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METHODOLOGY OF FORECASTING SCENARIOS OF EFFICIENT FOREST USE

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Abstract: *Due to the fact that the biological wood resourceful potential considerably surpasses the volumes of its use, methods of forecasting forest resources and timber products in the Russian Federation are based on the estimation of demand on the internal and external markets.*

It is determined that practically it means inevitable subordination of the supply of resources to the demand for them, but not vice versa as it happens in countries that are short of wood resources.

The conducted researches have shown that the demand for the timber products on the internal and external markets must

- *Define an efficient structure of the consumption of round timber according to the areas of its use,*
- *Determine an efficient structure of consuming end timber products taking into account factors of import replacement and substitution by products that are not made of wood,*
- *Define the volumes of wood and paper production in relation to the dynamics of macro-economic indicators, and*
- *Form a long-term strategy of allocating wood and paper production facilities taking into account their focus on the internal and external markets.*

The demand for timber products must be forecasted differentially for the internal and external markets as a consequence of the impact of various factors.

Forecasting of the demand for timber products taking into account the above factors is limited by the availability of true information and scientific analysis. As a result, the demand in the report is estimated on the basis of the expert estimations.

Keywords: *biological diversity, ecosystem, forest policy, forest services, "green" economy, habitat, monitoring, payment for ecosystem services, protective forest functions, recreation.*

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1. NTRODUCTION

The scenarios under consideration provide the modernization of basic woodworking enterprises. Medium density fibreboard (MDF) and oriented standard boards (OSB) will prevail in the structure of wood boards. Growth of the number of top priority investment projects in the Privolzhskiy, Uralskiy, Siberian, and Far-Eastern federal districts is anticipated.

Capacities will be constructed and put into operation at specific new paper mills in the European part of Russia and Siberia. They will focus on the comprehensive processing of low quality leaf wood and production of import replacing products. It will allow to decrease the import of paper and cardboard, and to achieve the positive balance in selling products of the pulp and paper industry.

In order to implement the moderate scenario, it is necessary to have new federal laws about industrial policy and new forest legislation. The scenario requires taking measures of state support in the form of taxation and investment privileges.

The production of new biological products with a high value added will essentially change the structure of the pulp and paper industry and its economic parameters.

During the first decade the generation of knowledge and stimulation of breakthrough technologies on creating liquid and solid biological fuels, pharmacological products, carbons, composite materials, and polymers will be of high priority. The second decade will be characterized by a high quality shift that will cause the change of the structure of producing and consuming products of the pulp and paper industry on the internal and external markets.

2. METHODOLOGY

These are basic methodic provisions that made up the basis for forming forecasting estimations, in particular:

- Methods of forecasting forest resources,
- Methods of forecasting forest products, and
- Scenarios to develop the forest sector.

Forest resources in the Russian Federation are forecasted on the basis of the forests state inventory (FSI). The model of forecasting calculations is based on the equation of the multivariable correlation where the forests productivity index (Y) is a function of the following factors:

- (X) – volumes of financing the forest sector according to years and scenarios,
- (Z) – climate changes, and
- (M) – restrictive factors.

Famous thermodynamic correlations of quants of photosynthetic active radiation (PAR) and CO_2 molecules absorbed by a green plant cell in the process of photosynthesis made up the basis of the methodology of model calculations of the state and productivity of forest ecosystems. When the total PAR topped the boundary of the plant cover and a share of its absorption by a leaf (green) mass, initial materials were taken from the NASA global base of satellite data. Above 3,000 trapezes were allocated for the whole territory of the Russian Federation. The specific data on them was calculated as for the area of 1,460 forest districts (Khashir 2015, pp. 1345-49; FAO, 2012).

Possible changes of climate parameters were estimated on the basis of references data. Ecological limitation included indicators of the relation of the total vapor to the sum of solids (E/P), as well as source and target streams of nitrogen (KN). It was assumed that if KN < 1, the territory of forests under research lacks nitrogen (Khashir 2015, pp. 1451-58; FAO, 2012. FRA-2015)

3. RESULTS

When forecasting the development of the forest sector, three scenarios are considered. They are inertial, innovational, and moderate ones.

The inertial scenario is based on maintaining the tendencies in the development of the Russian forest sector that were over the latest 20 years (1990-2010). It does not provide additional target measures of the state support of the forest sector development by increasing investments for modernizing and reconstructing productions. The inertial scenario is based on the supposition that the world financial crisis may continue. It takes into account the possibility of further increase in rates of natural monopolies for gas, electrical power, and railways transportation of forest cargoes. It does not provide for the growth of prices for wood and timber materials, and construction of new paper mills. The inertial scenario provides the development of the forest sector due to modernizing and reconstructing operating wood enterprises and implementing few top priority investment projects on constructing wood-sawing, plywood and MDF plants. In the international trade the export of round wood and lumber, as well as import of paper and cardboard will hold the dominating place. The inertial scenario is based on low tempos of the growth of basic macroeconomic indicators of the Russian Federation for 2010-2030. The current forest legislation provides for the using, protecting, securing and renewing forests (Khashir 2015, pp. 291 – 297; FAO, 2012. FRA-2015).

The moderate scenario provides for the transfer from the inertial to innovational scenario. The moderate scenario provides that the economy of the Russian Federation will entirely get out of the crisis in 2012-2015. In the future the tempos of the GDP growth will make up 4-4.5% per year, and in the second decade the growth tempos will accelerate.

The innovational scenario is based on the following pre-requisites:

- Industrial production, investments and salary grow of not less than 4% per year,
- New paper mills are constructed in North-Western, Uralskiy, and Siberian federal districts, part of them will be put into operation not later than in 2020,
- Current wood enterprises are technologically modernized on the basis of the breakthrough technologies including innovational construction wooden materials, and
- Wooden residential construction is developed in accordance with the "Accessible and Comfortable Houses for Russian Citizens" National Project by putting into operation 140 mln. m^2 per year, i.e. 1 m^2 per one citizen of the Russian Federation.

The use of nano-pulp is organized in the pulp and paper industry. The development of bio energy at woodworking enterprises will allow to meet own needs in power and heat supply (Khashir 2016, pp. 53-61; Bgane, et al 2016, pp. 85-89).

The innovational scenario provides target measures of state support for the development of the forest infrastructure and implementation of top priority investment projects. The scenario provides for the improvement of the structure of the external trade, decrease in the import, and increase in the export of products with high value added. It is supposed that the growth of problems related to stable development and global heating will contribute to the promotion of the Russian forest sector to the top priority areas of industry that are supported by the state in the form of taxation and investment privileges, preferences, and other tools.

The scenario provides for the modernization of basic woodworking enterprises. Medium density fibreboard (MDF) and oriented standard boards (OSB) will prevail in the structure of wood boards. It is anticipated to grow the number of top priority investment projects in the Privolzhskiy, Uralskiy, Siberian, and Far-Eastern federal districts.

Capacities will be constructed and put into operation at specific new paper mills in the European part of Russia and Siberia. They will focus on the comprehensive processing of low quality leaf wood and production of import replacing products. It will allow to decrease the import of paper and cardboard, and to achieve the positive balance in selling products of the pulp and paper industry.

In order to implement the moderate scenario, it is necessary to have new federal laws about industrial policy and new forest legislation. The scenario requires taking measures of state support in the form of taxation and investment privileges (Khashir 2015, pp. 643-49; FAO, 2014).

The production of new biological products with a high value added will essentially change the structure of the pulp and paper industry and its economic parameters (FAO, 2012; Bgane, et al 2016, pp. 53-69).

During the first decade the generation of knowledge and stimulation of breakthrough technologies on creating liquid and solid biological fuels, pharmacological products, carbons, composite materials, and polymers will be of high priority. The second decade will be characterized by a high quality shift that will cause the change of the structure of producing and consuming products of the pulp and paper industry on the internal and external markets.

4. DISCUSSION

Forecasting of forest resources of the development of the forest sector up to 2030 was also considered in three variants: inertial, innovational, and moderate. The data of national inventories of the forest from 1956 to 2010, as well as national data of the General European indicators of stable forests management (Forest Europe, 2011) from 1990 to 2010 were taken as the basis for forecasting calculations.

As Table 1 shows, the current dynamics of the indicator of the total area, deposit, and growth of forests of the Russian Federation tend to increase. However, the average deposit of timber per 1 ha and the average age of forest show a considerable decrease.

Table 1
Forest Dynamics of the Total Area, Deposit, and Growth of Forests of the Russian Federation

Year	*Area of lands covered with forest (mln. ha)*	*Total deposit (mln. m^3)*	*Average deposit (m^3/ha)**	*Growth (mln. m^3)*	*Net increment (m^3/ha)*	*Average age of forest stands (years)*
1961	695.4	77.5	111.0	789.2	1.13	98
1966	705.6	76.9	109.0	792.1	1.12	97
1973	729.6	78.6	108.0	821.1	1.13	96
1978	749.4	80.6	108.0	824.2	1.10	98
1983	766.6	81.9	107.0	838.6	1.09	98
1988	771.1	81.6	106.0	822.5	1.07	99
1993	763.5	80.6	106.0	822.1	1.08	98
1998	774.2	81.8	106.0	853.9	1.10	96
2003	776.1	82.1	106.0	886.7	1.14	93
2008	796.1	83.2	105.0	947.3	1.19	88
2010	797.4	83.4	105.0	1,016.1	1.27	82

* It is calculated for the area of lands covered with forest.

Dynamics and forecasting of the total area of forests of the Russian Federation up to 2030. The "Other Wooded Lands" (OWL) category included bushes and municipal forests.

The data for 2010 were corrected for FAO (FAO, 2010) and somehow differ from the national data that made up the basis for the forecasting up to 2030. According to the forecasting, the area of forests of the Russian Federation will increase by 0.9-1.5% by 2030 depending on the scenario. Table 2.

Table 2
Forecasting Forests Areas

Year	*Total area (thous. ha)*		
	Forests	*Other lands with forest timber species*	*Other lands with forest timber species*
2010*	817,544	73,300	890,844
2015	822,000	73,779	895,779
2020	825,000	74,237	899,237
2025	828,000	74,677	902,677
2030	830,000	74,730	904,730
2015	821,000	73,579	894,579
2020	825,000	74,237	897,349
2025	826,000	74,109	900,109
2030	827,500	74,175	901,675
Innovational			
2010*	817,544	73,300	890,844
1990	808,949	75,143	884,093
2000	809,268	71,606	880,875
2005	808,790	73,169	881,959
2010	809,090	73,220	882,310
Inertial			
2010*	817,544	73,300	890,844
2015	820,000	73,380	893,380
2020	822,000	73,460	895,460
2025	824,000	73,540	897,540
2030	82,0,00	73,620	898,620
Moderate			

* According to the data of SFR–2010.

According to the inertial scenario, the total deposit of timber will increase up to 83.3 bln. m^3 in 2030. The increase in the deposit as compared to 2010 will be 2.2%. The net annual increment of timber (NAI) will also increase from 1,016 mln. up to 1,094 mln. m^3/year.

The average age of forest stands and bushes has a stable tendency to decrease: from 82 years old in 2010 down to 78 years old in 2030. It will happen due to the increase in the area of young trees and expansion of forest. According to the European forecasting (UN, 2012), the average age of European forests (excluding forests of the Russian Federation) will decrease from 54 years old in 2010 down to 50 years old by 2030 according to the basic scenario, Table 3.

The real net increment of carbon in ecology is called net ecosystem production – NEP. Net ecosystem production is defined as a sum of the annual growth of lively and dead phytomass. On the level of all forests of the Russian Federation net ecosystem production is obtained approximately – by dividing the summary reserve of living and dead phytomass according to age groups without organics by the average age of forest stands (FAO, Country Reports; Bgane, et al 2016, pp. 53-69).

Table 3
Forecasting of Deposit, Growth and Average Age of Forest Stands and Bushes

Year	*Deposit of wood (mln. m³)*			*Net increment (m³/year)*	*Average age of forest stands and bushes (years)*
	Forests	*Other lands with the forest cover*	*Total*		
1990–2010					
1990	80,039	1,604	81,644	822	99
2000	80,270	1,593	8,186	854	96
2005	80,479	1,651	82,130	887	93
2010	81,522	1,775	83, 298	1,016	82
Inertial					
2015	82,800	1,840	84,640	1,045	81
2020	83,100	1,890	84,990	1,061	80
2025	83,224	1,940	85,164	1,078	79
2030	83,325	1,990	85,315	1,094	78
Moderate					
2015	82,921	1,845	84,766	1,046	81
2020	83,780	1,900	85, 680	1,063	80
2025	84,252	1,955	86, 207	1,091	79
2030	84,405	2,005	86,410	1,108	78
Innovational					
2015	83,022	1,850	84,872	1,048	81
2020	84,400	1,910	86,310	1,076	80
2025	85,200	1,970	87,170	1,104	70
2030	85,490	2,020	87,510	1,122	79

According to the inertial scenario, net ecosystem production in forests of the Russian Federation will increase from 611 mln. up to 655 mln. of carbon in 2030 with the net increment of 2.2 mln. t. of carbon per year. Without knowing the net ecosystem production, it is impossible to calculate the carbon balance of the region of country. It is recommended to include this indicator in tables of the FAO global estimation of forest resources in accordance with Table 4.

Table 4
Forecasting of Deposits and Growth of Carbon

Year	*Deposit of carbon on forest lands (mln. tons)*					*Average age of forest stands and bushes (years)*	*Clean ecosystem products (mln. tons)*
	Surface biomass	*Under ground biomass*	*Deposit of carbon on forest lands (mln. tons)*	*Dead trees and brushwood*	*Summary mass without soils organics*		
1990-2010							
1990	26,277	6,562	7,432	9,715	49,986	99	505
2000	25,936	6,521	7,328	9,600	49,385	95	520
2005	26,250	6,533	7,313	9,610	49,468	90	550
2010	26,250	6,620	7,525	9,725	50,120	82	611

(*contd...*)

(*Table 4 contd...*)

Year	*Deposit of carbon on forest lands (mln. tons)*					*Average age of forest stands and bushes (years)*	*Clean ecosystem products (mln. tons)*
	Surface biomass	*Under ground biomass*	*Deposit of carbon on forest lands (mln. tons)*	*Dead trees and brushwood*	*Summary mass without soils organics*		
Inertial							
2015	26,362	6,732	7,656	9,769	50,519	81	624
2020	26,479	6,759	7,686	9,807	50,730	80	634
2025	2,661	6,785	7,716	9,845	50,960	79	645
2030	26,682	6,811	7,746	9,883	51,122	78	655
Moderate							
2015	26,447	6,764	7,629	10,019	50,860	81	628
2020	26,684	6,825	7,697	10,109	51,315	80	641
2025	26,858	6,869	7,747	10,175	51,650	79	654
2030	26,968	6,898	7,779	10,217	51,861	78	665
Innovational							
2015	26,606	6,805	7,675	10,079	51,165	81	632
2020	26,938	6,890	7,771	10,205	51,804	80	648
2025	2,716	6,948	7,836	10,291	52,238	79	661
2030	27,286	6, 979	7,871	10,337	52,473	78	673

Table 5
Forecasting of the Areas of Forests Damage (thous. ha)

Year	*Destructive insects and forests diseases*	*Windfall and snow breakage*	*Forest fires*	*Total area of damages*
1990-2010				
1990	1,841	174	681	2,696
2000	5,909	508	1,267	7,685
2005	2,800	1,351	1,081	5,233
2010	4,293	378	2,500	7,172
Inertial				
2015	3,600	480	1,800	5,880
2020	6,000	500	3,000	9,500
2025	4,300	540	2,400	7,240
2030	6,600	600	3,600	10,800
Moderate				
2015	3,300	440	1,650	5,390
2020	5,500	450	2,750	8,700
2025	3,850	520	2,200	6,570
2030	5,150	550	300	9,000
Innovational				
2015	3,000	400	1,500	4,900
2020	5,000	400	2,500	7,900
2025	3,500	500	2,000	6,000
2030	4,500	500	3,000	8,000

In order to calculate the balance of carbon on the level of the whole biome of forests, it is also necessary to know the losses of carbon that took place as a result of fires, cuttings, in the epicenters of injurious organisms and forest diseases. However, carbon losses are calculated with a great level of indefiniteness and require further researches in this area (Fernholz & Kraxner 2012; Bgane, et al 2016, pp. 85-89).

Over the recent 40 years stable tendency has emerged in relation to the increase in the area of the forests damages and losses of forest resources caused by fires, injurious organisms and diseases. In 2010 the total area of the forests damaged by fires made up about 7.2 mln. ha. The dynamics of the fire of forest fires, epicenters of injurious organisms and forest diseases has a flexuous nature. It makes the process of forecasting extremely difficult, Table 5.

The decrease in the volumes and quality of forests regeneration makes up the real danger for the future. Over the recent two decades, the area of forest regeneration in the country has decreased almost twice, and 2.5 times by creating forest plants. Over the recent five years the area of forest plants has almost not changed and is about 17 mln. ha. By 2030 the annual areas of forest plants turned into lands covered with forests will increase from 180 thous. up to 220-280 thous. ha, Table 6.

Table 6
Forecasting of the Area of Regeneration of Natural Forests and Forest Plants

Year	*Natural forests (thous. ha)*	*Forest plants (thous. ha)*	*Forest lands (thous. ha)*	*Area of forest plants turned into lands covered with forest (thous. ha/year)*
1990-2010				
1990	796,298	12,651	808,950	430*
2000	793,908	15,360	809,269	402*
2005	791,827	16,962	808,790	250*
2010	792,099	16,990	809,090	181*
Inertial				
2015	802,060	17,940	820,000	190
2020	83,060	18,940	822,000	200
2025	804,010	19,990	824,000	210
2030	803,910	21,090	825,000	220
Moderate				
2015	802,984	18,016	821,000	205
2020	805,400	18,100	823,500	220
2025	807,825	18,175	826,000	235
2030	809,250	18,250	827,500	250
Innovational				
2015	803,900	18,100	822,000	220
2020	806,800	18,200	825,000	240
2025	809,700	18,300	828,000	260
2030	811,600	18,400	830,000	280

* Average value for 5 years

The concept of developing specifically protected natural territories of the federal importance for the period up to 2020 (Order of the Government of the Russian Federation, 2011) provides for the creation of 11 reserves, 20 national parks and 3 federal forests. In this case the total deposit of the timber that is available for procuring will decrease down to 62 bln. m^3 in 2030 according to the innovational scenario, Table 7.

According to the inertial forecasting, the net annual increment (NAI) of timber on lands covered with forest where it is possible to procure timber industrially will gradually decrease by 0.44 mln. m^3/year. By 2030 the volume of the increment will have decreased by 1%. According to the innovational forecasting, the net increment will have increased by 1% by 2030.

Since 2010 the permissible volume of extracting timber (the logging area under calculation) tends to increase with the annual trend of 0.85 mln m^3/year (Khashir 2015, pp. 1345-1349; Bgane, et al 2016, pp. 49-51)

According to the forecasting, the share of the calculated logging area from the net increment of forest stands in forest lands where it is possible to procure timber will have increased up to 77% by 2030.

Table 7
Forecasting of the Area, Supply and Growth of Forests Where it is Possible to Procure Timber

Year	*Area of forests with possible procurement of timber (thous. ha)*	*Share from all forest lands (%)*	*Deposit (mln. m^3)*	*Growth (mln. m^3)*	*Periodic yield (mln. m^3)*	*Share from the net increment of timber (%)*
1990-2010						
1990	698,527	86	69,114	833	570	68
2000	703,781	87	69,807	841	552	66
2005	690,978	85	68,756	849	571	67
2010	677,204	84	68,234	853	633	74
Inertial						
2015	670,297	82	67,700	853	640	75
2020	664,356	81	67,100	852	642	75
2025	658,416	80	66,500	849	647	76
2030	654,455	79	100	844	650	77
Moderate						
2015	671,287	82	67,800	855	660	77
2020	667,327	81	67,400	855	670	78
2025	663,366	80	67,000	854	673	79
2030	659,406	80	66,600	851	677	80
Innovational						
2015	672,277	82	67,900	857	680	79
2020	670,297	81	67,700	859	700	81
2025	667,327	81	67,400	860	704	82
2030	665,347	80	67,200	858	710	83

According to experts' estimates, in the zone that must be urgently reclaimed, the admissible annual volume of extracting timber in the Russian Federation is estimated in the amount of 390 mln. m^3, including on the area that are not rented – 200 mln. m^3, mainly in the North-Western (54 mln. m^3) and Siberian (40 mln. m^3) federal districts.

As the practice showed, the admissible volume of extracting timber (the logging area under calculation) in some areas of the extensive reclamation of forests is considerably overstated. It is necessary to calculate the *economically admissible* volume of extracting timber that will exclude forest stands with low deposit, as well as remoted areas of forests where it is possible to convert forest stands only after investing great funds in the development of transportation infrastructure.

At the present time the forest certification is widely spread in the Russian Federation. It is represented by two systems – Forest Stewardship Council (FSC) and the scheme of the Russian National Forest Certification Council (RNFCC) that was accredited in the international Program for the Endorsement of Forest Certification (PEFC). FSC scheme is the most wide-spread in Russia.

The first FSC certificates for managing forests and supplies chains were issued in Russia in 2000. By the end of 2011 the total area of forests where the forest management was certified according to the FSC scheme made up almost 30 mln. ha. According to this indicator the Russian Federation holds position 2 in the world after Canada. The total number of certificates (for forest management and supply chain) was almost 300. About 70 of them are forest management certificates (including 115 controlled timber certificates), and the rest of them are supply chains certificates. At the present time 177 thous. ha have been certified according to the PEFC system, and five certificates have been issued, including one for forests management. All five companies also have FSC certificates. Certified forests are located in 17 subjects of the Russian Federation. Their area is 26% of all forests of the Russian Federation leased out for timber procurement (FAO, 2010; FAO, 2012. FRA-2015)

Forecasting of the development of certifying in the Russian Federation up to 2030 is considered in three variants: *inertial, moderate, and innovational.*

Unfortunately, there is no information about procuring timber in the certified forests. In 2010 renters procured 123 mln. m^3 of timber out of 174 mln. m^3 according to all types of cuttings. It is possible to conditionally assume that the fourth part of the renters' logging according to the area and volumes accounts for the certified forests. It makes up about 30 mln. m^3 per year or about one fifth of all timber procurement in the country.

The largest areas of forests are certified in the European part of the Russian Federation. Forest territories certified in Siberia make up 23% of the whole area of the certified forests, and 13% in the Far East. Herewith, in the Far East an implacable growth of certified areas is observed.

The *inertial* scenario is based on maintaining the current tendencies of the development of certifying in the Russian Federation. The *moderate* scenario is related to the increase in the demand for the certified products on the part of ecologically sensible markets. The *innovational* scenario provides for the formation and growth of the internal demand for the certified products made of wood.

The inertial scenario is based on the following pre-requisites:

- Mainly export focus of the forest sector on ecologically sensible international markets,
- Wish of forest industrial and trading organizations to ensure their business by certification,
- Activity of Russian and international social non-governmental organizations (SNO),
- Availability of companies that have funds and opportunities for certification, and
- Overall compliance of the forest management system with international certification requirements. All these factors as aggregated provide the growth of the forest certification. No other industry of the Russian economy can be compared with the forest sector according to the coverage by international schemes of certification.

Certification allows to

- Increase indicators of forest management and environmental protection,
- Solve important social issues in the forest sector of economy,
- Improve the products sale and economic efficiency of forest companies, and
- Increase social and ecological responsibility of business.

Perspectives of voluntary forest certification are reflected in the following documents:

- National plan of actions on counteracting illegal cuttings,
- Strategies of developing the forest complex of subjects of the Russian Federation,
- Forest plans and forestry regulations of subjects of the Russian Federation, and
- Projects of reclaiming forests of subjects of the Russian Federation.

When maintaining the current tendencies, by the end of 2012 the area of forests certified according to FSC in the Russian Federation will have increased up to 32–33 mln. ha. By 2025 it is possible to expect the increment on the level of 3 mln. ha per year. In the future the tempos of increment may decrease, although the absolute increment shall be maintained.

In case of the moderate scenario the forest certification is based on the supposition of expending ecologically sensible markets. First of all, these are external markets of Europe, the USA, and China, as well as the internal Russian market. In this case Russia will maintain the current high tempos of the increment of the FSC certified areas (FAO, 2012; Bgane, et al 2016, pp. 49-51).

The forest sector of the Russian Federation is export-focused. According to the data of the Federal Customs Service, two thirds of all products of the Russian forest sector are exported. Only one third of the manufactured forest products accounts for the internal market. The greatest part of the exported wood accounts for the markets of economically developed countries. Thus, in 2010 the basic importers of the forest products in the Russian Federation included China (31%), European Union countries (21%), Egypt (5.5%), and Japan (4.3%).

Ecologically sensible markets increase around the world. According to polls, above 66% of Europeans are seriously concerned about the state of the environment. Above 80% of Japan consumers think that the environment is in a very bad state. In the USA and Great Britain 54% of buyers think that ecological stability is one of serious factors when taking decisions about buying goods. In spite of the financial crisis, above 1/3 of consumers are ready to buy "green" goods that are 5-10% more expensive.

Politicians who are responsible for purchases and work in a number of EU countries, Japan, and other countries play an extremely important role in the formation of forest products market. The list of these countries constantly increases. In the European Union the share of state purchases in the total volume of wood and paper-based products is 16-18%. For serious companies these facts are a sufficient basis for the certification.

At the present time in the Russian Federation the majority of the largest exporters of forest products are certified. All 10 leading Russian exporters of products of timber sawing and woodworking industry (whose share is almost 20% of export) have already got FSC certificates or are in the process of obtaining certificates. Among other 40 largest exporters with 20% of export, 24 companies also have FSC certificates. In the pulp and paper industry eight leading exporters that provide two third of products export have FSC certificates.

China is the main exporter of Russian forest that process wood on its territory and exports ready products mainly to the USA and EU countries. Thus, a considerable share of the Russian wood materials finally gets through China to ecologically sensible markets of these countries. Due to the demands of the American and EU markets, Chinese companies started demanding to supply certified products from the Russian Federation. It has already caused the interest to certification in the Far East and Siberia.

The European Union is going to enact New Regulations (No. 995/2010 dated October 20, 2010) since March 2013. They will stimulate further certification of Russian exporters in the North-West of the Russian Federation. Finnish companies are among

the leaders of PEFC certification in Europe. However, in Russia they prefer FSC standards. Harmonization of both standards (PEFC and FSC) is possible and reasonable (Khashir 2015, 643-649; International Standard Sectorial Classification of All Types of Economic Activity).

Japan is an important export market that demands certified products. Five basic Russian exporters to Japan whose share is above 1/3 of the Russian export have already been certified or are in the process of certification. Small exporters from the Russian Far East are gradually involved in the process of certification.

The USA consumes 13% of the Russian plywood export. Amendments to the Lacey Act bring in criminal responsibility for exporting products made of illegally procured wood to the territory of the country. Four companies out of five leading Russian exporters of plywood to the USA have FSC certificates. Their share in the export makes up 40%.

Innovational scenario anticipates an increase in the FSC certified areas due to the formation of responsible consumption of wooden products inside the country and maintenance of demand for FSC certified products on the internal market. According to this scenario, the certified area will make about ¾ of the forests leased out for forest procurement.

The Russian internal market is the main potential for FSC certified products. The first stage of the WWF and FSC campaigns on promoting FSC certified products on the internal market has already caused the certification of many manufacturers of forest products and raw materials suppliers. FSC certification will continue in the European part of the Russian Federation, mainly in the North-West. Regions of the Central Part of the Russian Federation and Povolzhye that are mainly focused on the internal market will be also certified. In Siberia and the Far East the certification will be gradually spread on neighboring regions adjoined to the current centers of certification (Amurskaya Region, Zabaikalskiy Krai, Khakassia, Altayskiy Krai, etc.).

Actually the only region of the Russian Federation where no forests were certified is the Caucasus. The export of this region focuses on Turkey (65%) and Azerbaijan (10%). The European Union and the USA that buy products from this region must become movers of certification in the Caucasus. Other Russian markets with a considerable part of flooring from the Caucasus will also stimulate certification in the region. During the nearest 2-3 years it is possible to expect the first FSC certificates in the Caucasus.

The Kaliningrad Region has not yet got FSC certificates. This region focuses on exporting to EU countries. The largest manufacturer in the region has got a FSC and supply chain certificate. However, the raw materials are mainly supplied from Siberia. It is expected that the adoption of new forest legislation by the European Union will cause the certification of forests in the region (Khashir 2015, pp. 53-61; 8].

In the Russian Federation the first campaign on promoting certified products started in 2009. It was initiated by the National Office of the Forest Stewardship Council (FSC) and WWF of Russia. For the nearest 20 years it is planned to regularly conduct campaigns on increasing the awareness of the FSC logotype among consumers of the final products.

The majority of examples of forest certification in Russia still come from Russian subdivisions of international companies that manufacture products with the FSC logo. First of all, they are manufacturers of certified paper packages and copy paper that now already make up about 50% of the whole Russian market.

The requirements of FSC certification of materials are stated in the standards of "green" construction:

- Method of assessing ecological efficiency of buildings (BREEM),
- Leadership in energetics and ecological design (LEED).

These methods are actively distributed in the Russian Federation. FSC certified timber and wood boards must become the basis for the "green" construction of houses and be highly demanded. This demand must rapidly rise. The demand to use FSC certified materials is included in the "green standards" of the Olympic Games 2014 in the city of Sochi.

The Government of Moscow and some subjects of the Russian Federation started forming the policy of ecological purchases focused on buying certified wood and wood and paper-based products. This process is actively spread to other regions of the country.

Expenses of countries for certification include two components: expenses for preparation and certification itself. These expenses are not net expenses for production. When preparing for the certification, companies improve forests management and bring it up to the world standards. The certificate is an obligatory requirement of the products access to ecologically sensible developed markets. It justifies certification in the long-term perspective (Fernholz & Kraxner 2012; Bgane, et al 2016, pp. 45-49).

The average price of services on forest certification is USD 0.15 per 1 hectare per year when certifying forest management, and the certification of supplies chain costs USD 2,000+. The price of certification depends on many factors, including the certified area, number, dispersion and remoteness of areas, composition of forests, etc. It is indicative that during the first years of certification in Russia the certification was considered to be justified when the area of forests was not less than 30 thous. ha. Later this threshold decreased. Now there are examples of certifying only several thousand hectares of forest. It is possible to expect that during the nearest years the areas that are less than a thousand hectares will be certified. Expenses for certifying decrease and will go on decreasing in the future. Competition of certifying bodies play an important role here. At the present time in the Russian Federation three-four auditing

companies provide certification services. However, about ten companies are accredited. More than half of them have obtained accreditation recently. It says about the perspective of the Russian market of certification services.

The competition will decrease the cost factor of certification services, and increase their volume and accessibility.

5. CONCLUSION

The demand for timber products must be forecasted on a differential basis for the internal and external markets as a consequence of the impact of various factors.

It is determined that for the internal market the demand is defined by the needs of the state and population. The volumes of the internal demand for timber products in the state sector are defined by the following factors:

- Programs related to budgetary areas growth,
- Growth of state purchases,
- Ratio of budgetary expenditures for purchasing timber products,
- Terms and conditions of state purchases, for example, the need in certification and import replacement, and
- Ratio of wood fuel in the structure of the fuel and power resources.

It is defined that the consumer demand for timber products is not of top priority as compared to the demand for food, clothes, footwear, medicine, education, leisure, and culture. The price of the minimum commodity bundle does not include the expenses for buying furniture, paper, and other products made of wood. The consumption of domestic timber products on the internal market can be complicated due to the entering the World Trading Organization (WTO) by the Russian Federation. Factors that define the consumer demand of the population for timber products include the following:

- Size of population,
- Gross domestic product per head,
- Average amount of real profits per head,
- Ratio of the price of timber products in the minimum commodity bundle, and
- Budgetary means to stimulate the demand for timber products.

The following factors have an impact on the forecasting of the timber products expert:

- Forecasting of consuming timber products on external markets,
- Ratio of the import from Russia in the general volume of consumption of other countries, and
- Impact of the WTO and certification of forests on lumber trade.

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References

Bgane, Yu.K., V.P. Zyza and A.V. Stiagun, 2016. Formirovanie kontseptsii sotsialno-ekonomicheskogo razvitiya lesnogo sektora [Formation of Concept of Social and Economic Development of Forest Sector]. Economy and Entrepreneurship, 1 (2) (66-2): 45-49.

Bgane, Yu.K., V.P. Zyza and A.V. Stiagun, 2016. Aspekty ekonomiki ekosistem v sfere uslug lesopolzovaniya [Aspects of Economy of Ecosystems in the Area of Forest Use Services]. Economy and Entrepreneurship, 1 (2) (66-2): 49-51.

Bgane, Yu.K., V.P. Zyza and A.V. Stiagun, 2016. Razvitie sfery prirodopolzovaniya i obespecheniya medico-ekologicheskoy bezopasnosti [Development of Area of Natural Resource Use and Provision of Medical and Ecological Safety]. Economy and Entrepreneurship, 1 (2) (66-2): 85-89.

Bgane, Yu.K., V.P. Zyza and A.V. Stiagun, 2016. Otsenka vliyaniya investitsionnyh protsessov na prirodnye sistemy [Estimation of Influence of Investment Processes on Natural Systems]. Economy and Entrepreneurship 1 (2) (66-2): 53-59.

Khashir, B.O., 2015. Organizational and Economic Mechanisms for Monitoring of Processes Ensuring Sustainable Development of the Forest Sector. BBRA - Biosciences, Biotechnology Research Asia, 12(2): 1345-1349.

Khashir, B.O., 2015. Economic Mechanisms of Competitiveness in Nature Management, Environment Protection and Ensuring Medico-Ecological Safety. BBRA - Biosciences, Biotechnology Research Asia, 12(2): 1451-1458.

Khashir, B.O., 2015. The Economic Value of Forest Ecosystem Services. Journal of Environmental Management and Touris. University of Craiova, Romania, VI 1(11): 291-297.

Khashir, B.O., 2015. Legal Aspects of Ecosystem Services Related to Efficient Forest Exploitation. Journal of Environmental Management and Tourism University of Craiova, Romania, VI 1(11): 53-61.

Khashir, B.O., 2015. "Green Economy" Ecosystems in the Forest Sector Services. "BBRA - Biosciences, Biotechnology Research Asia, 12(2): 643-649.

Mezhdunarodnaya standartnaya otraslevaya klassifikatsiya vseh vidov ekonomicheskoy deyatelnosti [International Standard Sectorial Classification of All Types of Economic Activity], 2016. Statistical documents of M Series, 4. New York, UNO. Retrieved September 2016 from http://unstats.un.org/

FAO, 2012. Prognoz razvitiya lesnogo sektora Rossiysoy Federatsii do 2030 [Forecasting of Developing Forest Sector of the Russian Federation up to 2030], 2012. Retrieved September 2016 from http://www.fao.org/

FAO, 2010. Glovalnaya otsenka lesnyh resursov - 2010 [Global Estimation of Forest Resources - 2010]. Retrieved September 2016 from http://www.fao.org/

FAO, 2012. FRA-2015. Terms and Definitions. Forest Resources Assessment Working Paper. Retrieved September 2016 from http://www.fao.org/

FAO, 2014. "State of World Forests". Retrieved September 2016 from http://www.fao.org/3/contents/1dcf0b9c-06b0-4fe6-b6b0-5f8bcc338edf/i3710e00.htm

FAO, Country Reports. Retrieved September 2016 from http://www.fao.org/

Fernholz, K. and F. Kraxner, 2012. Certified Forest Products Markets UNECE. FAO Forest Products Annual Market Review. Geneve, European Economic Commission of UNO. Retrieved September 2016 from http://www.fao.org/