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Trends of Development of Agroforestry and Food Forest Resources within the Substance of Environmental Economics.

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ABSTRACT

Use of agroforestry and food forest resources on an industrial scale, named earlier as NTFP, as scientific issues has long been known, as evidenced by a large amount of scientific papers on the subject. However, it is worth noting that for a long time, these problems more interested experts on forestry, or as maximum specialists in agriculture in general. Currently, the situation is somewhat different; this problem is becoming urgent for scientists and the profile of the food industry, which has a number of causes, the essence of which is presented in this paper. As the priority objective of the study authors put the analysis of the existing problems in Russia and in the world in matters of food agroforestry and forest resources in the environmental economics. On the basis of the study authors presented in this article the findings for systematization of a common set of problems in the sector of agroforestry and food forest resources in the environmental economics.

Keywords: biotechnology, policy, environmental economics, bioeconomics

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INTRODUCTION

Economic aspects of development of agroforestry and food forest resources field in Russia and in the world as part of scientific research in recent years has actualized [1]. The particular interest is the range of work here on the interaction with the partition of scientific knowledge as environmental economics [2-3]. The issues become even more relevant in the analysis of implementations of this kind of knowledge in the educational sphere of higher education, the real economy (industry), as well as in the financial sector [4-17].

METHODS

In the course of the work the authors used abstract, logical, deductive, inductive, monographic, economic and statistical research methods, on the basis of which holistic scientific conclusions on issues of agroforestry and food forest resources in the environmental economics were made.

THE MAIN PART

The concepts of agroforestry and food forest resources

If you start with definitions, the agroforestry and edible forest resources can be defined as "the concept of an industrial nature of activities in the forestry complex aimed at improving the conditions for agricultural purposes, or activities in agriculture aimed at increasing the volume of forest vegetation. The main methods of functioning of the concept is to build a different sort of shelter belts, steep slopes and sands, afforestation of gullies" and "the totality of forest agricultural products such as wild fruits, berries, nuts, mushrooms, seeds, birch sap" or in the total as "rural economic part of the forest complex of Russia."

Food forest resources are the final produced product, so at first the authors turned to the history of the question for the study of the subject. Food forest resources, as the term appeared in Russia in the framework of the Forest Code only in 2007. Until that time, the given totality of had a domestic name as wide-planted, and through formal regulations, the term was only a wide range of products under the name of NTFP.

To be precise in matters of history of the definition, this phrase was included in the scientific revolution in the 60s of the twentieth century, replacing outdated by the time "by-products of the forestry", which are so called as in scientific works since the nineteenth century. For the totality of these terms refer such by-products of the forestry sector as berries, nuts, mushrooms, medicinal and technical raw materials, furs and others. Since 2007, this totality has been divided into a set of non-timber forest and food forest resources within the framework of which to the first were considered - the stumps, birch bark, bark of trees and shrubs, twigs, twig food, spruce, fir, pine legs, spruce for the holidays, moss, forest litter, reed, cane and other similar forest resources, and the rest to food forest resources (FFR).

In this regard, analyzing the retrospective of the issue, you need to understand that its own separate history of scientific research for FFR does not exist. Researches in the use of non-wood products are relevant for the national scientific community from the 60-ies of the twentieth century. Since that time and to our days the main research centers on this issue were "The Russian Scientific Research Institute of Forestry and Mechanization of Agriculture (RSRIFMA), Russian Scientific Research Institute of Hunting and Farming (RSRIHF), Arkhangelsk Institute of forest and wood chemistry (AIFWC), Institute of Forests in Petrozavodsk (IFP) [18].

According to the calculations of research departments of these organizations average annual biological stock of wild berries in the forests of Russia to the mid-1990s was equal to 9.5 million tons of nuts - 2.8, 4.3 edible mushrooms, birch sap - 784.1 million tons. However, more than 72% of these reserves are located in the inaccessible Asian part of the country. Resources of medicinal plants in the forests of Russia at that time were also significant, but their calculation was not made, and this is despite the fact that today more than 40% of medicines are made from plant materials, including growing in the forest, and a large number of forest plants, honey plants provide a reliable food base for beekeeping.

Modern state of forest food resources

Current status and prospects of use of non-timber forest resources today as holistically and systematically submitted to analysis in the modern scientific literature [19]. In the article "State and perspectives of the use of non-timber forest resources" of the noticed collection an employee of the of All-Russian Research Institute of Forestry and Forestry Mechanization B.M. Bolshakov formulates that despite the fact that the holdings of major types of food forest resources are considerable, they are not massively used at the same time, in particular: berries only 3-5% of operational stocks; pine nuts - up to 8%, mushrooms - about 15% .At the same time, the annual output from the sale is more than 4 billion rubles. The distribution of these types of stocks of resources is not spread through the whole territory of Russia, more than 80% of their focus today in the Asian part of the country (Table 1).

Table 1: The distribution of the main types of food resources by federal districts of the Russian Federation

Type of resource	The biological reserve, thousand tons							
	The Russian Federation	including federal districts						
		Central	North-Western	Volga	South and North-Caucasus	Ural	Siberian	Far Eastern
Wild berries	8 840,5	98,3	923,5	274,2	–	2 101,0	4 257,2	1 186,3
Nuts:	3 519,9	–	0,8	0,4	–	184,6	1 048,2	2 285,9
Cedar pine	991,5	–	0,8	0,4	–	184,6	727,5	78,2
Cedar elfin	2 528,4	–	–	–	–	–	320,7	2 207,7
Mushrooms	4 325,4	81,2	497,4	153,5	–	314,5	1 089,6	2 151,7

A considerable part of the collected raw materials are used by the population to meet personal needs, some are purchased for industrial processing. In addition, food forest resources are promising for export. Demand for them in foreign markets is constantly growing. According to the Federal Customs Service, in the largest volumes are exported pine nuts (10-12 ths. tons), blueberries (up to 13-15 ths. tons), cranberries (3-5 ths. tons), cranberries (2-3 ths. tons), bracken (2 ths. tons) and fungi (2-3 ths. tons). In the export of mushrooms the first rank belongs to white (40-60%) and chanterelles (30-45%). Such complex for harvesting and storage, but delicious wild berries like raspberry (1-2 m) and cloudberries (about 1 ths. tons) are exported. And it can't be said that in previous decades, the situation was much better, especially in the 70s of the twentieth century. Berries reception by the state in the face of consumer implemented only to the extent of 55-60 ths. tons per year, and harvesting of mushrooms in the 90s of the twentieth century averaged about 6.2 ths. tons, respectively, that accounted for about 3% and 1% of the total reserves of these products.

With a quantitative characteristic of the market of these products to the problem comes Natalia Bobileva, formulating that "Among the leaders in terms of yield, for example, of pine nut in 2011-2013 are Tomsk Region and Altai Republic. In these regions, a large number of forest land is not transferred to the lessee, but at the same time, they are actively using for collection of food forest resources. In particular, in Tomsk region of 2.952 million hectares of pine forests just over 139 hectares are leased (it is only 5%) and in the Republic of Altai - from 5,061 million hectares 122.27 hectares (or 3%) are given in to lease.

Great difficulties arise from the evaluation of the real volume of food forest resources, including the actual amounts of the harvest. It was possible to establish only that, for example, in 2012 in the Altai region were collected 101 tons of mushrooms, 35 tons of berries in the Trans-Baikal region - 27 tons of pine nuts, in the Altai Republic - 201 tons, in the Tomsk region - 1,500 tons, in the Republic of Buryatia - 49.8 tons, in the Kemerovo region - 30.5 tons of pine nuts. For most of the subjects there are not data to these and other positions. Meanwhile, Natalia Bobileva believes, that the lack of objective information on the stocks and harvest volumes, proper control - "this is a serious shortage in the budget system of the Russian Federation on the use of forest resources in this way."

Take into account, for example, the Altai Republic: in 2013 there were leased 122.2 ths. ha. (not leased - 4.938 million. ha). The amount of lease payments is 717 881 rubles. But forgone and recorded payments - 28.9 million. rub., for 2012 - 126.4 million. rub. The actual amount of pine nuts was 691 tons. At a price of 400 rubles per kilogram the income is calculated in 276.4 million rubles. Only with this amount, the value added tax would have to make - 49,750,000. rub. At the same time, how much money went into the

budget of the subject is unknown. Certainly, business in this area is extremely difficult, as the population has easy access to free food forest resources. And if the owner has to pay taxes and wages, the citizens are not affected. Therefore, selling in that way "forest" items, they are, therefore, receive illegal income under the law"[20].

To a large extent with this view are in solidarity the representatives of the Ministry of Forestry of the Altai at the IX Krasnoyarsk Economic Forum, held in February 2014, who proposed take into order forest legislation in the direction of the food and non-timber forest resources, as there is a "short-term use in the procurement of food and medicinal plants, due to the fact that the use is seasonal"[21].

Finally, it is worth noting that during 2013-2015 and by the faculty of the department of "Modern trading North-South" of the Moscow State University of Food Production were worked on a quantitative and methodology formats pressing economic issues of food forest resources as:

- the formation of new methodological approaches to the economic valuation of forest resources, which will allow to carry out a comprehensive assessment of effective food forest resources;
- the estimation and forecasting of short-term market potential of food forest resources in Russia, including on the geopolitical North-South axis.

This Department has been conducting these studies to develop methods and ways of predicting harvest different types of berry and fruit plants, as well as other food forest resources of Russia in the context of trade policy of modern North-South.

Prospects for the use of food forest resources on an industrial scale

Scientific and technological issues determining the prospects for food forest resources on a commercial scale as a whole within the framework of the Moscow State University of Food Production, was also carried out on a significant scale. Among other things, it is worth noting that in June, 2014 under the leadership of Prof. Voyno L.I. Bilyalova Anastasia Sergeyevna protected thesis for the degree of candidate of technical sciences on the theme "Development of technology and merchandising evaluation of biologically active food supplements on the basis of higher basidiomycete" [22]. This work is being worked out, as it should be according to the requirements of HAC for 3 years - and help in the experimental and scientific-methodological framework was rendered and by other representatives of the faculty of the Department "Biotechnology and Technology of bioorganic synthesis" and "Commodity and Food" such as prof. Ivanov L.A., PhD. Shipareva D.G., PhD., prof. Molchanov EN, which was reflected in a number of joint papers and words of thanks on the last page of the abstract of the paper[23-25].

In addition as a separate item of analysis, the authors propose to consider the development of post-graduate of MGUPP Morina N. C. "Prospects for the use of cranberry as an ingredient of the fat emulsion product on an industrial scale", initial studies for which were formulated in the form of abstracts at the XIV Conference "Forests of Eurasia - Vologda dawn". The essence of this idea is the following: created product is to recognize perspective for manufacturers of mayonnaise products, in terms of improving the technology of obtaining, expanding the product line according to the organoleptic items and enrichment of production by healthful ingredients.

Within the field and desk marketing researches it was revealed by the author that because of the fact that market in general is saturated by manufacturers of fat and oil products, it is an interesting development is the sauce - dressing containing traditional ingredients familiar to the consumer and at the same time useful, and affordable. Sauce, declared as a "useful product" must not contain any preservatives in its composition. In turn, the fat - emulsion product refers to perishable goods in connection with the content of the protein framework. Therefore, cost-effective must be production, located in the region of the intended marketing. If we consider the Vologda region as a production site, the perspective is the use of cranberry as sensory and functional ingredients".

In order to improve the efficiency of complex food forest products according to the authors of the study, it is desirable not only to systemize it, including statistical and legal, but also requires its industrialization. The transition to industrial rails of the complex is possible to implement not only by the

growth of the collection of products as well as improving logistics and packaging, but also through the introduction of the methods of the major agricultural sectors as chemicals, and especially genetic modifiability of the product in FFR. Despite the fact that at the present time in Russia, in contrast to the other BRICS situation with legalization of GMO products in the food and agricultural sectors of the economy remains too difficult, according to the authors for the production of FFR perhaps making an exception, what is happening both in the scientific and research investigations in general, and in particular in the biomedical industry.

Passing from the final product of "forest agriculture" to its infrastructural part, agroforestry, it is worth noting that this trend in its development also has a significant number of issues for Russia. For the world culture of the matter is somewhat different, in particular, the by research staff of biological research centers was discovered a rich and varied agglomeration of poultry farms in the shade of forest coffee farms not so long ago. This amazing collection of farms is located in the eastern part of Ethiopia. Within this area comes the practice of building some kind of forest agriculture cluster as growing crops (coffee) and for livestock, including poultry.

The combination of forestry and farming provides here a whole habitat for many wildlife species. This practice helps to preserve the region's waterways clean, and the soil in biosafety. Agroforestry in the process helps in many ways to obtain one of the world's favorite treats - chocolate. And if today, this phenomenon does not seem more than a large-scale, in connection with the predictions of climate change in the future this trend may become one of the most perspective. Despite the advantages of this phenomenon, not all farmers are ready to adopt the practice of agroforestry. This segment of society continues to believe in the majority today that decent crop can only be obtained on the ground, not in the forest.

Agroforestry tree planting has long been known, not only in Africa but also in other parts of the world space. In Hawaii and other tropical islands in the Pacific, for example, farmers have a history of growing forests, followed by collection of coconut, bananas, breadfruit and others.

Agroforestry is also found in other places, even in the continental United States. In particular, windbreaks which are in North Dakota consist of trees protecting the crops in the fields and reducing the amount of soil erosion by wind. When analyzing a plurality of trusses of America, including a plurality of corn fields in Indiana, Montana barley or soybeans in Iowa, you can always see here in the form of their borders thin wall of trees, called the common people windbreak. Despite the fact that it looks very different from the Ethiopian coffee farm, analyzed above, the windbreaks are also a form of agroforestry.

In fact, these shelterbelts, referred to windbreaks can be considered one of the most easily recognizable forms of agro-forestry in the United States. Planting trees on the edges of fields interrupts the wind, changing its speed. Near the windbreak is always a bit warmer and less windy, the crops here always grow better. Trees, inter alia, help to protect the soil from wind erosion.

Another common type of agroforestry in the United States occurs in the so-called coastal zone. These regions are located along the banks of rivers and streams. For creation here a buffer, a protected area, farmers are planting trees and other vegetation types. It helps to limit erosion of vegetation. The plants also provide food and habitat for birds and other wildlife. Considered greens help to prevent the effects of rain, especially from harmful deposits and leaching of nutrients and pesticides in rivers and lakes. The trees here are a buffer or protection, coastal zone along the river. Absorbing chemicals and blocking rainfall, the vegetation helps to keep the environment clean.

Sometimes it can be difficult for specialists in environmental protection to convince farmers that planting a windbreak on the outskirts of the fields is a rational move for their production activities. Farmers do not always recognize the benefits that can come from giving their land for the growing number of accommodation of the trees.

Unlike most crops, growing trees is a long and costly process. In this regard, experts say financial grants to conduct this kind of work for agroforestry farms can be a great impetus to the development. To increase profits, some farmers combined with the placement of the trees already growing food for cattle and for fodder – it means those plants that feed on herbivores. This is another type of agroforestry, called silvopastur. This practice is common in the southern United States.

Controlling the amount of trees in the sector area helps to regulate the amount of light that reaches the surface. When it is too much amount of shadow, nothing can grow under these trees. However, the system opens silvopastur that the canopy gives the farmers a reasonable balance in the collection timber in the future and the annual gathering of forage.

Increasing the number of cattle and growing trees on the same land not only provide two sources of income, as well as protect against losses in bad years. If timber prices fall too low for one year, a farmer can expect to collect firewood and to rely only on cattle for profit.

Cows can also capitalize on grazing pastures secured to them arising canopy. This is especially true for the warmer parts of the world. Emerged canopy helps these animals here to stay cool in the sun.

Not only animals suffer from too much sunlight. Despite the fact that plants need sunlight to grow and thrive, but an excess of sun can bake their tender leaves and sap the soil where they grow. Many tropical plant species grow better in the shade. For example, the quality of plants such as coffee, black pepper and vanilla is much improved when they are grown in the shade. The same goes for the cacao tree, whose beans are a key ingredient in chocolate.

Some farmers grow coffee and other shade-loving culture in direct contact with sunlight, because they believe that by doing so they increase the volume of production of products, but very often the product is made out of lower quality. This lower quality plants are likely to require additional volumes of chemical pesticides or fertilizers that would achieve the quality that the products which were growing in the shade. Consumers, for producing organic food, according to marketing research data is already ready to pay more for those varieties of plants that grew in the shade to avoid the use of these chemicals. For example, in the above-mentioned Ethiopia, coffee grown in the shade can bring more than \$ 310 per hectare than the same crop grown on the field with direct contact with sunlight.

CONCLUSION

Agroforestry economics according to the authors of the study course in many ways has great prospects for development, and in the Russian Federation, but this requires additional large-scale studies and programs, both at the federal and regional levels.

At the end of the work the authors formulate that in terms of the instability of the environment, in the process of changing of technological ways for the effective development of environmental economics in Russia, holistic solution of a common set of issues of environmental economics is necessary to share the risks between the different actors of the national economy, as well as the use of state guarantees for the development of this particular sector of the economy as the most viable scheme to attract financial resources for the successful implementation of the transition to a new technological way.

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