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Timber Industry Complex as a Bio-Socio-Economic System: The Development of Effective Methods and Forms of Management

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ABSTRACT

The emerging trends in the development of the forest sector of our economy do not allow expecting positive changes in the future, given the current macroeconomic conditions and the absence of government's clear action aimed at stabilizing the situation in the industry. The inconsistency of controlling of the timber industry development and the processes of state regulation of forest management in the region are among the causes of many problems in the industry. Consequently, the severity and the urgency of the problem related to effective ways of managing the forest sector of the economy as a bio-socio-economic system gave rise to this study. It contains theoretical-methodological and practical recommendations for the development of effective methods and forms of government of the forestry sector as a bio-socio-economic system that allows us to remove the existing contradiction between the high level of resource capacity and low level of management in the forestry sector. In particular, a method of assessing the quality of the forest sector of the economy management system's functioning has been developed. It is characterized by the use of indicators of the areas of the bio-socio-economic system. The theoretical foundations, conclusions, and practical recommendations make it possible to improve the management of the region's timber industry complex and ensure the most efficient use of forest resources. The proposed measures will lead to an increase in employment and the welfare of the population, reduce social tensions and promote sustainable socio-economic regional development.

JEL Classification: O35, L73, M10, K23.

Keywords: Management, forestry economy, conceptual model.

1. INTRODUCTION

Negative trends in the development of the forestry sector (low level of technical development, disparities in the territorial distribution of the productive forces, inadequate use of forest resources) are the main causes of the precarious economic situation of the industry.

The forest is a complex self-organized ecological system. The primacy of social, environmental, and especially global significance of the forest for the climate control and the conservation of biological diversity of the planet should dictate the need for the effective functioning of the forestry sector. Therefore, in the current economic situation, the public authorities should create the conditions for the taking of the forest sector out of the depression and the sustainability of its development. At the same time, the system of state regulation of development of the timber industry should to a maximum interact with the state regulation of forest management system.

The dispersion and insufficiency of measures of state regulation currently do not provide the establishment of the destroyed inter-sectoral and regional relations, reconciliation of interests at different production stages and sale of forest products sector.

The efficiency of the forestry sector of the economy is determined by the level of use of its raw potential that is provided by the management built on the approach to the essence of the forest sector as a bio-socio-economic system.

The relevance of the research subject is that the emerging trends in the development of the forest economics of the Bryansk region do not allow to count on positive changes in the future given the existing macroeconomic conditions and the absence of clear government action aimed at stabilizing the situation in the industry. The cause of many problems in the industry, as has been said before, is the inconsistency of controlling the timber industry development and the processes of state regulation of forest management in the region.

2. LITERATURE REVIEW

A large group of Russian scientists has dealt with problems of improving the methods of state regulation in the forestry sector of the economy. Research in this area was conducted by A.V. Antonov, N.A. Moiseyev, N.I. Kozhukhov, A.P. Petrov, V.N. Petrov, N.A. Medvedev, N.P. Moshonkin, A.P. Ivanov, M.B. Tatsyun, N.A. Burdin, P.T. Voronkov, V.V. Strakhov, A.I. Pisarenko, S.V. Pochinkov, A.I. Zakirov, G.A. Shmulev, V.L. Berestov and others. However, the native science has not yet developed a universal methodological framework in this direction. Only a small number of scientific papers are devoted to the complex research of the forestry sector and the problems of its state regulation at the regional level. At the same time, the interconnection between the processes of state regulation of forest management and the process of the monitoring of forestry development, especially at the regional level, have not been clarified in the majority of works.

3. OBJECTIVES, METHODOLOGY AND RESEARCH DESIGN

The aim of the study is to develop theoretical and methodical foundations and practical recommendations for the development of effective methods and forms of management of the forest sector treated as a bio-socio-economic system.

4. DISCUSSION OF THE RESEARCH OUTCOMES

The scientific novelty of the research is to develop and substantiate the theoretical and methodological foundations, scientific and practical recommendations to improve the Bryansk region timber industry complex management process as a bio-socio-economic system. This would allow us to resolve the existing contradiction between the high level of resource capacity and low level of management in the timber industry.

The practical significance of the work lies in the fact that the theoretical foundations, conclusions and practical recommendations proposed in it make it possible to increase the efficiency of management of the region timber industry complex and ensure the most efficient use of forest resources.

The role of the management as a particular kind of activity and the social institution of society is very important. A country can have all the resources for development, but the control system which is not based on the intellectual strategies of modern information and analytical base throws it backward.

Today in Russia there is an opportunity to develop the special social management which would provide a holistic view of the world. At the moment, the link between the forestry and wood production industry is being broken. Profit gains, regardless of any social and environmental factors, are becoming a top priority.

To overcome this situation, managers need to have a holistic nature-friendly thinking that allows to present and analyze a managed object as an integral phenomenon of activity in a changing environment, in the unity of elements and connections typical for this phenomenon. Such a vision of the object would reveal the causes of the difficulties in its functioning and development, would allow to correctly diagnose imperfections, and to plan recovery procedures.

The forest sector is a complex bio-socio-economic system which needs public administration based on models that take into account social, environmental and economic factors. Taking into account the main requirements for the integrity of the display, we propose a model shown in Figure 1.

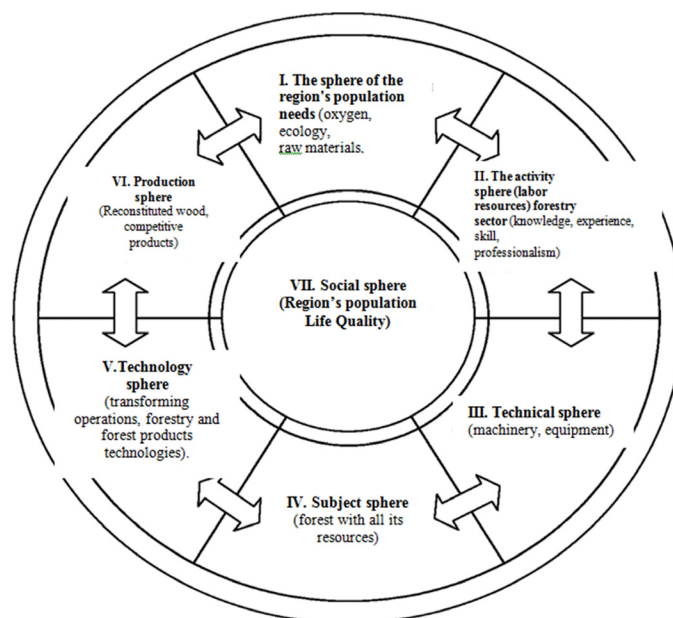


Figure 1: The forest sector as a model of the relationship between elements of bio-socio-economic system

The scheme below shows a «cross-section» of the bio-socio-economic system. The structure of this system can be represented as a «tree» which corresponds to the principle of nature conformity (Figure 2). The cut of the tree will correspond to the model shown in Figure 1 at any hierarchical level. The root system of the scheme represents resource-efficient organizations, the crown – processing ones. The bark is information, and the roots, the trunk, branches are linking structural elements. Arrows represent know-how, science, and education.

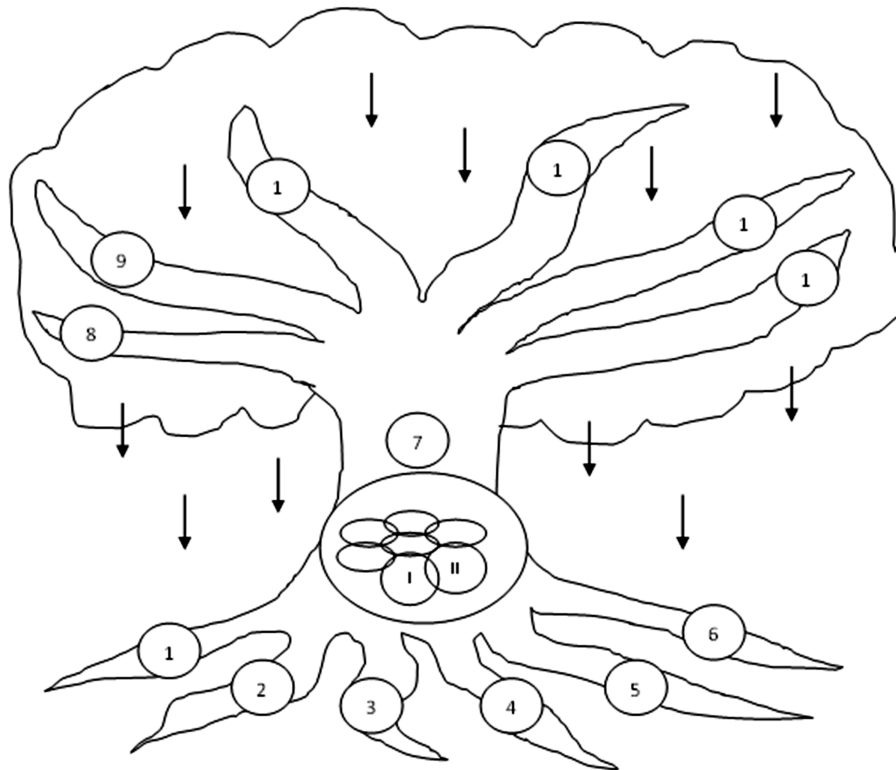


Figure 2: Conceptual model of management of the timber industry complex as a bio-socio-economic system

1 - 6 - forest resources, including 1 - coniferous wood; 2 - hardwood; 3 - mushrooms, berries, medicinal plants; 4 - hunting-forestry; 5 - recreation; 6 - phytomass, bark, stumps. 7 - management and organizational structure, 8 - an accounting of forest resources, 9 - timber processing, 10 - logistics 11 - forestry income 12 - planning for forest reproduction, 13 - finance for the reproduction of forest resources.

The conceptual model of the forest sector of the economy management shows the relationship between the object and the subject of a control system. The functioning of an integrated forest sector management system will be shown in Figure 3.

The input block “Management body” is the flow of applications for a certain type of use or resource of the forest object (management facility D). Consumers or users of forest resources (block “Users and Consumers”) are agriculture, water management, industry, energy, construction and other sectors. The motivation of requests makes it necessary to meet the needs of the material (wood, mushrooms, berries, furs) and non-material (aesthetics, recreation) forest goods (resources). Under the influence of the control (block “Management body”) is formed by the flow of control actions in the form of requests for satisfaction

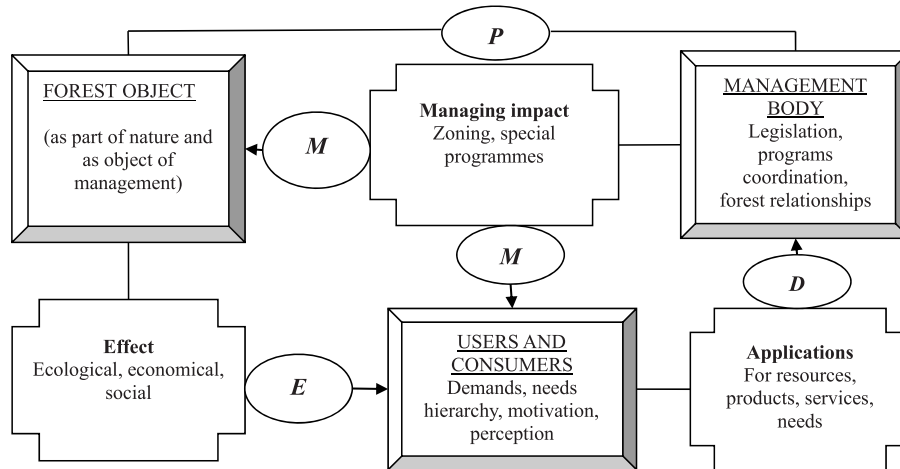


Figure 3: Logical model of management of the forest sector as a bio-socio-economic system

programs (M). As a result of natural processes in the forest and the control action to receive the resource output block elements “Forest object” will be characterized by a certain effect (E) on applications. At the same time, a stream of output elements (P) characterizes the information on the state of the forest object.

The proposed models are means of the more efficient use of resources and management of the forest sector as a bio-socio-economic system. They make it possible to take into account the interests of the forestry and timber industry. On the basis of the diagnostic use of natural resources and management capacity of the timber industry, a contradiction between the high level of resource capacity and the low level of management of the timber industry complex has been revealed. Bryansk region forests have a huge ecological and economic importance. Despite the significant raw material, financial, environmental and social potential the region’s wood resources are used inefficiently (Table 1).

Table 1
Indicators of the forestry sector in Bryansk region, in Russia in general and abroad

Indicators	Bryansk region	Russia	Canada	The USA	Finland	Japan
Territory, mln. ha	3,49	1707,5	922	916,4	33,8	37,8
Percentage of forest land, %	33	51,7	45,3	32,6	74,8	24
Forest area per person, ha	1	6	13,5	1,1	4,4	0,2
The share of timber industry in the total volume of industrial production, %	7,1	4,6	15,4	9,4	25,4	7,0
Manufactured products of timber industry per person, Rub	1385	933,1	22610,3	21358,7	41239,4	14355,6

Forest resources assessment and the analysis of trends in the development of Bryansk region forest economy have shown that most of the production sector of the economy is considered unprofitable. The general condition of the fixed assets of a timber industry complex is poor, and the level of utilization capacity of most productions remains low.

Higher incomes of forestry in market conditions can be achieved only on the basis of accounting and management of all types of forest resources, especially including secondary resources and by-products.

There is no doubt that the results are mainly determined by the control status. The increasing complexity of the socio-economic processes with the deepening division of labor, cooperation, application of new technologies, technical means, and presentation of higher consumer preferences require a qualitatively new management, a high level of intellectual activity and genuine creativity based on nature-friendly and holistic thinking.

The results of interviews showed that managers and specialists of the forestry economy of Bryansk region support market-income conception. The priority is to conquer the market and on this basis to increase the income of employees. Management improvement is in the last place. This is the main disadvantage of the existing conception because management factor's role and power are neglected. Management resource is fundamental in enhancing the profitability of the timber industry, as demonstrated by the data which served as the basis for developing a methodology for assessing the quality of the forest economy management system.

It is necessary for the control system to guide the labor potential in the direction of development of all types of forest resources, which is the task of the state because the departmental disunity and omnidirectional interests of organizations do not allow coordinating development of the forest sector.

While doing the research we conducted a survey among the population working in the forestry sector. People were offered to assess the level of indicators that form the basis of the effective functioning of the timber industry.

The research examined the following indicators: the level of consumer desires; level of knowledge, experience, skills and professionalism; level of technical security; the level of availability of raw materials (resource potential); the degree of compliance of processes and operations; the degree of the depth of processing; level of management (information security, decision-making).

Indicators of compliance of processes and operations, security knowledge, experience, skill, professionalism also have several connections with other components but the control indicator has more such ones. This quality is the most significant and important for the effective functioning of the timber industry.

Indicators relating to the management have a low value. Formed in vivo and interconnected indicators have a sufficiently high value. Consequently, management resources that are fundamental to improving the profitability of the forest sector of the economy are at a low level.

In the course of the research, we developed the priority measures to improve the efficiency of the use of forest resources and forest management sector of the economy of Bryansk region as a bio-socio-economic system. These measures allow us to take into account the interests of the forestry and timber industry.

The potential of the timber industry in the structure of Russia's national economy is significantly higher than its current level. The main task in the area of forest management is forestry transition from the subsidized into a cost-effective category, providing not only self-sufficiency but also a contribution to the national economy.

Despite the fact that it is in Russia where most high-quality types of wood in the world grow, Russia's domestic forest industry remains uncompetitive. The country grows a quarter of the world's forests, with up to 185 million m³ cut down yearly, a significant part of exports leaving as an untreated wood.

Since 1 January 2007, the new Forest Code has been in effect. However, the Code does not reflect the main problem of timber producers: how to organize industrial wood processing and recycling. It does not indicate whether the state will promote the construction of factories in Russia for processing softwood timber and whether it will interest the forest users to prepare not commercially valuable wood, but small-scale one, which we have in abundance. Each year Russia fails in cutting down about 200 million m³ of average growth, i.e. as much as is harvested today all over the country. The losses in logging are huge and sometimes reach 50%. A The Code overlooks the primary problem, not obliging forest user to harvest all the stumps, borings, and tops.

Despite the fact that the subjects of the Russian Federation enjoy considerable authority, they have no financial interest in the organization of effective forest management. There is a financial equalization of forestry through the federal budget which does not take into account the effectiveness of forest management in each region.

As part of the new Forest Code, forest enterprises are prohibited from having economic activity since all kinds of timber are assigned to entrepreneurial activity. Appropriate organizations will be established on the basis of existing processing plants. Separation of economic functions from management under the current forestries will entail their division into two structures with different organizational and legal forms: forestries - state unitary enterprises and forest districts - public institutions.

Proceeding from the above, the scheme of reforming of forestry production management structure and the state forest fund management can be represented as follows (Figure 4).

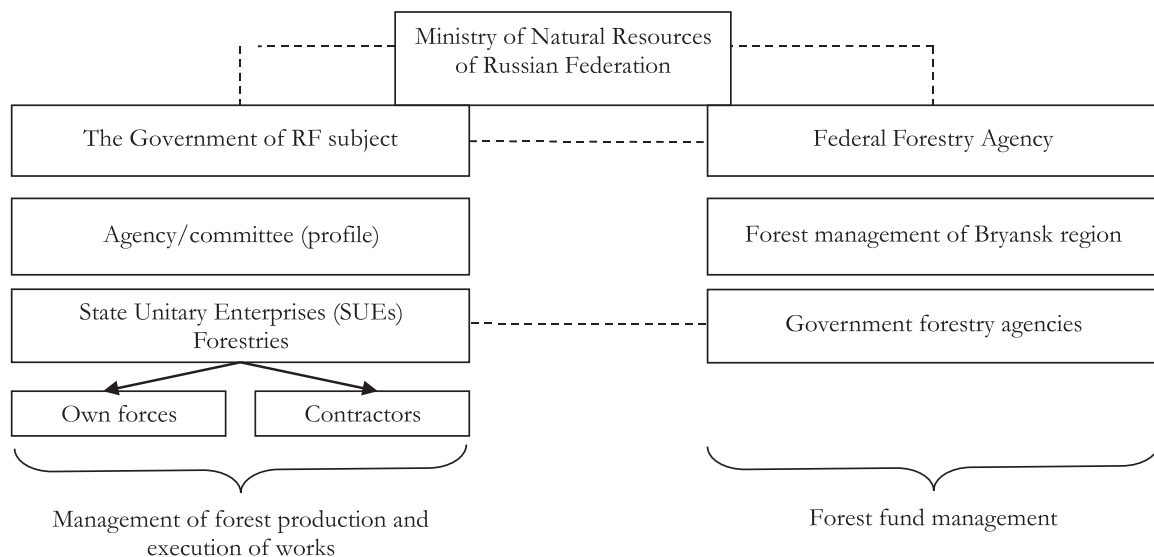


Figure 4: Scheme of reforming of forestry production management structure and management of the state forest fund

The main problem of the sector is the low profitability of wood processing which, in turn, is explained by the lack of capital investment. Small enterprises have no opportunity to save on production scales, to create effective logistic schemes. In order to survive smaller companies should unite and become stronger. It is necessary to strengthen the relationship between forestry, forest sector financing mechanisms, public forest institutions, and forest industry.

Improving governance is crucial to ensure the sustainable use of forests. Inefficient use of forests and forest income leads to the fact that their contribution to the economy is much smaller than the existing potential. The interest in the long-term conservation of these goods is lost. It is necessary to ensure a clear allocation of responsibilities, rights, and duties, the desire not to technical excellence, but to more action and simplicity.

In order to maintain high-plantations and prevent unwanted change of breeds, we need measures for the forest management structuring. The current economic situation in the region and the auction sale of forest stimulate logging operations in the most highly productive forests where the level of forest management is very low.

Timber recycling is not only processing of wood as a raw material: cutting technology, transportation, timber storage, sawmilling, i.e. wood processing, but also processing of secondary forest resources (cutting areas and woodworking waste); pulp and paper industry; furniture manufacturing. Moreover, it is harvesting and processing of non-wood products: tapping forest, complex processing of galipot, a small wood chemistry (processing of wood greens, pyrolysis of wood, hydrolytic production, tarring, charring), as well as non-timber forest use (harvesting of mushrooms, berries, medicinal plants, beekeeping).

In relation to the above, it seems appropriate to create the state unitary enterprises on the basis of the existing plants for the processing of wood, not in all forestries of Bryansk region but only in Dyatkovo, Klintsovsky and Navlinsk (Figure 5). These forestries are chosen on a territorial basis. Forest resources and the development of woodworking industry in these areas are also taken into account.

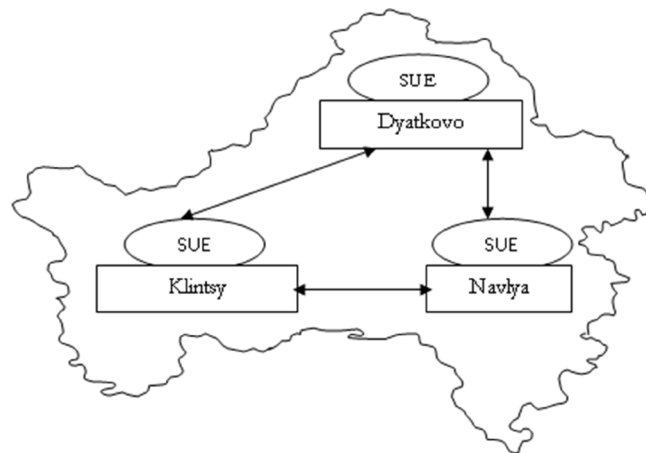


Figure 5: Scheme of the support frame of the forestry economy of Bryansk region on complex processing of forest resources

The state unitary enterprises will have to engage in the processing of wood harvested in all forest enterprises of Bryansk region, to cooperate with the furniture factories and with building companies, to carry out government orders. It is necessary to set up collection points for medicinal raw materials, berries, mushrooms and other such on the basis of all the forestries. Then non-timber forest resources should be sent for processing relevant enterprises. Selling of mushrooms and berries in the trading network at wholesale prices is beneficial to manufacturers. It is not expedient to organize the enterprises for processing of non-wood forest products on the basis of forestries because these companies already exist in the territory of the Bryansk region.

State enterprises need to provide the right and the opportunity to acquire the necessary equipment for the sustainable income-generation from government property. It is necessary to carry out the main forest use and industrial activities on the processing of forest resources into marketable products. That will significantly strengthen the financial position of workers and the financial position of forestries, which will beneficially affect forests management by forestry enterprises. On the basis of the proposed measures, we have calculated the economic efficiency of complex processing of forest resources (Table 2).

Table 2
Results of complex use of forest resources

<i>Potential of forest raw material</i>	<i>The possible result, thous. rbl. for 1 person</i>
Wood products	37,5
Wood waste from the harvesting and processing	11,3
Illiquid low-grade wood, old-growth plantings	0,9
Pine stands (subsidiary production)	1,1
Non-wood forest products	4,9
Softwood, low-quality wood, small-diameter trees	9,1
Softwood trees (mostly willow tree)	2,4
Total:	67,2

As a result of the measures proposed the cost of the forest sector products per capita could reach 67.2 thousand Rub. There will be changes in all elements of the bio-socio-economic systems between which there is a close harmonious relationship and interdependence which provides forest sector management efficiency.

The main directions of resource conservation in the forest industry are the rational use of wood raw material (which at the stage of harvesting of timber is expressed in the most efficient use of forest fund, reducing wood losses) as well as expanding the use and recycling of wood waste as a substitute for commercial timber, allowing to achieve tangible environmental benefits, consisting in reducing felled forest areas preserving the natural environment, etc.

Industrial and economic activity of the forest complex is closely connected with the problems of environmental and social functions of forests. Restriction on further increase in the volume of harvested wood raw material together with conservation and improvement of the forest environment as a part of the biosphere, with the need to increase the efficiency and the use of the biomass obtained at logging sites, require a reorientation of the entire complex to the resource-saving way of development.

This transition is possible only through the use of the cutting-edge achievements of science and technology, through the introduction of non-waste technologies, through the expansion of the use of secondary resources and waste products, through the development and use of labor potential of the forest sector.

5. CONCLUSION

Our research led to a number of evidence-based recommendations to ensure the development of effective methods and forms of management of timber industry complex as a bio-socio-economic system.

The research shows that the activities of the forest sector are based on the use of renewable natural resources – forests, an important ecological component of the human environment. Therefore, a prerequisite for the effective functioning of the forestry sector in the country and the region for the long term is to develop effective methods and forms of management of the forest sector as a bio-socio-economic system.

The estimation of forest resources and the analysis of trends in the development of timber industry complex of the Bryansk region have been made. It has been revealed that a large part of forest sector of the economy production is unprofitable. The general condition of the fixed assets of timber industry complex is unsatisfactory, and the level of utilization capacity of most production remains low. Based on the diagnostics of the use of natural resources (forests) and management capacity we found a contradiction between the high level of resource capacity and poor management of forest sector of the economy. Thus in Russia, there are 6 hectares of forest per capita, and the production cost is 933.1 Rub. per 1 person (in Bryansk Region - 1 hectare and 1385 Rub., respectively), while in Finland there are 4.4 hectares of forest per capita, and the cost of production for 1 person is 41239.4 Rub.

While doing the research we developed a method of assessing the quality of the forest sector management of the economy functioning which is characterized by the use of indicators of the areas of the bio-socio-economic system. It is concluded that the administrative resource which is fundamental in enhancing the profitability of the forest sector of the economy is at a low level. The effectiveness of administrative activity is manifested in the full use of all available resources.

The developed model of the concentration of the timber industry will increase the availability of credits for the sustainable development of the timber industry complex of the Bryansk region, will allow establishing an ongoing process of industrial activity; to develop the necessary measures to regulate the sustainable development of the forest sector; to coordinate the actions of public authorities, commercial and non-profit organizations that affect the sustainable development of the forestry sector; to significantly increase the effectiveness of control of dynamic development of the forest sector in the region. The realization of these measures will increase the cost of timber industry complex production in Bryansk region to 67.2 thousand Rub per capita.

The measures proposed will lead to higher levels of employment and well-being of the population of Bryansk region, as well as reduce social tensions and promote the sustainable socio-economic development of the region. The exploitation of forests can and must ensure a stable output of a wide range of forest products and by-products of forest use, to maintain ecological functions of the forest, to conserve biological diversity, to ensure the livelihood of people which largely depends on the managers and their ability to find the best way of use of regional forest resources.

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