Drewno 2019, Vol. 62, No. 204
DOI: 10.12841/wood.1644-3985.307.02

Anastasiia GRINKEVICH, Larisa Sergeevna GRINKEVICH†, Samo BOBEK, Polona TOMINC

TAXATION OF THE USE OF FOREST RESOURCES: THE CASE OF THE RUSSIAN FEDERATION

Our research is driven by the fact that only a small part of the forest resources in the Russian Federation is economically effectively used. Therefore, the main contribution of this paper is the construction of a model for calculating forest rents, a model that includes elements for achieving efficient and sustainable forest management. The model is based on an analysis of the weaknesses of the existing forest management systems, the identified advantages of various existing methodological approaches, and consideration of certain specificities of forest wealth in the Russian Federation. The model is based on a calculated forest rent, which is, for the amount above the minimum rent, based on different determinants, both regionally specific as well as related to the specifics of the forest's uses, rate of utilization, sustainability of methods, forest reproduction and others.

Keywords: forest resources, Russian Federation, taxation, forest rent

Introduction

According to the FAO Global Forest Resources Assessment [FAO 2015], as at 2015, the world's largest forest territories are located in the Russian Federation: 815 million hectares, or 20.4% of the total forest area of the world (compared with 12% for Brazil, 9% for Canada, 8% for the USA and 5% for China). The total area of land in the Russian Federation (RF) on which forests are located, according to the State Forest Register's report as at 1 January 2016, amounted to 1184.1 million hectares, including 1146.3 million hectares of forest fund land, of which the area of reserve forests (RF forests that do not plan to harvest timber for twenty years) is 268.5 million hectares [Ministry of Natural Resources and Ecology of the Russian Federation 2016].

In terms of the stock of wood, Russia is second to Brazil, with 81.5 billion cubic metres or 15.4% of the world's stock, which is explained by the lower

Anastasiia GRINKEVICH (*tasya-g89@mail.ru*), National Research Tomsk State University, Tomsk, Russian Federation; Larisa Sergeevna GRINKEVICH (deceased March 2019); Samo BOBEK (*samo.bobek@um.si*), Polona TOMINC✉ (*polona.tominc@um.si*), University of Maribor, Maribor, Slovenia

forest cover (defined as the ratio of forest area to the total area of the country), amounting to 49.8%. For comparison, the forest cover in Brazil is 59% (96.8 billion cubic metres of wood), 67.3% in the Republic of the Congo, 65.4% in Zambia, 57.8% in Peru, 53% in Indonesia and 52.7% in Colombia [Filipchuk et al. 2017]. Russian regions are characterized by different areas of forest land, as well as forest cover. The highest levels of forest cover are found in the Irkutsk region (83.1%), the Komi Republic (72.7%) and Perm Krai (71.5%).

However, only a small part of Russia's forest resources is economically effectively used. Thus, the RF accounts for only about 6% of the world's official harvesting volume [FAO 2015] and 3% of the world timber trade.

There are several reasons for this situation in the forest sector, associated with the natural conditions on one hand and with the development of the economic system on the other. There is severe competition on the world market, with countries that have advantages due to more favourable composition of forest species, higher coefficients of forest cover, better developed infrastructure, greater processing and innovative technological processing of forests, and the cultivation of genetically modified forests. Additionally, there is extreme non--uniformity of forest locations in the RF – the most valuable logging areas are in hard-to-reach regions with severe climatic conditions, while at the same time the infrastructure development of the majority of logging areas is very poor, which increases the cost of products and reduces the attractiveness of investment in the sector. In addition, the low rate of natural forest regeneration also affects the attractiveness of investment. There is also a tendency in the RF for unfavourable changes in the composition and properties of the forests: the average stocks of wood per hectare are decreasing, and the average age of coniferous and mixed stands decreases with the active aging of soft-leaved forests, which results in cluttering, decay of forests, loss of technical qualities and deterioration of the overall sanitary condition. On top of this, the lack of an effective economic mechanism for stimulating forest use and forest regeneration increases the prevalence of illegal logging and undeclared exports of wood and timber products.

An important and concerning characteristic in the RF is a tendency for total costs of reforestation and forestry conservation to exceed the amount of proceeds from the use of forests (see Table 1). At the same time, the ratio of the fee rate per cubic metre to the cost of wood is about 3% (see Table 2), which is about 10 times less than in Canada and 26 times less than in Sweden. Also extremely low is the ratio of payments for the use of forests to the total amount of tax revenue under the consolidated budget of the Russian Federation, which is just 0.2% (see Table 3).

All of the above confirms the need for significant change in the organizational and economic mechanisms of forest resource management.

Table 1. Expenses and payments in the forestry sector for the Russian Federation in total for the period 2011–2015, in billion roubles [Rajmhen 2016]

Indicators	2011	2012	2013	2014	2015
Expenses[a]	28.9	32.0	34.8	36.8	34.5
Payments[b]:	21.6	22.6	23.2	25.4	26.5
– to the federal budget	16.3	17.0	17.4	19.1	19.6
– to the budgets of entities of the RF	5.3	5.6	5.8	6.3	6.9

a – Expenses for the development of forestry; b – Receipts of payments for the use of forests.

Table 2. Ratio of producer prices and rates of payment for harvesting of wood from forest stands in the Russian Federation, roubles per cu. metre [Rajmhen 2016]

	2011	2012	2013	2014	2015
Minimum rate of payment	33.3	32.2	31.3	32.5	34.6
Average rate of payment[a]	48.3	47.4	46.2	48.5	52.6
Average producer price:					
– for coniferous timber	1579.7	1600.5	1605.5	1752.5	1898.1
– contribution of the average rate[b]	3.06	2.96	2.87	2.77	2.77
– for hardwood timber	1568.5	1534.3	1412.8	1337.5	1568.9
– contribution of the average rate[c]	3.1	3.1	3.27	3.63	3.35

a – Average rate of payment for 1 cubic metre of harvested wood; b – Ratio of the average rate of payment for 1 cu. m of harvested wood to the average producer price for coniferous timber, %; c – Ratio of the average rate of payment for 1 cu. m of harvested wood to the average producer price for hardwood timber, %.

Table 3. Contribution of payments for the use of forests to the total amount of tax revenue under the consolidated budget of the Russian Federation in the period 2005–2015, in billion roubles [Finance of Russia 2017]

	2010	2011	2012	2013	2014	2015
Total tax revenues[a]	7695.8	9720.0	10959.3	11327.2	12670.2	13788.3
– of which receipts of payments for forest use	19.9	21.6	22.6	23.2	25.4	26.5
Contribution of payments[b]	0.26	0.22	0.21	0.20	0.20	0.19

a – Total tax revenue under the consolidated budget; b – Ratio of payments for forest use to the total amount of tax revenue under the consolidated budget, %

It should be noted that great expectations were attached to the enactment of the Forest Code of the Russian Federation [2006], under which, while maintaining the federal state ownership of forests, the management of forests was transferred to the level of the Russian federal subjects, and the

implementation of economic management, protection and regeneration of forests was transferred to forest lessees.

To date, it is clear that the introduction of the Forest Code has not improved the state of the forestry sector: the balance of relations in the forestry complex has been disturbed, and there is an accelerated depletion of profitable resources. It also failed to create a competitive market environment; the innovative development of the forestry sector is not stimulated; the sector remains unattractive for investment; there are elements of corruption and unreasonable preferences in the conduct of auctions or transfer of forests for rent; and the condition of the forests has deteriorated due to the poor performance of work on artificial forest regeneration by lessees, the absence of a regulatory list of forest protection and forest regeneration measures, etc.

There are several reasons for this situation: (i) In fact, only 30% of the country's forest fund is available for commercially profitable exploitation, so the remaining 70% is neglected [Zozulya 2011a]; (ii) Lessees have received unjustifiably wide discretion, including exemption from the legally established order of forest use that was historically fixed for state forests, and the right, at their own discretion, to create forestry development projects [Moiseyev 2016]; (iii) Commercial interests predominate in the actions of lessees (the most valuable forest areas that are closer to the infrastructure available in the region and do not require significant investment are cut down), and at the same time the cutting age of forests is altered, obsolete technologies are used, clear cutting is predominant and no cutting residues are used; (iv) the process of reproduction of forest areas and carrying out of forest conservation and regeneration work, mandatory for lessees, is poorly controlled, and the volume of investment in all types of forest protection and regeneration work is not sufficient.

Since it is obvious that the forest management system and the mechanism for its financial provision and stimulation in the RF require adjustment, this paper addresses four main objectives: (i) to analyse systematically the established approaches to the design and calculation of forest rent; (ii) to assess the current system of forest management and the related fiscal approach in the RF; (iii) to develop principles and approaches that will lead to sustainable, yet effective forest management; and (iv) to develop a model for calculating forest rents.

Approaches to the design and calculation of forest rent

The classical approach: the calculation of forest rent based on cost or on the reproduction approach

The classical approach involves the use of a cost basis or a reproduction approach. According to the cost approach, the rent is the net income received by the owner at the time of exploitation of forest resources, defined as the difference between the market price of the final product and the costs of its

production, considering a standard profit on capital [Bolshakov 2001; Eismont et al. 2002; Petrov 2002; Pochinkov 2004]:

$$R = P - C - Np$$

where: R is the value of the forest rent;
P is the market price of final forest products;
C is the costs of production and transportation of forest products;
Np is the standard profit.

The reproduction approach [Bolshakov 2001] further takes account of the costs of artificial forest regeneration. Thus, the forest rent is the residual value of the market price of the products sold, minus the costs of its reproduction and cultivation, as well as the production costs associated with harvesting wood and delivering it to markets, and minus the standard profits of economic entities for all of the aforementioned types of work [Tretyakov 2015]:

$$R = P - C - B - Np$$

where: B denotes artificial forest regeneration costs.

A distinctive contribution to the discussion on determining the amount of forest rent was the introduction of the concept of accessibility of forest resources [Tretyakov 2015]. It is stated that the development of forest resources (usually considered as wood resources, although the entire biomass of the forest – bark, branches, stumps – should be considered) makes economic sense if they are economically accessible. This is possible when the value of forest rent, r (forest rent per unit of resource), has a positive value and when the rent, r, is greater than B (costs of reproduction and protection of forests in exploited forest areas in accordance with the established requirements for sustainable forest management).

The approach based on the differentiation of absolute and differential rent

Absolute rent is the net additional income received from the exploitation of a natural resource, regardless of its specific quality characteristics; that is, a relatively guaranteed minimum rental income. Absolute rent arises only in a case when the market price is higher than the socially necessary expenses for the reproduction and protection of the natural resource (forest). For Russia, it is believed that the role of absolute rent for forest released for logging is performed by the established minimum rates.

Differential rent is an additional super-income. The possibility of obtaining this super-income depends on many factors, including specific selling prices, production and economic costs, characteristics of natural resources, etc.

The mixed approach to the calculation of absolute and differential forest rents has been applied in the Republic of Belarus [Neverov and Ravino 2000].

When calculating the absolute and differential rent, it is necessary to make differentiations in the calculation depending on the wood species, size categories, sales markets, and logging areas [Zozulya 2011a]. Differential rent of type I takes into account the following rental indicators: varieties available in the forest area, transport accessibility and sizes of forest areas. Differential rent of type II is created on the basis of more efficient use of exploited natural resources through the use of more advanced, innovative logging technologies, like ecological anti-rent, which is charged for predatory exploitation of natural resources (clear cutting of the best forest areas without their artificial regeneration).

The legislative framework in the RF

The legislative framework in the RF assumes the federal minimum rate (compulsory application of the established payment rates) and regional coefficients [Decree of the Government of the Russian Federation 2007].

Payment rates for a unit of forest resources are divided into two groups. The first group includes payment rates per unit of wood volume, taking into account the qualitative and quantitative characteristics of the resource: species (pine, spruce, fir, larch, etc.), wood merchantability (high, medium, low), and geographic location. The second group includes payment rates per unit of volume of non-timber forest resources (stumps, birch bark, pine paw, spruce paw, chat wood, etc.) and per unit of non-wood forest products (wild fruits, berries, nuts, seeds) and medicinal plants.

The differentiated payment rates apply to the types of activities conducted in the forest area: hunting, agriculture, research and educational activities, recreational activity, creation of forest plantations and their exploitation, growing of forest fruit, berries, ornamental plants and medicinal plants, use of forests to perform geological exploration work during the construction and operation of reservoirs and other artificial water bodies, hydraulic structures and specialized ports, construction, reconstruction and operation of linear facilities, processing of wood and other forest resources, performance of survey work, and growing of planting material of forest plants (young plants, seedlings).

An approach that considers the multifunctionality of a forest

A forest is a complex ecological-socio-economic biological system which simultaneously performs several functions: social, ecological, environmental, raw material. Considering the multifunctional importance of forest resources, it is proposed to apply a systematic approach to the calculation of forest rent. Thus, the total forest rent should be estimated taking account of: the environmental rent of the assimilated forest potential (water regulation, soil protection, carbon

reduction and other functions); the forest protection rent of the regeneration potential of forests (water protection zones, protective forests, especially valuable forestlands); forest raw material rent (harvesting of wood, secondary non-timber resources, utilization of non-wood forest products (collection and harvesting of berries, mushrooms, walnuts) [Puntzukova 2011; Pechatkin 2013]:

$$R = (P - C(1 + p)) + E + L$$

where: R is the forest rent;
P is the market price of final forest products;
C is the costs of production and transportation of forest products;
p is the rate of return;
E is the value of the environmental rent of the assimilation potential of forests;
L is the value of the environmental rent of the restoration potential of forests.

The value of the specific carbon reduction function of forests is proposed to be calculated as follows [Rincikova 2011]:

$$E_c = \sum \left(K_{ij} \cdot V_{ij} \right) \cdot P_c$$

where: K_{ij} is the coefficient of CO_2 absorption by forests consisting of trees of a certain species and age (i – tree species; j – tree age);
V_{ij} is the volume indicator for the area and stocks of forests consisting of trees of a certain species and age (i – tree species; j – tree age);
P_c is the price per tonne of CO_2 emissions on the carbon market in roubles/tonne.

The territorial–production cost approach

The calculation of forest rent payments for the release of forest for logging is based on a more detailed differentiation of costs by types of cutting, sales markets and other rent-influencing factors of the forest economic region and subregion: the volume of wood released, average values of stem volume, distance of hauling and transportation of wood to points of sale, commodity groups, directions of use (domestic or export), and others. This approach to the calculation of forest rent payments is ready for application and has been tested in the Republic of Buryatia [Puntzukova 2014, 2015]. In this case, the lowest and highest levels of forest rent were determined for each region, subregion and forest district. The average calculated rate of rental payment per cubic metre of forest released for logging was paid, but not lower than minimum rates approved by the Government of the Russian Federation [Decree of the Government of the Russian Federation 2007].

The most important advantage of this approach is the more detailed zoning and determination of costs and profitability, which makes it possible to consider the real values of differential rent and to determine the lowest level of absolute rent from the use of forest resources more objectively. The approach includes the following steps [Puntzukova 2015]:

1. Process of forest-economic zoning of forest areas:

1.1. Analysis of factors and conditions affecting the production of wood and calculation of forest rent in the region.

1.2. Division of the territory into forest economic regions and subregions.

2. Assessment of forest rental income:

2.1. Determining of weighted average prices of wood by forest economic region:

$$P_j^{\text{av}} = \frac{\sum_{i=1}^{m} d_{ij} Q_j P_{ij}}{Q_j}$$

where: P_j^{av} is the weighted average price of a pooled cubic metre of wood for forest economic subregions;

i is the number of the commodity group of the wood, $i = 1,\ldots,m$;

j is the number of the subregion, $j = 1,\ldots,n$;

d_{ij} is the specific weight of the i-th commodity group in the total volume of released wood in the subregion; is the volume of wood released in the j-th subregion;

P_{ij} is the price of the i-th commodity group in the j-th subregion.

2.2. Calculation of the normative cost of harvesting a pooled cubic metre of wood by forest economic region:

$$S_j^{\text{av}} = \frac{S_j^c Q_j^c + S_j^s Q_j^s}{Q_j}$$

where: S_j^{av} is the average costs of production and transportation of wood products in the conditions of the j-th subregion;

S_j^c, S_j^s are the costs of wood production in case of wood harvesting by clean and selective cutting;

Q_j^c, Q_j^s are volumes of wood released by clean and selective cutting.

2.3. Determination of standard profit per cubic metre of wood by forest economic region.

2.4. Calculation of forest rental income by forest economic region:

$$R_j = P_j^{\text{av}} - S_j^{\text{av}} \cdot (1 + p)$$

where p is the rate of return.

3. Determination of rental payments for forests released for logging:

3.1. Determination of the highest and lowest levels of payment rates per pooled cubic metre of wood.

3.2. Calculation of the average minimum rates for wood in medium-sized forest economic subregions.

3.3. Determination of the multiplying coefficient for the minimum rate level for wood.

3.4. Calculation of the average payment rate for forests released for logging by forest economic region.

3.5. Drawing up of a price list of rental payments.

An approach with differentiation of forest rent according to the stage of production of timber products (process stage)

It is proposed to determine the size of forest rent considering the stages of production and selling of wood products: a) when wood is processed into final consumption products and sold; b) when harvesting and selling round wood; c) when harvesting and selling forests for logging [Mezenina 2012]. It must be noted that the differentiation should be carried out according to the stages and specific cutting units.

When differentiating according to the process stages, the following stages are proposed: the first process stage is the harvesting of wood, the second is the physical transformation of wood, while the third is the chemical transformation of wood [Aslamov 2010; Mezenina 2012; Pyzhov et al. 2013; Tretyakov 2014]. The value of rent at the stage of processing of wood into final consumption products and its sale is calculated according to the equation:

$$r = \frac{P_0 - C_0 - i_0 \times K_0}{S} - C_1 - i_1 \times K_1$$

The value of rent at the stage of harvesting and selling of round wood may be calculated as follows:

$$r = P_1 - C_1 - i_1 \times K_1$$

The value of rent when harvesting and selling forests for logging is given by:

$$r = r_m$$

In the above formulae:

r is the value of forest rent;

r_m is the payment for forests released for logging received on the basis of the results of bidding for forest districts selected as analogues of the assessed district;

P_0 is the market FOB price of final wood consumption products (sawn wood, cellulose, paper, plywood, slabs, etc.);

P_1 is the market FOB price of round wood;

C_0 is the current costs of wood processing excluding the cost of wood raw materials, including depreciation and return of interest on loans;
K_0 is specific capital investment in processing industries (buildings, equipment, etc.);
s is consumption of raw materials (round wood) per unit of wood processing products;
C_1 is the current costs of harvesting wood and hauling it from the forest to the lower landing, point of sale or point of processing, including depreciation and return of interest on loans;
K_1 is capital assets (fixed and liquid assets) used in forest harvesting, including specific capital investment in the construction of hauling roads and hauling of wood from the forest;
i_0 is the rate of return on capital assets (fixed and liquid assets) in wood processing (or the capitalization ratio);
i_1 is the rate of return on capital assets (fixed and liquid assets) in forest harvesting.

The majority of researchers therefore argue that the size of payments for forest resources should be determined on the basis of the rental approach, while the methods for calculating and identifying rents and types of rental payments for forest use that are subject to withdrawal are different.

The current system of forest payments in the Russian Federation

According to the fiscal approach, the basic payment is currently a rent (in the USSR a stumpage fee was charged, while in the RF from 1991 to 2006 a forest tax applied). This is actually determined separately from the rent-forming factors (qualitative and quantitative characteristics of forest resources); multi--component forest use is not considered.

The procedure for establishing and collecting payments for the use of forest resources has been changed: the status of payments has been changed to non-tax, administration has been transferred to the federal executive body (Rosselkhoz), and the approach to setting payment rates entails the introduction of a federal minimum for payment rates and regional coefficients correcting their amounts upwards.

There are several disadvantages of the current system of payments for forest resources. Payments for forest resources are made when land is leased; as a result, other types of forest use and other functional benefits received by the community from forest resources are not assessed; rental payments are not based on the real value of forest resources. The minimum rates for the release of forest for logging are not differentiated within the forest taxation area; they do not consider the different quality and location of forest resources, market conditions,

or other regional natural and industrial conditions of their exploitation [Puntzukova 2015]. The method used (a method of averages in setting rates) contradicts the essence of rental payments, violating the proportionality and objectivity of the extraction of natural rent. The use of fixed rates is the initial mistake, since forest rent should be determined at the time of extraction of the resource and should depend on both general economic factors (the main one being prices for timber products) and domestic production and economic factors. Additionally, the lower limit of payment for forest resources is not sufficiently justified, and no upper limit is set. There is also no provision for a zero rent for loggers operating under the worst conditions [Zozulya 2011a]. Moreover, the regional component of rental payments usually lacks adequate environmental and economic justification. The analysis of rent-influencing factors within the forest taxation area is not carried out regularly, its results are not used as a basis for setting specific payment rates and rental rates, and at the same time the reliability of statistical rent-influencing data is extremely low (loggers' costs grouped according to economic elements, real incomes and the volume of work performed). On the other hand, low rates of payment for the release of forest for logging discourage the introduction of modern technologies in logging and wood processing and its integrated, waste-free use [Petrov 2013]. The current system is also characterized by the lack of a real mechanism for setting payments for other types of forest use (collecting berries, mushrooms, nuts, medicinal plants) by individuals. Also, the cadastre of forest resources requires adjustments. There should be a responsibility assigned for the application of the annual allowable cut, and, consequently, for the receipt of payments [Rudakov et al. 2009].

Results by issues

By synthesizing the results of the analysis and by comparing the developed methodological approaches, along with the shortcomings of the existing RF calculation system, we have developed a system of principles and approaches that would lead to sustainable, yet efficient forest management. On this basis we have developed a model for the calculation of forest rent. The system for improving compulsory payments for forest use in the RF can be classified in the following 15 postulates:

1. Calculation of payments for forest use based on forest rent.
2. Introduction of environmental and forest conservation rent into the system of payments for forest use.
3. A transition to the calculation of forest rent for all types of forest use based on the reproduction approach.
4. Maintenance of the approach by which the payment should consist of two components: the federal minimum, playing the role of absolute rent, and the regional component (with the obligatory normative fixing of a standard methodology for establishing regional adjustment coefficients).

5. Revision of the current amount of payments for forest use with more detailed links to quantitative and qualitative factors.
6. Use of normative averaged values: costs of forest harvesting (processing), realization prices, profitability of activity, and costs of reproduction of the forest areas used, which should be differentiated according to the methods of artificial forest regeneration.
7. Differentiation of rental payments according to the stages of production of forest products.
8. Calculation of payments for other types of forest use (conduct of hunting or forestry, leasing by oil and gas companies, geological exploration during construction and operation of reservoirs, etc.) based on environmental damage.
9. Introduction of additional payments for the recategorization of forest land and its transfer to other categories of usage.
10. Introduction of a mechanism for collecting payments for other types of forest use (collection of brushwood, wild plants, medicinal plants, etc.) based on licensing.
11. Establishment of rates of export duties to stimulate a greater degree of processing within the RF.
12. Replacement of payments for the main types of forest use with a forest tax, and payments for other types of forest use with charges for utilization of non-wood forest products [Zozulya 2011b], which also should have tax status. This will ensure the better administration of payments and accelerated introduction of information and IT into the accounting and control system in the forest sector.
13. Creation of a transparent, unified and complete information and statistical system [Lesekspert 2015] for accounting and control of the following indicators:
    – actual volumes of forest harvesting (for example, based on laser scanning, blazing and micro chipping using modern logging techniques – forwarders and harvesters with built-in on-board computers keeping accounts of harvested volumes);
    – technical and economic factors influencing the amount of forest rent: the stem volume, the yield of commercial wood, the stock of the stand, the distance of hauling, removal and transportation of wood to points of sale, commodity groups, the selling price, costs, profit, directions of use: domestic or export and others;
    – applied technologies of extraction (processing).
    Indicators should be determined in the context of forest taxation areas, subareas, forest districts and plots. Thus, the zoning should be based on quantitative (composition) and qualitative indicators of the wood (*bonitet* class, stem diameter, average height, age of the dominant wood species –

young stand, pole- -stage stand, ripening stand, ripe stand, declining stand – and the density and thickness of the stand).

14. In special cases (for example, difficult-to-reach, economically unprofitable logging areas, depressed areas, requiring socio-economic support), a special tax regime or agreement on the sharing of forest products should be applied.
15. Inclusion of incentive instruments (benefits, preferences) in the forestry payment mechanisms, aimed at increasing investment, favouring the use of lower impact and waste-free logging technologies, and encouraging innovations that would reduce wage costs and material capacity and provide an increase in the quality of reforestation.

The model proposed

Based on the conclusions presented, we propose the following approach to the design and calculation of forest rent:

1. Introduction of a differentiated forest tax (DFT):

$$DFT = AP + DR,$$

where: AP is the absolute rent per cu. m of harvested wood;
DR is the differential rent per cu. m of harvested wood.

$$AP = ZVK + EAK,$$

where: ZVK is the cost-reproduction component, including the cost of reproduction (restoration) of one cubic metre of the lowest grade species (for example, aspen) on average in Russia;
EAK is an ecologically assimilating component of this low-grade species per cubic metre of wood.

$$DR = ZVK \cdot K1 \cdot K2 + EAK \cdot K1 \cdot K2,$$

where: K1 is an increasing coefficient for other tree species;
K2 is a coefficient of regional cost differentiation.

In this case the differentiated forest tax is not considered as a forest lease fee. If the forest plot is leased and the lessee takes over the reproduction costs, then the cost-reproduction component should not be charged. If the lessee takes over only part of the cost of reproduction, this part is deducted from the cost--reproducing component. In addition, the lease agreement may specify other additional conditions for the lessee's activity, increasing payments: collecting wild plants, hunting, etc. Therefore, in the general case, both a differentiated forest tax and a forest lease fee must be paid.

Thus, the fiscal mechanism of forest use should become one of the most effective elements of a system of sustainable, efficient use of forests, and contribute to eliminating unnecessary crisis situations in the forest sector.

Conclusions

The most important result of this paper is the establishment of a model for calculating forest rents, a model that includes elements for achieving efficient and sustainable forest management. The model is based on an analysis of the weaknesses of the existing forest management system, the identified advantages of various existing methodological approaches, and consideration of certain specificities of forest wealth in the RF. The model is based on a calculated forest rent, which is, for the amount above the minimum rent, based on different determinants, both regionally specific as well as related to the forest's uses, rate of utilization, sustainability of methods, forest reproduction and others.

All four objectives of this paper have been fulfilled. The systematic analysis of established approaches and models for the calculation of forest rent, along with the assessment of the current system of forest management in the RF, has enabled us to construct a model for calculating forest rents, based on principles and approaches that will lead to sustainable, yet effective forest management.

References

Aslamov S.V. [2010]: Conditions of stable development of the "Forest Complex" ecological and economical system. Chita State University Journal 7 [64]: 4-10

Bolshakov N.M. [2001]: Methodology of calculation of rental payments in forest use. Forestry 1: 26-27

Decree of the Government of the Russian Federation [2007]: No. 310: Rates of payment for a unit of forest resources and rates of payment for a unit of a forest area under federal ownership (22.05.2007, amended 19.08.2017) [accessed 15.07.2018]. Available from: http://www.consultant.ru/document/cons_doc_LAW_68813/

Eismont O.A., Petrov A.P., Logvin A.V., Boske B.D. [2002]: Evaluation of forest rent and the efficiency of increasing rental payments in Russia. EERC, Moskow 59

FAO [2015]: Global forest resources assessment 2015, Food and Agriculture Organization of the United Nations, Rome [accessed 15.07.2018]. Available from: http://www.fao.org/3/a-i4808e.pdf

Filipchuk A.N., Moiseyev B.N., Medvedeva M.A., Kinigopulo P.S., Yugov A.N. [2017]: Comparative analysis of forests according to FAO global resources assessment 2015. Forestry Information 3: 75-91 [accessed 15.07.2018]. Available from: http://dx.doi.org/10.24419/LHI.2304-3083.2017.3.07

Finance of Russia [2017]: Data of statistical collections – Finance of Russia, Moscow. Official site of the Federal Service of State Statistics of the Russian Federation [accessed 15.07.2018]. Available from: http://www.gks.ru/wps/wcm/connect/rosstat_main/rosstat/en/statistics/publications/catalog/doc_1138717651859

Forest Code of the Russian Federation [2006]: No. 200-FZ of 4 December 2006 (amended 03.08.2018) [accessed 07.08.2018]. Available from: http://www.consultant.ru/document/cons_doc_LAW_64299/

Lesekspert [2015]: Recommendations for timber sorting and accounting No. 14 of 28 December 2015 in accordance with the federal law of December 28, 2013 N 415-FZ on the accounting of wood and transactions with it [accessed 07.08.2018]. Available from: http://lesexpert.info/415/14.pdf

Mezenina O.B. [2012]: Peculiarities of renting a forest plot and payment for the use of forest resources. Bulletin of the BSAU 1: 70-73

Ministry of Natural Resources and Ecology of the Russian Federation [2016]: State report, The State and Protection of the Environment of the Russian Federation in 2015. Moscow: Official site of the Ministry of Natural Resources and Ecology of the Russian Federation. – Electron.dan [accessed 15.07.2018]. Available from: http://www.mnr.gov.ru/gosdoklad-eco-2015/environmental-management.html.

Moiseyev N.A. [2016]: The crisis in forestry in Russia: the origins and possible ways out of it. Lesnoy Vestnik 3: 116-125

Neverov A.V., Ravino A.V. [2000]: Forest differential rent: methodology, methodology and practice of calculation. Bulletin of the Youth Scientific Society 4: 105-111

Pechatkin V.V. [2013]: Methodological and applied questions of the ecological and economic assessment of the forest potential of Russian regions. Regional economy: theory and practice 3 [282]: 49-54

Petrov A.P. [2013]: Economic organization of the use of forests in Russia in market conditions. Lesnaya Vestnik. 4: 42-45

Petrov A.P. [2002]: Rent payments are an effective mechanism for increasing the profitability of forest use. Use and protection of Russia's natural resources 3: 82-84

Pochinkov S.V. [2004]: A methodology for the rental valuation of woody forest resources. Forestry 3: 8-13

Puntzukova S.D. [2011]: Ecological and economic assessment of forest resources as a basis for sustainable forest management. Bulletin of the Buryat State University 4: 38-45

Puntzukova S.D. [2014]: Substantiation of the principles of forest resource rent formation in the region and the procedure for its calculation. Economic Recovery of Russia 1 [39]: 157-165

Puntzukova S.D. [2015]: The mechanism of rational forest management based on the evaluation of forest resource rent. Society: Politics, Economics, Law 6: 38-45

Pyzhov A.I., Zander E.V., Pyzhova Y.I. [2013] Assessment of forest rent in the Russian economy. Journal of Siberian Federal University. Humanities & Social Sciences 8: 1240--1248

Rajmhen E.A. [2016]: Assessment of the dynamics of incomes and expenditures in forest sector in the RF. Federal Forestry Agency [accessed 15.07.2018]. Available from: http://www.rosleshoz.gov.ru/finance/12/0/2016_10_26_prezentatciya_E_A_Rajmhen_stavki_platy.pdf

Rincikova O.Zh. [2011]: Boundaries of municipalities and fixing them on the terrain on the example of the Republic of Buryatia. Bulletin of the Buryat State University. Issue 4; Biology, Geography: 43-49

Rudakov M.N., Shegelman I.R., Makarihin A.V., Petukhov R.A. [2009]: Rent for the use of forest resources. Russian Entrepreneurship 6 [1]: 144-149

Tretyakov A.G. [2015]: Forest rent and economic accessibility of forest resources: methodological aspects. Lesnaya Vestnik 2: 153-160

Tretyakov A.G. [2014]: Modeling the conditions for economic accessibility of forest resources and the formation of an information base for its assessment. Lesotekhnichesky Journal 4: 241-249

Zozulya V.V. [2011a]: Methodology for the formation of a system of taxes and other mandatory payments for the use of forest natural resources. Doctoral Thesis, Moscow, 349

Zozulya V.V. [2011b]: Methodical support of the system of taxes and other mandatory payments for the use of forest natural resources. Tax Policy and Practice 2: 3-7

Acknowledgements

The research was carried out with the support of the bilateral research cooperation project BI-RU/16-18-037, financed by the Slovenian Research Agency.

Submission date: 5.10.2018

Online publication date: 2.10.2019