Forest complex in the system of economic security of the Russian Federation

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Abstract. Forests are an important component of the economic development of the state and people's livelihoods. They provide not only the needs of the economy for timber, food, but also perform important environmental functions related to the purification of water and air, soil formation, etc. At the same time, in many regions of the world, forest conditions are deteriorating, which determines negative socio-economic and environmental results, which violates the principles of sustainable forest management. The term “sustainable forest management” came into use in 1993, but questions still arise about how to put this concept into practice? The authors of the article concluded that the safety of socio-economic and environmental processes should become a prerequisite for sustainable development. It is economic security with the identification of threats and their further neutralization that can lead the forest industries to the path of sustainable development. Within the framework of expert assessments of the authors and analysis of domestic and foreign literature, four components of the economic security of the forest complex of the Russian Federation were identified: entrepreneurial, food, environmental and foreign economic. Threats to the economic security of the forest complex were characterized. The results of the study show the relationship between the components of economic security and the criteria for sustainable development of management. Meeting the criteria will contribute to the safe development of the forest complex of the Russian Federation.

1. Introduction

Sustainable forest management is expressed by a dynamic and evolving concept aimed at preserving and enhancing the economic, social and environmental values of all types of forests for the benefit of present and future generations. This approach has improved the quality of forest management in many countries, including through the development and implementation of forest management criteria and the use of more flexible forest management methods. However, not all issues of sustainable forest management are currently addressed. Thus, issues of irrational use of forests and the role of deforestation on climate change are considered in writings [1-4]. Attention is drawn to the fact that with climate change associated with rising temperatures, the risk of fires increases, which entails serious damage to ecosystems [5-7]. The role of fires in deteriorating human health is assessed [8]. The insufficient role of forests in providing the population with food is not neglected, especially in lean years when forest products come to the forefront in providing people with food [9-11]. Few works are devoted to the use of wood as thermal energy in terms of environmental sustainability [12-14].
Lack of attention to sustainable forest management questions the contribution of forests to environmental and food issues. Therefore, new approaches to forest management are needed and these approaches can be associated with the assessment of economic security as a necessary factor for sustainable development. The authors conclude that the transfer of forest management to the field of economic security will lead to the implementation of the concept of sustainable forest management.

2. Methodology
The purpose of this article is to characterize threats to the economic security of the forest complex of the Russian Federation. This required consideration of issues characterizing the content of economic security. According to the characteristics of the forest complex of the Russian Federation, the dynamics of indicators was selected. To analyze the indicators, qualitative and quantitative methods of analysis were used. Qualitative analysis methods based on expert assessments of the authors of the article made it possible to single out the components of economic security and substantiate the connection of criteria for sustainable forest management with the components of economic security of the forest complex of the Russian Federation. Quantitative analysis methods were used to assess the growth rate of indicators, express trends of indicators and use forecasting methods. The analysis of indicators allowed us to identify threats for each component of the economic security of the forest complex of the Russian Federation.

3. Economic security: definition and principles
The economic security Strategy of the Russian Federation for the period up to 2030 provides a more comprehensive picture of economic security - as a state of protection of the national economy from external and internal threats, which ensure the economic sovereignty of the country, the unity of its economic space, the conditions for the implementation of strategic national priorities of the Russian Federation [15]. Consideration of the problem of economic security of the forest complex of the country showed the lack of comprehensive research in this direction, which determines the relevance of this topic.

Security is based on a number of principles:
1) the observance and protection of the rights and freedoms of man and citizen;
2) legality;
3) systematic and comprehensive application of political, organizational, socio-economic, information, legal and other security measures by federal state bodies, state bodies of the constituent entities of the Russian Federation, other state bodies, local self-government bodies;
4) the priority of preventive measures in order to ensure safety;
5) the interaction of federal bodies of state power, bodies of state power of the subjects of the Russian Federation, other state bodies with public associations, international organizations and citizens in order to ensure security [16].

The above principles are basic for all types of economic security, including ensuring the security of branches of the forest complex.

4. The components of the economic security of the forest complex
The forest complex of the Russian Federation systematically includes a set of economic entities interconnected by economic and technological processes of forestry, logging and wood processing. The forest complex of Russia has unique characteristics. So, it accounts for more than 20% of the global forested area and more than 15% of the total world timber supply. However, the forest complex still does not play a significant role in the country's economy. It accounts for only 1.3% in gross domestic product (GDP), 3.7% in industrial production and 2.4% in the country's foreign exchange earnings [17]. The current situation is explained by a large number of factors determining the inefficiency of economic activity at the enterprises of the forest complex, which to some extent hinders the development of the Russian economy and reduces the level of its economic security [18-20].
Considering the forest complex as a system, one can single out the main components of its economic security:

- entrepreneurial;
- food;
- environmental (can be considered as an independent type of national security, but, in our opinion, is directly related to economic security);
- foreign economic.

Business security is considered as an opportunity for organizations (enterprises) to independently realize their economic interests if they meet the interests of ensuring the country's economic security.

Business security in the forest sector of the economy is expressed:

- ensuring the legal security of the enterprise;
- high qualification of employees of enterprises;
- the availability of technologies that allow you to create competitive products;
- ensuring profitable and stable activity of the enterprise.

Entrepreneurial activity in the forestry complex shows good dynamics in the growth of production volumes (Table 1).

| Table 1. Production of certain types of forestry complex products |
|---------------------------------------------------------------|
| Product                     | 2000 | 2005 | 2010 | 2015 | 2016 | 2016 as a percentage of 2000 |
| Logging, million m³          | 165.9| 185  | 175.5| 205.2| 213.8| 128.9                      |
| Sawnwood, million m³         | 20.0 | 23.9 | 28.9 | 41.0 | 42.6 | 213.0                      |
| Paper and cardboard, thousand tons | 5312 | 7448 | 7583 | 8196 | 8539 | 160.7                      |
| Chipboard, thousand m³       | 2335 | 3930 | 5466 | 6591 | 6573 | 281.5                      |
| Plywood, thousand m³         | 2777 | 2556 | 2689 | 3607 | 3759 | 135.4                      |

According to our estimates, in the coming years, the growth of lumber, paper and cardboard will exceed 3%, chipboard and plywood – 1%, which is associated with an increase in the consumption of these products.

At the same time, possessing significant reserves of forest resources, the Russian Federation for the production of finished products is significantly inferior to the leading countries of the world. For example, Russia produces paper and cardboard less than 10 times compared with the United States, Japan 4 times less, and Germany 3 times less. There are several reasons for this.

The main reason is the insufficiency and high depreciation of fixed assets of enterprises of the forest complex. Depreciation of most of them in the industry ranges from 70% to 80%. In the pulp and paper industry, only 5% of the main technological equipment corresponds to the world level, more than 50% require modernization, 45% – full replacement. The actual operating time of the main technological exceeds the standard by an average of 80%. The volume of input of new equipment and equipment is two times less than the retiring production assets. The share of products obtained with the use of advanced technological processes is less than one third, and in many of its types – less than 10% [21].

An actual problem in modern conditions of development is the insufficient level of investment in forestry industry. The amount of funds allocated for investments in the forest complex of the Russian Federation in 2018 amounted to 54.6 billion rubles, which is 3% less than the investments of 2012. To solve the promising areas of development of the forestry complex, an increase in the volume of funds is required, approximately by a factor of 2–3 [22].

The share of forestry enterprises that are engaged in innovative activity remains low – 8.4%. This corresponds to the level of the federal significance of innovation-oriented enterprises in the economic sectors, but does not correspond to the level of development of the modern economy.

The food component of the forest complex is associated with food products, which can be an important source of nutrition. Such products play a significant role as food stabilizers for people in both...
urban and rural areas. An important feature of this factor is the short cycle of reproduction of forest food products, which reduces food safety risks.

Forest food products in accordance with the Forest Code of the Russian Federation of the Russian Federation Article 34 include wild fruits, berries, nuts, mushrooms, seeds, birch sap and similar forest resources [23]. Forest foods are environmentally friendly, i.e. harmless to humans, as well as these products cover the lack of food in lean years. Despite the fact that the food reserves of the forest are huge, but they are used very little. Thus, the resources of wild berries are used for 3-5% of the operational reserves; pine nuts – up to 8%, mushrooms – up to 15%.

The main volumes of harvesting and processing of forest food products (up to 70%) are allocated to consumer cooperation. Procurement offices attributable to consumer cooperatives worked successfully during the Soviet era, but with the collapse of the USSR, many of them ceased operations. To date, forest harvesting centers have become 25 times less than in the early 90s of the last century. This significantly reduced the turnover of forest food. Therefore, the urgent task is to restore the number of procurement offices, but already on a new technological basis for processing harvested forest products.

The ecological component of the forest as an element of the economic security of Russia is that the forest, besides the source of wood and food, performs protective functions of the environment. This is reflected in the ability of forests to reduce the negative effects of natural phenomena, to protect the soil from erosion, to prevent environmental pollution, to help regulate water flow, to improve the health of the population, etc.

Forest functions as an object of environmental safety can be divided into three groups:

- environmental protection function protects water, air, soil, environment.
- the environmental function provides the ability to maintain and form the microclimate of the territories, which is necessary for the preservation and development of certain natural components;
- preservation of biodiversity ensures the creation of conditions for the preservation and development of biological (berry, mushroom, hunting, fish, honey) resources, the formation and maintenance of natural recreational areas.

The ecological properties of the forest depend on the geographical location and climatic conditions of the territories, hence the implementation of the ecological functions of the forest has territorial specificity.

Consider the factors that influence the ecological component of the forest.

Although the forest is a renewable resource, the cutting areas are not always covered by the volume of rehabilitation works. This leads to the complete destruction of forest vegetation, the collapse of forestry and the degradation of forest ecosystems. According to statistics, the annual area of clear cutting in Russia is approximately from eight hundred thousand to a million hectares, and forests are planted at best by 1/4-1/5 of the total area of deforested forests. If we take into account that some of the young plantings are dying due to the failure to perform in the necessary volumes of thinning in young plants, the situation with reforestation becomes even more critical.

Forest areas are being reduced due to illegal logging of forest plantations. In Russia, the scale of illegal logging reaches 4.1 thousand hectares per year (1.7 thousand hectares in the USA). According to statistics, the total amount of illegally cut wood for 2013–2016 amounted to 4.1 million cubic meters, and the economic damage caused by illegal logging reaches 30.8 billion rubles. The figures show that illegal logging creates a real threat to the forest complex in terms of environmental and economic security.

Significant areas are deforested in Russia as a result of forest fires. The emergence of fires contributes to: greater intensity of visits to forests by the population; proximity of settlements, climatic conditions, wind rose in the region and other factors. As a result of fires, large areas of forest are lost, causing the threat of negative deformation of forest ecosystems.

Figure 1 shows the dynamics of the number of forest fires in the Russian Federation over the period 2009–2018 and the predicted value for 2019.
Dynamics of forest fires shows a downward trend. The forecast for 2019 allows using the regression equation to give the number of forest fires in the amount of 8.8 thousand units. However, such statistics hide the size of the areas covered by fire, which in 2018 amounted to 3.2 million hectares, which exceeded the figure for 2010 by 1.7 times.

Along with fires, the forest areas that perform recreational functions, which affect the daily life of the citizens of the country, are lost, determine their way of life, recreation, and peculiarities of life.

Deforestation of forest areas due to illegal logging and fires has negative consequences associated with climate change; deterioration of the atmosphere; natural water quality; the occurrence of soil erosion; disappearance of some species of flora and fauna, etc.

Certain deficiencies are also characteristic of the foreign economic activity of the forest complex. The problems in the country with the production and use of logging products cause insignificant shifts in the export of forest products (Table 2).

| Table 2. Dynamics of exports of the main types of forest products from Russia for the period 2010-2017 |
|---------------------------------------------------------------|
|                  | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 | 2017 as a percentage of 2011 |
| Untreated timber, million m$^3$                             | 21.2 | 17.0 | 16.9 | 16.7 | 17.2 | 20.1 | 19.4 | 91.5                          |
| Sawnwood, million m$^3$                                     | 18.5 | 18.7 | 18.9 | 18.6 | 19.0 | 16.2 | 18.0 | 97.3                          |
| Glued plywood, thousand m$^3$                               | 1516.8 | 1527.3 | 1544.4 | 1560.2 | 1520.1 | 2460.0 | 2469.0 | 162.8                        |
| Wood pulp, thousand tons                                   | 1921.0 | 2068.5 | 2088.3 | 2095.7 | 2114.6 | 2147.0 | 2107.0 | 109.7                        |
| Newsprint, kt                                              | 2519.2 | 2540.0 | 2532.9 | 2540.6 | 2566.1 | 1062.8 | 1125.0 | 44.7                          |

A significant increase in export volumes occurred only for plywood (162.8%) and slightly for wood pulp (109.7%). Exports of other types of products presented in the table decreased. From this we can...
conclude that in exports there is an increase in products with higher added value. At the same time, it should be noted that the share of wood exports in the total volume of logging has decreased from 24% in 2007 to 8% in 2018.

Analysis of the structure of forest exports allows us to identify the following problems in the foreign economic activity of the forest complex of Russia:

- orientation to a foreign customer makes our forest industry completely dependent on the global situation in forest prices;
- the discrepancy between the possibilities of logging and the capacities of woodworking industries: the state of the material and technical base of most enterprises of the forestry complex, especially in the Siberian and Far Eastern regions, is close to critical. There is an acute problem of investment development, connected not only with the modernization of woodworking industries, but also with the active development of infrastructure, the construction of forest roads;
- insufficient competitiveness of Russian forest products of deep processing on the foreign market due to its low quality;
- insufficient sales practices of Russian suppliers under long-term contracts, inconsistency of actions in regional markets and, as a result, undervaluation of contract prices;
- the remoteness and multiplicity of places of shipment of timber, impeding control in domestic customs, which leads to a rapid increase in illegal logging;
- lack of reliable and timely information on forest exports. Information is not complete, «blurred» according to different sources, often incompatible units of measure are used [24].

The objectives of the development of export products include an increase in sawnwood consumption by 2020 by 16%, plywood by 80%, chipboard – by 50%, fiberboard – by 27%. World consumption of paper and paperboard will increase by 35% and in 2020 will reach 490 million tons against 362 million tons in 2007. In our opinion, the consumption of wood and paper products in Europe will exceed the production capacity, which will increase the deficit of forest products. The shortage of paper and cardboard will grow especially rapidly.

Russia can significantly increase its export potential. Its increase should occur due to an increase in the production of competitive types of forest products through the modernization and reconstruction of existing production capacities of forest enterprises. This will allow solving the national task of reducing the share of raw materials in the export of forest products and increasing the share of high-quality products that meet international requirements and samples.

5. Threats to the economic security of the forest complex

The conducted review of the components of the economic security of the forest complex makes it possible to identify the causes of negative trends under the influence of internal and external factors, identify threats, and assess their level using safety indicators.

The concept of “threat to economic security” is given in the Strategy of Economic Security of the Russian Federation for the period up to 2030 as “a set of conditions and factors that create a direct or indirect possibility of harming the national interests of the Russian Federation in the economic sphere”. The threat to economic security can be expressed according to different criteria, but any threat is complex because it has a multi-factor nature.

Let us highlight the threats to the components of the economic security of the forest complex.

Business Security Threats:
- low productivity of forest areas;
- insufficient development of capacities for deep processing of raw wood;
- high depreciation of fixed assets of enterprises of the forest complex;
- low level of investment in forestry production;
- low share of forestry enterprises engaged in innovation activities.

Food Security Threats:
- low level of harvesting and processing of forest food products.
Threats to environmental safety:
- insecurity of clear felling;
- illegal deforestation (corruption);
- the lack of effectiveness of the system of forest fire protection and protection;
- impoverishment of biodiversity when using forest resources.

Threats to foreign economic security:
- a low share of exported wood products in the total export volume of Russia;
- noncompetitiveness of forest products on world markets;
- low growth rates of export forest products.

The unstable state of the Russian economy increases the possibility of the appearance of external and internal threats, and the protection of the country's economy from them becomes the primary task of economic management bodies.

6. Criteria for ensuring the economic security of the forest complex

The elimination of threats to economic security in the forestry complex is connected, in our opinion, with the strict observance of the principle of sustainable forest management and forest management. The criteria for sustainable forest management in the Russian Federation were approved by Order No. 21 of the Federal Forest Service of Russia dated February 5, 1996. The criteria are linked to the economic security components of the forest complex of the Russian Federation (Table 3).

| Criteria for sustainable forest management in the Russian Federation | The components of the economic security of the forest complex of the Russian Federation |
|---------------------------------------------------------------------|----------------------------------------------------------------------------------|
| Criterion 1. Maintaining and preserving the productive capacity of forests. | Entrepreneurial Foreign trade Food |
| Criterion 2. Maintaining an acceptable sanitary condition and viability of forests. | Ecological |
| Criterion 3. Preservation and maintenance of protective functions of forests. | Ecological |
| Criterion 4. Conservation and maintenance of forest biological diversity and their contribution to the global carbon cycle. | Food Ecological |
| Criterion 5. Maintenance of socio-economic functions of forests. | Entrepreneurial |
| Criterion 6. Forest policy instruments for maintaining sustainable forest management. | Foreign trade Ecological Food |

Each of these criteria contains a set of indicators, which simplifies the task of assessing the components of the economic security of the forest complex of Russia.

In September 2018, by the order of the Government of the Russian Federation, the Strategy for the Development of the Forest Complex of the Russian Federation until 2030 was adopted [25]. The objectives of the Strategy are aimed at sustainable forest management, innovative and effective development of the use, protection, protection and reproduction of forests, ensuring the rapid growth of the forest sector of the economy, social and environmental safety of the country, unconditional fulfillment of Russia's international obligations with regard to forests. The strategy emphasizes the connection of the objectives of the development of the forest complex with the issues of economic security.
7. Conclusion
Currently, there are no comprehensive solutions for sustainable forest management, due to uncertainty in the conditions of their long-term development. The authors propose complementing and expanding the opportunities for sustainable forest management with economic security issues. Such an approach will allow us to timely capture the first signs of threats in various areas of the forestry sector, which will create the prerequisites for assessing and supporting decision-making in the field of sustainability. Further areas of research should be aimed at forming requirements for monitoring the results in order to detect negative factors and trends in the forestry complex of the Russian Federation. This task should be an important problem for forestry specialists in identifying ways for sustainable forest management.

References
[1] Curtis P G, Slay C M, Harris N L, Tyukavina A and Hansen M C 2018 Classifying drivers of global forest loss. Science. 361 (6407) 1108 DOI 10.1126 / science.aau3445
[2] Mansourian S 2018 In the eye of the beholder: reconciling interpretations of forest landscape restoration. Land Degrad Dev. 29 2888 https://doi.org/10.1002/ldr.3014
[3] Leblois A, Damette O and Wolfersberger J 2017 What has driven deforestation in developing countries since the 2000s? Evidence from new remote-sensing data. World Dev. 92 82 DOI 10.1016/j.worlddev.2016.11.012.
[4] Hull R B, Kimmel C and Robertson D 2016 Innovating solutions to deforestation: cross-sector collaboration in the Amazon. J. Entrepreneurship Organ. Manag. 5 172 DOI 10.4172/2169-026X.1000172
[5] Stevens-Rumann C S, Kemp K B, Higuera P E, Harvey B J, Rother M T, Donato D C, Morgan P and Veblen T T 2018 Evidence for declining forest resilience to wildfires under climate change. Ecology Letters 21 243 https://doi.org/10.1111/ele.12889
[6] Ferreira-Leite F, Bento-Goncalves A, Vieira A, Nunes A and Lourenco L 2016 Incidence and Recurrence of Large Forest Fires in Mainland Portugal. Natural Hazards. 84 1035 DOI 10.1007/s11069-016-2474-y
[7] Fischer A P et al. 2016 Wildfire risk as socioecological pathology. Frontiers in Ecology and the Environment. 14 276 https://doi.org/10.1002/fee.1283
[8] Adetona O, Reinhardt T E, Domitrovich J, Broyles G, Adetona A M, Kleinman M T, Ottmar R D, Naehler L P 2016 Review of the health effects of wildland fire smoke on wildland firefighters and the public. Inhalation Toxicology 28 (3) 95 DOI org/10.3109/08958378.2016.1145771
[9] Rowland D, Ickowitz A, Powell B, Nasi R and Sunderland T 2017 Forest foods and healthy diets: Quantifying the contributions. Environm. Conserv. 44(2) 102 DOI org/10.1017/S0376892916000151
[10] Powell B, Thilsted S H, Ickowitz A, Termote C, Sunderland T and Herforth A 2015 Improving diets with wild and cultivated biodiversity from across the landscape. Food Security. 7(3) 535 DOI org/10.1007/s12571-015-0466-5.
[11] Vira B, Mansourian S and Wildburger C 2015 Forests and Food: Addressing Hunger and Nutrition across Sustainable Landscapes (Cambridge UK: Open Book Publishers) DOI org/10.11647/OPB.0085
[12] Alcayde A, Montoya F G, Baños R, Perea-Moreno A-J, Manzano-Agugliaro F 2018 Analysis of Research Topics and Scientific Collaborations in Renewable Energy Using Community Detection. Sustainability. 10 4510 DOI org/10.3390/su10124510
[13] Fitzpatrick J J 2016 Environmental sustainability assessment of using forest wood for heat energy in Ireland. Renewable and Sustainable Energy Reviews. 57 1287 DOI org/10.1016/j.rser.2015.12.197
[14] Muizniec I, Blumberga D 2017 Wood resources for energy sector in Latvia. Is it a sustainable solution? Energy Procedia 128 287 DOI 10.1016/j.egypro.2017.09.076
[15] Strategy of Economic Security of the Russian Federation for the period until 2030 2017 (Decree of the President of the Russian Federation)
[16] Federal Law N 390 2010 of On Security (State Duma Moscow Russia)
[17] The forest sector of the Russian economy today and tomorrow, VI International Forum “Forest and Man”, available at: https://lesprominform.ru/jarticles.html?id=3037

[18] Antonova N E 2017 The transformation of the forest complex during the years of Russian reforms: the Far Eastern point of view. Spatial Economics. 3 83

[19] Bulgakova M A 2019 Theoretical and practical aspects of the economic security of the Russian forest industry. Int. J. of Economics and Business Administration VII (1) 426

[20] Pyzhev A I 2018 The forest complex of Russia through the mirror of the presidential decree in May: is it worth waiting for a breakthrough? J. of Economic Regulation 10 (1) 77

[21] Losev M V 2006 Forestry in Russia and its place in the global economy (Moscow: MGUL)

[22] State program of the Russian Federation Development of forestry for 2013-2020, available at: https://base.garant.ru/70644228/

[23] Federal Law N 200 2006 Forest Code of the Russian Federation (State Duma Moscow Russia)

[24] Oleynik E B 2011 Ways to improve the export forest policy of Russia Bulletin of the Pacific state economic university [Vestnik Tikhoookeanskogo gosudarstvennogo ekonomicheskogo universiteta – in Russian] 2 42

[25] The development strategy of the forest complex of the Russian Federation until 2030 2018 (Government of the Russian Federation)