoor A, Wu X, Li Y, Rashid MHU, Zhang X, Gilani MM, Kumar U, Chen X, Yan W (2021). Perspectives of plantation forests in the sustainable forest development of China. iForest 14: 166-174. - doi: 10.3832/ifor3551-014. [↑](#footnote-ref-31)
32. 中华人民共和国中央人民政府。国务院办公厅关于重点林区“ 十四五” 期间年森林采伐限额的复函。

[Электронный ресурс]. – Режим доступа: <http://www.gov.cn/zhengce/content/2021-02/09/content_5586306.htm> (дата обращения: 2.05.2022). [↑](#footnote-ref-32)
33. Timber Trade Portal. Overview of timber sector of China. [Электронный ресурс]. – Режим доступа: <https://www.timbertradeportal.com/en/china/29/timber-sector>(дата обращения: 3.05.2022). [↑](#footnote-ref-33)
34. Research 经贸研究. China`s Furniture Market. [Электронный ресурс]. – Режим доступа: <https://research.hktdc.com/en/article/MzA3ODY3OTk5> (дата обращения: 3.05.2022). [↑](#footnote-ref-34)
35. Renewable carbon. China Pulp & Paper Industry – Macro Policies and Challenges. [Электронный ресурс]. – Режим доступа: <https://renewable-carbon.eu/news/china-pulp-paper-industry-macro-policies-and-challenges/> (дата обращения: 4.05.2022). [↑](#footnote-ref-35)
36. CEIC. China Export: Paper & Paperboard. [Электронный ресурс]. – Режим доступа: <https://www.ceicdata.com/en/china/usd-export-by-major-commodity-value/export-paper--paperboard>(дата обращения: 4.05.2022 [↑](#footnote-ref-36)
37. CIFOR. Production and Standards for Chemical Non-Wood Forest Products in China. [Электронный ресурс]. – Режим доступа: <https://www.cifor.org/knowledge/publication/115/>(дата обращения: 4.05.2022). [↑](#footnote-ref-37)
38. Guide to Chinese Climate Policy. Forestry. [Электронный ресурс]. – Режим доступа: <https://chineseclimatepolicy.energypolicy.columbia.edu/en/forestry>(дата обращения: 4.05.2022). [↑](#footnote-ref-38)
39. Ministry of Ecology and Environment the People`s Republic of China. Forest Law of the People’s Republic of China. [Электронный ресурс]. – Режим доступа: [https://english.mee.gov.cn/Resources/laws/envir\_elatedlaws/202102/t20210207\_820735.shtml#:~:text=organization%20](https://english.mee.gov.cn/Resources/laws/envir_elatedlaws/202102/t20210207_820735.shtml#%3A~%3Atext%3Dorganization%20or%20individual.-%2CThe%20owners%20and%20users%20of%20forests%2C%20woods%20and%20forest%20lands%2Cforests%2C%20woods%20and%20forest%20lands) [or%20individual.,The%20owners%20and%20users%20of%20forests%2C%20woods%20and%20forest%20lands,forests%2](https://english.mee.gov.cn/Resources/laws/envir_elatedlaws/202102/t20210207_820735.shtml#%3A~%3Atext%3Dorganization%20or%20individual.-%2CThe%20owners%20and%20users%20of%20forests%2C%20woods%20and%20forest%20lands%2Cforests%2C%20woods%20and%20forest%20lands) [C%20woods%20and%20forest%20lands](https://english.mee.gov.cn/Resources/laws/envir_elatedlaws/202102/t20210207_820735.shtml#%3A~%3Atext%3Dorganization%20or%20individual.-%2CThe%20owners%20and%20users%20of%20forests%2C%20woods%20and%20forest%20lands%2Cforests%2C%20woods%20and%20forest%20lands) (дата обращения: 05.05.2022). [↑](#footnote-ref-39)
40. The Word Forest Organisation. Assessing China`s “Green Wall”: Lessons to the World on Afforestation. [Электронный ресурс]. – Режим доступа: [https://www.wordforest.org/2022/03/11/assessing-chinas-green-wall-lessons-to-the-world-](https://www.wordforest.org/2022/03/11/assessing-chinas-green-wall-lessons-to-the-world-on-afforestation/) [on-afforestation/](https://www.wordforest.org/2022/03/11/assessing-chinas-green-wall-lessons-to-the-world-on-afforestation/) (дата обращения: 19.05.2022). [↑](#footnote-ref-40)
41. XINHUANET. China to continue promoting afforestation, protecting forests: official. [Электронный ресурс]. – Режим доступа: <http://www.news.cn/english/2021-03/11/c_139803370.htm>(дата обращения: 20.05.2022). [↑](#footnote-ref-41)
42. China’s Natural Forest Protection Program: Progress and impacts. [Электронный ресурс]. – Режим доступа: <https://pubs.cif-ifc.org/doi/pdf/10.5558/tfc2017-017> (дата обращения: 24.04.2023). [↑](#footnote-ref-42)
43. China's Conversion of Cropland to Forest Program for Household Delivery of Ecosystem Services: How Important is a Local Implementation Regime to Survival Rate Outcomes? [Электронный ресурс]. – Режим доступа: [https://www.researchgate.net/publication/266080681\_China's\_Conversion\_of\_Cropland\_to\_Forest\_Program\_for\_Household\_Delivery\_of\_Ecosystem\_Services\_How\_Important\_is\_a\_Local\_Implementation\_Regime\_to\_Survival\_Rate\_Outcomes/link/5ac3219a0f7e9bfc045f4f9f/download](https://www.researchgate.net/publication/266080681_China%27s_Conversion_of_Cropland_to_Forest_Program_for_Household_Delivery_of_Ecosystem_Services_How_Important_is_a_Local_Implementation_Regime_to_Survival_Rate_Outcomes/link/5ac3219a0f7e9bfc045f4f9f/download) (дата обращения: 24.04.2023). [↑](#footnote-ref-43)
44. Counties benefit from Beijing-Tianjin sandstorm source control project. [Электронный ресурс]. – Режим доступа: <https://news.cgtn.com/news/2020-09-27/Counties-benefit-from-Beijing-Tianjin-sandstorm-source-control-project-U7wvmur4Zy/index.html> (дата обращения: 24.04.2023). [↑](#footnote-ref-44)
45. China’s Key Forestry Ecological Development Programs: Implementation, Environmental Impact and Challenges

[Электронный ресурс]. – Режим доступа: [https://www.researchgate.net/publication/348596789\_China's\_Key\_Forestry\_Ecological\_Development\_Programs\_Implementation\_Environmental\_Impact\_and\_Challenges](https://www.researchgate.net/publication/348596789_China%27s_Key_Forestry_Ecological_Development_Programs_Implementation_Environmental_Impact_and_Challenges) (дата обращения: 24.04.2023). [↑](#footnote-ref-45)
46. Towards a new paradigm: the development of China's forestry in the 21 st century. [Электронный ресурс]. – Режим доступа: <https://www.jstor.org/stable/43740361?read-now=1&seq=5#page_scan_tab_contents> (дата обращения: 24.04.2023). [↑](#footnote-ref-46)
47. Ukraine - EU and UK Sanctions – Update & Fifth and Sixth Packages. [Электронный ресурс]. – Режим доступа: https://www.londonpandi.com/knowledge/news-alerts/ukraine-eu-and-uk-sanctions-update-fifth-and-sixth-packages/ (дата обращения: 03.05.2023). [↑](#footnote-ref-47)