An assessment of the contribution of forest sector to federal and regional fiscal budgets in Russia

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Abstract. The article deals with the problems of effective use of forest ecosystem resources. The purpose of the article is to quantify the socio-economic efficiency of forest management in the regions of Russia. The paper uses the methods of correlation analysis and spatial analysis with the use of Geographic information system technologies. The assessment of the socio-economic efficiency of regional forest management was carried out using the author's methodology. Several quantitative indicators are considered. The calculations allowed us to draw a number of conclusions. In the 2010-2019 period, these indicators in the east of the country, as a rule, are significantly lower than the national average. At the same time, revenues from regional forest management to the consolidated budget of the country in some regions are negative due to the return of the export value added tax. The federal government encourages the development of the forest sector, using the mechanism of Priority Investment Projects, providing significant benefits to large-scale investors. The analysis shows that in general, the Priority Investment Projects mechanism contributes to the development and modernization of the forestry in Russia, but it does not take into account some regional features and needs to be adjusted.

1. Introduction

The idea that Russia has such a large reserve of forest resources and that the possibilities to increase the logging are practically unlimited has long been untrue. Even in the regions of Siberia and the Far East, the territory of economically accessible forest areas is rapidly declining. The state of the timber stock is significantly affected by forest fires and climatic processes [1, 2]. Therefore, the task is to increase the efficiency of forest management, increase the contribution to the individual and collective well-being of citizens per unit of forest resources removed from the natural environment. Studies of scientists from different countries show that the success in solving such problems depends on the natural and socio-economic conditions of the regions [3-7].

Methodologically, our work is based on the principles of the green economy in accordance with the approach adopted by UNECE [8]. The idea is expressed there is to use the contribution to social and individual well-being for quantitative estimates based on the unit of the resource used and/or the unit of negative anthropogenic impact. This approach has been implemented in a number of articles [9, 10]. In this work, the author's methodology is used, which is presented in detail in [11]. The novelty of the work consists in its application to the spatial analysis of the heterogeneity of the indicators of the contribution
to the well-being of the regions of Russia especially for forest use and the analysis of relations with the export flows of forest resources.

In this paper, we continue our research within the framework of the methodology and approaches of the article [11], where this task is linked to the problems of the transition to a “green” economy. Since the publication of this work, Russia has continued to use economic incentives to create a high-tech economy based on forest resources, including within the framework of the Priority Investment Projects Program (PIP). The purpose of our work is to quantify the trends in the development of the Russian forest sector, including some of the results of the measures taken by the state regulation.

2. Materials and methods

The information sources of the work were data from the website of the Federal Tax and Customs Services, the unified interdepartmental information and statistical system. The approach described in detail in the paper [11] was used to assess the efficiency of forest resources use. It is based on the definition of the following indicators:

- **FBPr** – tax revenues to the consolidated federal budget from the type economic activity «Wood processing and production of wood products» per 1 m³ of harvested wood;
- **RBPr** – tax revenues to the regional budget from the type economic activity «Wood processing and production of wood products» per 1 m³ of harvested wood;
- **L** – the amount of wages of the timber industry employees from the type economic activity “Wood processing and production of wood products” per 1 m³ of harvested wood.

In addition we use correlation analysis for evaluate correspondence between volume of export and contribution of forest sector in federal and regional budgets. For spatial analysis, we use GIS tools. In addition, the methods of correlation analysis are used.

3. Results and discussion

The analysis involved only the “forest” regions, that is, those where there is a reserve of resources that allows for logging of at least 1 million cubic meters per year. In 2019, in 12 regions of Russia, revenues to the consolidated budget of the country from the “Wood processing and production of wood products” type of economic activity (TEA) turned out to be negative (table 1). This is due to the VAT refund to exporters.

In order to evaluate the results for the entire period from 2010 to 2019, the average FBPr indicators for 10 years were calculated. According to the FEA “Wood processing and production of wood products”, they were negative for 7 regions with high volumes of logging and exports. The calculation of the average FBPr for 10 years against income in the consolidated Federal budget and foreign economic activity “Manufacturing of pulp, wood pulp, paper, paperboard and articles thereof” changes the picture. There are only three regions with negative indicators. The spatial distribution of these indicators is shown in figure 1.

Figure 2 shows the distribution of the average annual tax revenues to the consolidated budgets of the regions from the type of economic activity (TEA) “Wood processing and production of wood products” and “Production of pulp, wood pulp, paper, cardboard and products made from them” per 1 cubic meter of harvested wood for the 2010-2019 period. The eastern regions with the largest reserves of forest resources fall into the two lower classes according to this indicator.

A very similar picture is observed in relation to the average annual salary, which characterizes the contribution to individual well-being for forest workers per 1 cubic meter of felled forest (figure 3).

Thus, the indicators of forest management efficiency in the east of the Russian Federation in the 2010-2019 periods were, as a rule, significantly lower than the national average. Both the scientific community and experts in the field of forest sector, express the opinion that the export orientation of the forest sector creates significant obstacles to its modernization. In the work [12], a number of rather convincing arguments were given in favor of this hypothesis. If we assume that the main goal of modernization is not to increase logging and exports, but to increase the economic return from each felled tree, then the proposed performance indicators can serve as quantitative characteristics of these processes. To identify the relationship between export indicators and the budget efficiency of forest
management (in relation to the consolidated federal (CFB) and regional budgets (RB)), a correlation analysis was performed by region. Figures 4 and 5 show its results. On the horizontal axis – the region's export revenues (in US dollars) per 1 cubic meter of harvested wood.

**Table 1.** Regions with negative budget flows by type of economic activity “Wood processing and production of wood products” in 2019.

| Name of the subject of the Russian Federation | Volume of harvested wood, thousand m$^3$ in 2019 | Receipts of payments to the consolidated federal budget of the Russian Federation in 2019 by type of economic activity “Wood processing and production of wood products”, thousand rubles |
|-----------------------------------------------|-----------------------------------------------|--------------------------------------------------------------------------------|
| Republic of Karelia                           | 7 696.50                                      | -206 849.00                                                                    |
| Arkhangelsk Region and Nenets Autonomous Okrug| 14 314.89                                     | -2 436 554.00                                                                  |
| Vologda Region                                | 16 927.10                                     | -835 615.00                                                                    |
| Kaliningrad Region                            | 245.50                                        | -112 246.00                                                                    |
| Novgorod Region                               | 2 705.80                                      | -832 260.00                                                                    |
| Republic of Bashkortostan                    | 2 951.02                                      | -553 321.00                                                                    |
| Perm Region                                   | 7 848.27                                      | -15 342.00                                                                     |
| Tyumen Region                                 | 1 351.75                                      | -2 113.00                                                                      |
| Krasnoyarsk Region                            | 25 594.94                                     | -1 139 153.00                                                                  |
| Irkutsk Region                                | 31 662.84                                     | -327 069.00                                                                    |
| Primorsky Krai                                | 4 129.10                                      | -16 199.00                                                                     |
| Khabarovsk Region                             | 7 618.70                                      | -671 969.00                                                                    |
| Total                                         | 115 349.91                                    | -7 148 690.00                                                                  |

Source: Rossstat, Federal Tax Service, authors’ calculations

**Figure 1.** Average annual tax revenues to the consolidated federal budget from the type of economic activity “Wood processing and production of wood products” and “Production of pulp, wood pulp, paper, cardboard and products made from them” per 1 m$^3$ of harvested wood (2010-2019). (Source: Rossstat, Federal Tax Service, authors’ calculations).
Figure 2. Average annual tax revenues to the consolidated regional budget from the type of economic activity “Wood processing and production of wood products” and “Production of pulp, wood pulp, paper, cardboard and products made from them” per 1 m³ of harvested wood (2010-2019). (Source: Rossstat, Federal Tax Service, authors’ calculations).

Figure 3. Average annual salary fund by type of economic activity: “Wood processing and production of wood products” and “Production of pulp, wood pulp, paper, cardboard and products made of them” per 1 m³ of harvested wood (2011-2019). (Source: Rossstat, Federal Tax Service, authors’ calculations).

In the eastern regions of Russia, whose timber products are still mainly exported to China, the efficiency of forest management remains much lower than in the regions of the European part of the country. In some cases, this difference reaches two orders of magnitude. Government support measures in the form of PIP are yielding positive results in terms of production and export growth, but so far they...
have not significantly influenced the efficiency of forest sector in terms of the concept of a «green» economy [8]: improving well-being per unit of resource used.

Figure 4. The ratio between the average annual revenues from wood processing and production of wood products to the consolidated federal budget of the Russian Federation per 1 m³ of harvested wood and the ratio of exports for the group of goods 44-49 wood and pulp and paper products, thousand US dollars to the volume of harvested wood, thousand m³ in 2015-2019. (Source: Rossstat, Federal Tax Service, authors’ calculations).

Figure 5. The ratio between the average annual revenues from wood processing and production of wood products to the consolidated regional budget of the Russian Federation per 1 m³ of harvested wood and the ratio of exports for the group of goods 44-49 wood and pulp and paper products, thousand US dollars to the volume of harvested wood, thousand m³ in 2015-2019. (Source: Rossstat, Federal Tax Service, authors’ calculations).
It is possible to note that there is some positive correlation between the export indicators, but it is weak. At the same time, it can be stated that the majority of regions with high export revenues (more than $ 50 per 1 m³ of harvested wood) have low budget efficiency in relation to the CFB.

To determine the relationship between state support measures in the form of PIP and budget efficiency, a correlation analysis was conducted for the budgets of the regions of Siberia and the Far East where such projects exist. The results showed a practical lack of correlation (figure 6).

The state encourages the development of forest sector, using the mechanism of Priority investment Projects, providing significant benefits to large investors [13, 14]. At the same time, the competitive environment is destroyed, and regional business initiatives often lose out to large “external” companies. This conclusion has been derived on the base of in-depth interviews with local rural communities and municipal administration. In the Khabarovsk Territory, where a significant share of forest resources was transferred for the implementation of 5 large PIPs, the negative budget balance has been observed since 2013, and the specific revenues to the regional budget are among the lowest. Thus, the country's budget actually subsidizes the region's forest production, while the state still grants the right to lease forest plots without competition and gives significant benefits for paying this rent. Similar effects are observed in some other regions with export orientations of the forest sector. Absence of correlation between the scale of forest cutting area for PIP and replenishment of regional budgets demonstrates week effectiveness of this mechanism for local population.

**Figure 6.** The ratio between the average annual income from wood processing and production of wood products to the consolidated regional budget of the Russian Federation per 1 m³ of harvested wood and the size of the estimated cutting area for priority investment projects thousand m³ in 2015-2019. (Source: Rossstat, Federal Tax Service, authors’ calculations).

### 4. Conclusions

The calculations showed that the trends noted in the work [11] have generally been persistent until 2019. There is still a high degree of unevenness in the distribution of indicators of budget efficiency of forest management. In most regions with large-scale logging and exports, there are low and even negative revenues to the CFB from forest management. Thus, the de facto timber industry complexes of these regions are subsidized from the budget of the Russian Federation. This cannot be considered as an insignificant shortcomings, since in total we are talking about wood harvesting of more than 115 million...
cubic meters and budget deductions of more than 7 billion rubles. These same regions are the largest exporters of timber from the Russian Federation. It should be noted that there is some positive relationship between the export revenues of the regions and budget efficiency. This relationship is stronger for regional budgets ($R^2 = 0.3192$), and much weaker for the CFB ($R^2 = 0.0395$).

The analysis shows that in general, the PIP mechanism contributes to the development and modernization of the forest sector in Russia, but it does not take into account some regional features and needs to be adjusted.

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