

# THE VALUE OF FORMING ECOLOGICAL FRAMES OF TERRITORIES FOR THE CONSERVATION OF FOREST ECOSYSTEMS

## ВРИЈЕДНОСТ ФОРМИРАЊА ЕКОЛОШКИХ ОКВИРА ПОДРУЧЈА ЗА ЗАШТИТУ ШУМСКИХ ЕКОСИСТЕМА

Nadezda Prokhorova<sup>1\*</sup>, Zoran Govedar<sup>2</sup>, Evgenya Moiseeva<sup>1</sup>

<sup>1</sup> Voronezh State University of Forestry and Technologies named after G.F. Morozov, Timiryazeva street 8, Voronezh 394087, Russian Federation

<sup>2</sup> University of Banja Luka, Faculty of Forestry, Stepa Stepanovic 75a, 78000 Banja Luka, Republic of Srpska/B&H

\*e-mail: nadnov40@yandex.ru

### Abstract

Modern approaches to the development of nature management are focused on the formation of a system of sustainable development of regions. Forest territories act as an edifier, which has a global impact on the state of all ecosystems under the conditions of increasing anthropogenic pressure, reducing biodiversity and reducing the productivity of natural ecosystems. When creating the ecological frameworks of territories, various research methods are proposed: information-analytical, comparative-geographical, the method of route survey of the territory, and cartographic.

The reduction in the area of natural ecosystems leads to a significant reduction in the biodiversity of the most diverse groups of organisms. The extinction and significant reduction of species (very often even background for certain territories) leads to a decrease in genetic biodiversity, and, as a consequence, a disruption to evolutionary processes.

**Keywords:** conservation, ecological frames, forest ecosystems

## 1. INTRODUCTION / УВОД

Modern approaches to the development of nature management are focused on the formation of a system of sustainable development of regions. The term “sustainable development” refers to such a development of society in which the human condition improves, and the environmental impact remains within the economic capacity of the biosphere, so that the natural basis for the functioning of mankind is not destroyed (Razgulyaev, 2010). One of the main components of the human environment is forests. At the same time, the forest area on the planet is steadily declining and the anthropogenic factor plays the main role in this.

Studies aimed at resolving issues related to the formation of ecological skeletons of territories of different ranks that help to solve many important bioclimatic, environmental and socio-economic problems, primarily related to the conservation of biodiversity of forest ecosystems.

Forest territories act as an edifier, which has a global impact on the state of all ecosystems under the conditions of increasing anthropogenic pressure, reducing biodiversity and reducing the productivity of natural ecosystems. In this regard, there is a need for updating and reconstruction of the existing green fund of various

territories and the formation of new ways to use them.

The ecological framework of the territory is a combination of its ecosystems with an individual nature management regime for each site, forming a spatially organized infrastructure that supports the ecological stability of the territory, preventing the loss of biodiversity and landscape degradation (Narbut 2015).

Most of the research is devoted to the creation of ecological skeletons of urban areas, which are forest-park green belts and urban parks and squares. In our opinion, urban forest park green belts should be an integral part of environmental frames of a higher rank. For this, in the study area, it is necessary to record and analyze all natural forests and forest stands, including forest belts, which

can play the role of ecological corridors between the structural parts of ecological frames.

The preservation of forest ecosystems, the creation and maintenance of forest belts significantly contributes to the productivity of agricultural ecosystems, which is especially important in conditions of land degradation (primarily erosion changes).

In conditions of an increase in the anthropogenic load on natural ecosystems, the territorial nature conservation (creation of specially protected natural territories) serves as a traditional tool for their conservation and restoration processes. However, studies of individual territories cannot fundamentally solve the problem due to their disunity, lack of communication of this area and migration channels.

## 2. ECOLOGICAL FRAMEWORKS - ELEMENTS OF SUSTAINABLE DEVELOPMENT / ЕКОЛОШКИ ОКВИРИ – ЕЛЕМЕНТИ ОДРЖИВОГ РАЗВОЈА

The concept of the development of ecological frameworks of a territory more fully meets this task, and therefore, the theoretical justification and development of ecological frameworks of territories is an urgent scientific task of research (Kharchenko et al., 2018).

According to Panchenko & Dyukarev (2010) the ecological framework is a compensation system, this area consists of a network of sites interconnected, with various restrictions on economic links to use, in order to ensure sustainable renewal of resource potential, to maintain existing biodiversity.

The issues of development and management of ecological frameworks in the modern world are the work of many authors (Bobylev et al., 2001; Narbut et al., 2002; Mirzekhanova & Narbut, 2013; Nizovtsev & Erman, 2015; Kalmanova, 2016, 2018; Santos et al., 2018 and others), who consider issues of improving environmental management systems, offer different theoretical approaches to solving the organization of ecological frameworks necessary for the preservation of natural ecosystems and increasing agroforestry productivity. When creating the ecological frameworks of ter-

ritories, various research methods are proposed: information-analytical, comparative-geographical, the method of route survey of the territory, and cartographic. The theoretical and methodological basis for creating ecological frameworks is contained in the scientific works of specialists in the field of geography and city ecology (Tyutyunnik, 1990; Purdik, 2000; Kolbovsky, 2013; Kalmanova, 2015; Kolomyts, 2018 and others).

When determining the role of ecological frameworks, the concepts of structure and their composition, as well as management issues, are important.

Narbut (2015), believes that in accordance with the modern concept of “geographical system”, the ecological framework of the territory is not a system. It is a collection of elements of a certain object, which does not have general control, and the elements that make up the ecological framework have different subordination. This is a set of geosystems that ensures the development of the territory through the preservation of the ecological functions of the carcass elements and the variety of natural complexes included in this set. Despite the fact that the location of individual elements in

the territory of one administrative subordination, they are managed not as territorial, but as sectoral systems. It is noted that, not being a system, the ecological framework of the territory is a special way of environmental management, in contrast to the traditional departmental management, is territorial.

On the example of the ecological framework of the city of Khabarovsk, it is shown that the ecological frameworks may include objects that are privately owned or long-term leased. So, the ecological framework of the city of Khabarovsk (forest park green belt) includes natural monuments of the regional level and protected areas of local importance, but each of these groups has its own subordination. Administrative authorities for road management and external beautification are responsible for the green space planting in only a small part of the city. It is noted that, the ecological framework does not have a single management, which leads to a lack of organization of the system.

Under the current conditions of creating the institution of private ownership of land in Russia, in the absence of non-normative documents of the environmental component governing this process, it has intensified the development of proposals to include an ecological framework in the process of legal and territorial zoning of lands of various categories.

One of the priority areas of environmental protection in the context of the transition to land privatization is the development of legal technologies for creating an ecological framework of territories, and its inclusion in the system of territorial zoning of land becomes a more effective mechanism for creating ecological framework. Furthermore, activities on the implementation of environmentally oriented zoning of territories, in the context of land reform, as well as the granting of legal status, should be carried out by local authorities that are interested in maintaining their ecological potential (Bobylev et al., 2001).

Elizarov (1998) offers a strategy for withdrawing steppe nature management from the crisis, based on the need to create ecological frameworks of territories that allow preserving and improving the quality of biological resources. The author believes

that already existing departmental measures of environmental regulation of environmental management should apply to environmental frameworks. There is a need to introduce the legal status of ecological framework lands, restoration of natural ecosystems, organization and creation of new protected areas, etc.

To identify proposals for the creation of ecological corridors in the Brazilian region, the Atlantic forest was used as an example (Santos et al., 2018). It was noted that this type of forest ecosystem is an intensely fragmented and globally important ecological point. For analysis, we used indicators of landscape ecology based on a map of forest fragments. The proposed corridors are based on the analysis of the least costly paths taking into account land use, slope, permanent conservation areas and the size of forest fragments. Although the predominant class sizes in the study area are small fragments, the analysis of landscape ecology showed good environmental quality for fragments larger than 100 hectares that do not lose their central area even at the largest edge distances. Polygons with forest fragments were selected on the map of land cover and land use, and forest fragments were identified that were classified according to their size:

- very small (<5 ha),
- small (5-10 ha),
- medium (10-100 ha),
- large (> 100 ha).

Conflicts in land use have shown that fragments of the corridors are located in a matrix in which pastures predominate. Within the framework of the proposed corridors, there are mainly irrationally used lands, which does not comply with environmental legislation. The proposed corridors were effective in using the largest fragments, which have the smallest edge effect and provide the necessary support for most wild animals.

According to Canadian authors (Albert et al., 2017) designing and developing interconnected landscapes is one of the most common strategies for achieving biodiversity and forest ecosystem conservation goals. The challenge is to simultaneously meet the needs for combining several species at different spatial scales in the face of uncertain

climate change and land use. To assess the contribution of residual habitat fragments to the connectivity of regional habitat networks, a method has been developed to integrate uncertainty in climate change forecasts for land use with the latest advances in the study of network connectivity and spatial, multi-purpose conservation priority. The authors used modeling of changes in land use to study the resilience of species networks to alternative development paths. The identification of connectivity criteria along with habitat quality criteria for designing protected areas was effective in terms of the number of areas that needed protection, and did not necessarily increase the trade-offs between conservation criteria. Establishing environmental priorities based on the quality of

the environment has allowed us to maintain a significant share of the region's connectivity, despite the expected loss of habitat due to climate change and land use. The application of connectivity criteria along with environmental quality criteria for designing protected areas was effective in terms of the number of areas that need protection and did not necessarily increase the trade-offs between conservation criteria. The method and results are already being applied in Montreal and its environs and are well suited for the design of ecological networks and green infrastructure for the conservation of biodiversity and ecosystem services in other regions and areas, in particular in the regions around large cities where the connection is critically low.

### 3. CREATING ECOLOGICAL FRAMEWORKS FOR THE CONSERVATION OF NATURAL RESOURCES IN RUSSIA (EXAMPLES) / ФОРМИРАЊЕ ЕКОЛОШКИХ ОКВИРА У ЦИЉУ ЗАШТИТЕ ПРИРОДНИХ РЕСУРСА У РУСИЈИ (ПРИМЈЕРИ)

On the territory of the Russian Federation in different regions, all authors agree on the critical importance of ecological frameworks for the conservation of ecosystem biodiversity. At present, the recognition of preserved ecosystems as part of the ecological framework is apparently the only way to protect them from complete destruction.

When developing the natural-ecological framework of the reserve, a technique involving 4 stages is often used (Nesgovorova et al., 2018):

- Stage 1 - analysis of the landscape structure of the territory, which includes conducting a landscape analysis of the territory in order to identify natural and anthropogenic factors in the formation and functioning of natural processes on the territory of the reserve, as well as assessing the environmental situation on the territory of the reserve (according to the criteria of tension, disturbance).
- Stage 2 - the selection of existing elements of the ecological framework, monitoring in order to identify their impact on the ecological situation of natural complexes.
- Stage 3 - substantiation of environmental protection measures or restrictions on use,

especially in need of protection of natural resources, nature objects, and the design of new ecological paths.

- Stage 4 - the creation of a functional planning model of the natural-ecological framework of the reserve and the establishment of protection and use modes.

This technique allowed us to conduct an initial survey of the state of the reserve, to obtain empirical materials for an additional, more in-depth analysis.

The area of Krim served for the development of methodology and general algorithm for the creation and use of cartographic and geographical information model of the ecological framework of the territory, as important components of ecological management of the territory of the republic (Karpenko et al., 2015). The authors see the environmental system as an ecological framework, which ensures the environmental sustainability of Krim, prevents the loss of biodiversity and landscape degradation. The paper shows the structure and creation of a geographic information database for the design of an ecological framework. The mapping of the ecological network was based on the use of ex-

peditionary research data with mapping of the areas most valuable for biodiversity conservation. These territories, promising for conservation, in accordance with the selection criteria are assigned to various structural elements of the ecological framework. The developed database of the cartographic and geographic information model of the ecological framework presented in this work is a structural element of the constantly updated geographic information territorial database of the region. This makes it possible to conduct on-line (monitoring of the state and spatial changes) monitoring studies of all eco-frame objects, as well as perform calculations of various parameters and make adjustments to the program of cartographic modeling of the sustainable development of Krim territory.

Zelenskaya (2016) proposes the development of an ecological framework in a district with a powerful industrial infrastructure and developed agriculture. The paper provides an analysis of the current state of the ecological framework of the Zhirnovsky district of the Volgograd region, identifies and substantiates specially protected natural areas that make up the main nuclei of the planned eco-frame, as well as reference natural territories that are planned to be withdrawn from economic activity, with the assignment of the status of specially protected natural territories to them. The model of the ecological framework of the Zhirnovsky district proposed by the author is based on the spatial interaction of natural components through a system of ecological corridors that promote the spread of living organisms that support the sustainable development of the district. This will contribute to the conservation and restoration of biological diversity within unmodified and unique natural complexes, in the future it will allow to increase the species and quantitative composition of flora and fauna within the boundaries of specially protected natural territories and increase the distribution areas of living organisms in the region itself.

Georgica (2011) also notes that the entire regional network of protected areas should be built on the principle of nested blocks of an eco-

logical skeleton of different levels - lower-level allotments are located inside larger ones, i.e. elements of the lower level are hierarchically nested in the sphere of the ecological framework of the upper. During the planning work, the creation of an ecological framework should be based on a number of principles, including those based on population ecology. Since biodiversity is the most important strategic goal, derived from landscape diversity, the following main principles are put forward by the author:

- the principle of landscape diversity, i.e. the representation in the system of protected areas of all types of natural ecosystems together with ecotones;
- the principle of viability, i.e. creation of conditions for self-sustainability of the viability of populations of all indigenous species in a natural ratio of numbers and within natural boundaries for a long period;
- the principle of maintaining natural processes, periodic natural events leading to succession of a different type;
- the principle of sustainability, planning and organization of ecosystems that would be resistant to short-term and long-term changes in environmental conditions and would be able to maintain the evolutionary potential of organisms for many generations.

One of the important parts of any ecological framework is forest-park green belts located around large cities and other settlements. The creation of forest park green zones around urban agglomerations is of particular importance, because such belts help to solve many important bioclimatic, environmental and socio-economic problems.

Semenyutina & Svintsov (2015) developed principles and technological measures for arranging degraded territories and forests of recreational importance in the conditions of an arid climate, which allow vacationers to be accommodated in the territory, taking into account all aspects of the environmental impact and especially carefully on the most vulnerable objects. In addition, it was determined that the influence of woody plants on the formation of the phyto-environment of urbanized territories under the

conditions of anthropogenic load is reduced by the arrivals of the species composition of green spaces in settlements of sparsely forested regions. The fact of the need for updating and reconstruction of the existing green fund (Podkolozin, 2011) has been established. A change in the functioning conditions of woody vegetation of ecosystems is shown in connection with a significant anthropogenic load and weather anomalies.

Forest park green belts are created around urban agglomerations in many countries. In the article by Balaeva (2015) the modern domestic and foreign urban planning experience of forming a forest park belt of agglomerations and resettlement systems is considered, in particular, the direction of a spatially functional organization, as well as the mechanisms used to regulate the development of a forest park belt.

Lashevsky (2017) considers the development of green spaces around cities and gives examples from world practice (London, Liuzhou, Minsk, Astana, Crimea). In the territory of the Russian Federation, forest park green belts to one degree or another are created in the Moscow and Smolensk regions (Vatlina & Voitenkova, 2018). In the works, the modern domestic and foreign urban planning experience of forming a forest park belt of agglomerations and resettlement systems, in particular, directions of a spatially functional organization, as well as applied mechanisms for regulating the development of a forest park belt, is considered. A theoretical model of the zone planning structure of the forest park belt of the largest city is proposed. Based on the analysis of foreign experience in legal regulation and the practice of creating green belts, the legislation of the Russian Federation in this area is evaluated. The basic elements of the legal regime of forest park green zones are revealed, such as the composition, restrictions on activities, the main directions of use and protection of the territory of the forest green belt.

The latest edition of Federal Law dated 10.01.2002 No. 7-FZ (as amended on 12.31.2017) "On Environmental Protection" determined the need to create forest park green belts to limit

the regime of natural resource use and management and preservation of natural ecosystems. At the same time, studies of this important issue are quite disparate in nature and do not offer a methodological apparatus for creating forest park green belts and their environmental and economic assessment. The economic assessment of forest park green belts is complicated by the lack of economic standards for the costs of creating, maintaining, operating and reconstructing forest park green belts.

The ecological framework of a territory of any rank should include forest strips, which have a significant impact on increasing the productivity of agricultural ecosystems.

Rodin & Rodin (2003) while studying the anthropogenic transformation of the nature of the steppe and forest-steppe, also note that this process contributed (contributes) to an increase in the area of agricultural land, stabilization of its borders, expansion of disturbed territories while reducing natural habitats, led to soil degradation, and reduced productivity pastures, pollution and even extinction in some cases of the rivers of brooks, which caused a decrease in the species composition of animals and birds. This led to erosion processes and other adverse factors that adversely affect the natural landscape. As a result, pre-existing natural ecosystems were disrupted. In this regard, one of the ways to solve the issues of restoration and transformation of the landscape of the steppe and forest-steppe is environmental optimization and scientifically based arrangement of territories, which is achieved by creating an interconnected system of bio natural and artificial origin (forest strips) that form the ecological framework.

The primary tasks in organizing the ecological framework are: conducting landscape mapping of the region using (*Geographic Information System – GIS*) technologies in order to identify areas where it is advisable to form an ecological framework that ensures the formation of an interconnected system of its elements, including forest objects, steppe and meadow areas and water areas; identification of valuable biological points of view of natural bio-



topes and their certification; implementation of measures ensuring the preservation and improvement of the identified valuable natural habitats, including the maintenance of organic nature management in them; development of a project to create the missing elements of the ecological framework. Solving the tasks associated with the implementation of all measures will stabilize and improve the state of natural and agricultural ecosystems.

Currently, the state of forest strips, at least in the Central Black Earth region, leaves much to be desired. This is primarily due to the significant age of the rocks that form them, as well as the absence of at least the minimum required care. At the same time, the importance of forest strips for the conservation and maintenance of various ecosystems is confirmed by the work of many authors.

#### 4. CONCLUSIONS / ЗАКЉУЧЦИ

The reduction in the area of natural ecosystems leads to a significant reduction in the biodiversity of the most diverse groups of organisms. The extinction and significant reduction of species (very often even background for certain territories) leads to a decrease in genetic biodiversity, and, as a consequence, a disruption to evolutionary processes.

Romanov (2004) in his works calls protective forest belts an environment-forming element of the landscape. The favorable effect of forest strips on crop growth conditions is manifested by weakening wind speed and turbulent mixing intensity, which contributes to snow retention and a decrease in evaporation, i.e. increase in soil moisture reserves and their more economical expenditure on evaporation and transpiration from agricultural fields. Soils under forest strips have the ability to accumulate surface runoff of fields, which creates favorable conditions for the successful growth of forest strips in arid zones. The finished system of forest strips with their correct location on the territory improves the micro-climate, reliably protects the soil fields from blowing, and at the same time practically eliminates water erosion of the soil with a constant increase in yield. In addition, forest strips can serve as ecological corridors.

On the territory of the planet as a result of natural and man-made origin in recent decades there has been a constant decrease in the number of forest territories. In this regard, the formation of ecological frameworks of different levels will undoubtedly contribute to the solution of one of the main problems of our time - the conservation of the biodiversity of forest ecosystems.

#### References / Литература

- Albert C.H., Rayfield B., Dumitru M., Gonzalez A. (2017). Applying network theory to prioritize multispecies habitat networks that are robust to climate and land-use change 2017. *Conservation biology* 31(6): 1383–1396.
- Balaeva K.A. (2015). General principles of functional planning organization of the forest park belt of agglomerations and settlement systems. *Architecton: university news* 51: 113–123. [Балаева, К.А. (2015). Общие принципы функционально-планировочной организации лесопаркового пояса агломераций и систем расселения. Архитектон: известия вузов. Издательство: Уральский государственный архитектурно-художественный университет
- Bobylev S.N., Medvedeva O.E., Sidorenko V.N., Stetsenko A.V. (2001). *Regional environmental policy*. Economic aspects, М.: СЭПР: 38 pp. [Бобылев, С.Н., Медведева, О.Е., Сидоренко, В.Н., Стеценко, А.В. (2001). Региональная экологическая политика. Экономические аспекты, М.: ЦЭПР, с. 38]
- Elizarov A.V. (1998). About creation of an ecological framework of the Samara region. In: *Ecological safety and sustainable development of the Samara region*. Samara: Izdvo gos. Committee for the Protection of the Environment of the Samara Region 6: 76–91. [Елизаров, А.В. (1998). О создании экологического каркаса самарской области // Экологическая безопасность и устойчивое развитие самарской области. Самара:

- изд-во гос. комитета по охране окружающей среде самарской области. Вып. 6. с. 76–91.] (Екатеринбург) № 51, с. 113-123]
- Elizarov A.V. (1998). Ecological framework .the steppe wildlife management strategy of XXI century. *Stepnoy byulleten* 1:10–14.
- Georgica I.M. (2011). Features of construction of an ecological framework of large territories. *Yaroslavl Pedagogical Bulletin* 1(3). [Георгица, И.М. (2011). Особенности конструирования экологического каркаса крупных территорий. Ярославский педагогический вестник, № 1, том 3]
- Karpenko S.A., Lagodina S.E., Pavlova-Dovgan O.A., Borisova N.I., Eepikhin D.V. (2015). Development of a cartographic and geoinformation model of the ecological framework of Crimea. *Geopolitics and eco geodynamics of regions* 11(4): 30–39. [Карпенко, С.А, Лагодина, С.Е., Павлова-Довгань О.А., Борисова, Н.И., Еепихин Д.В. (2015). Разработка картографо-геоинформационной модели экологического каркаса Крыма. Геополитика и экогеодинамика регионов, том 1 (11). вып. 4. с. 30-39.]
- Kalmanova V.B. (2015). Geoecological mapping of urban areas (on the example of Birobidzhan) *InterCarto/InterGIS-21. Sustainable development of territories: Cartography and GI Support*. In: *Proc. Int. Sc. Conf. Krasnoda: Kubansky gos.*:566–574.
- Kalmanova V.B. (2016). Ecological features of the functional-planning structure of medium and small cities in the south of the Far East (based on the example of Birobidzhan). *InterCarto/InterGIS* 22(2): 273–286
- Kalmanova V.B. (2018). Ecological planning of urbanized areas in the south of the Far East (Birobidzhan city as an example). *IOP Conf. Series: Earth and Environmental Science* 107: 12–13.
- Kharchenko N.N., Moiseeva, E.V., Prochorova, N.L. (2018). Ecosystem functions of forestpark green belts of urban agglomerations as a factor improving the quality of living standards in conditions of sparsely wooded regions. In: *Proceedings of the International Symposium “Engineering and Earth Sciences: Applied and Fundamental Research” (ISEES 2018) International Symposium on Engineering and Earth Sciences. Ser. “Advances in Engineering Research”* : 20–25.
- Kolomyts E. G. (2018). Introduction to Experimental Geoecology: Results of a Scientific Inquiry. *Herald of the Russian Academy of Sciences* 88(6): 482–493.
- Kolbovsky E.Yu. (2013). Analysis methods of landscape heritage. GIS modeling for evaluation of visual quality of a landscape and management, in Sel’skie kul’turnye landschafty: rekomendatsii po sokhraneniyu i ispol’zovaniyu. In: *Rural Cultural Landscapes: Recommendations for Preservation and Use, Moscow: Ekotsentr Zapovedniki*: 68–93.
- Lyashevsky V.I., Kupriyanova S.V., Medvedeva L.N. (2017). «Green shield» around the cities: prospects of creation. In: *Land reclamation and water management. Ways to improve the efficiency and environmental safety of land reclamation in southern Russia. Materials of the All-Russian Scientific and Practical Conference. Novochechassk, Publishing House: Lik LLC*: 169–176. [Ляшевский В.И., Куприянова С.В., Медведева Л.Н. «Зеленый щит» вокруг городов: перспективы создания». Мелиорация и водное хозяйство. Пути повышения эффективности и экологической безопасности мелиораций земель юга России. Материалы Всероссийской научно-практической конференции. Новочеркасск, Издательство: ООО «Лик» (2017). С. 169-176]
- Mirzekhanova Z, Narbut N. (2013). Ecological foundations of organization of urban territories(on the example of Khabarovsk). *J. Pacific Geology* 32(4): 111–120.
- Narbut N.A. (2015). On the question of managing the ecological framework of the territory. *Regional problems* 18(1): 43–47. [Нарбут, Н.А. (2015). К вопросу об управлении экологическим каркасом территории. Региональные проблемы, Том 18, № 1, с. 43-47.]
- Narbut N., Antonova L., Matyushkina L., Klimina E., Karavanov K. (2002). *Strategy for the formation of the ecological framework of urban territory (Khabarovsk, for example)*. (Vladivostok-Khabarovsk: FEB RAS): 129 pp.
- Nesgovorova N.P., Saveliev V.G., Vasilieva A.E. (2017). Environmental assessment conditions during the development of the natural and ecological framework of the territory of the Belozersky reserve. Ecological and geographical aspects of nature use, recreation, tourism. In: *Proceedings of the International scientific-practical conference dedicated to the Year of Ecology in Russia. November 8-9, 2017 / resp. a row. H. P. Nesgo-thieves. - Kurgan, 2017*: 35–39. [Несговорова Н.П., Савельев В.Г., Васильева А.Е. (2017). Оценка экологического состояния при разработке природно-экологического каркаса территории Белозерского заказника. Эколого-географические аспекты природопользования, рекреации, туризма: Сборник материалов Международной научно-практической конференции, посвященной Году экологии в России. 8-9 ноября 2017 года/ отв. ред. Н. П. Несго-ворова. – Курган, 2017. – 354 с. - С. 35-39]



- Nizovtsev V.A., Erman N.M. (2015). Landscape approach to the formation of the ecological frame of Moscow, EGU General Assembly. *Geophysical Research Abstracts* 17.
- Panchenko E.M., Dyukarev A.G. (2010). Ecological framework as nature protection system of the region. *Vestnik Tomskogo gosudarstvennogo universiteta* 340: 216–221. [Панченко, Е.М., Дюкарев, А.Г. (2010). Экологический каркас как природоохранная система региона. Вестник Томского государственного университета, № 340, с. 216–221]
- Podkolzin M.M. (2011). Current state and functioning of objects of gardening in the conditions of technogenic loading. Political Internet electronic scientific journal of the Kuban State Agrarian University 66: 29–38. [Подколзин М. М. Современное состояние и функционирование объектов озеленения в условиях техногенной нагрузки / Подколзин М. М. // Политематический сетевой электронный научный журнал Кубанского государственного аграрного университета (Научный журнал КубГАУ) [Электронный ресурс]. – Краснодар: КубГАУ, 2011. – №66(66) С. 29 – 38.]
- Purdik L.N. (2000). Landscape and ecological researches and mapping (practice methodology), in *Jekologicheskij analiz regiona (teorija, metody, praktika)*. In: *Sbornik nauchnyh trudov (Ecological analysis of the region (theory, methods, practice): Collection of scientific works)*. Novosibirsk: Siberian Branch of the Russian Academy of Science publishing house: 80–92.
- Razgulyaev V.N. (2010). Sustainable development: concepts and modern scientific practical interpretation. *Bulletin of Economic Integration* 9: 28–33. [Разгуляев, В.Н. (2010). Устойчивое развитие: концепции и современная научно-практическая интерпретация. Бюллетень экономической интеграции, № 9. с. 28–33.]
- Rodin A.R., Rodin S.A. (2003). Formation of ecological carcass steppe and forest-steppe. *Les* 5: 9–10. Federal law of 10.01.2002 №7-FZ (ed. Of 31.12.2017) "On protection environment". [Родин, А.Р., Родин, С.А. (2003). Формирование экологического каркаса степи и лесостепи. [текст] : научное издание/А.Р. Родин, С. А. Родин//Лес. х-во. - № 5, с. 9-10. Федеральный закон от 10.01.2002 №7-ФЗ (ред. от 31.12.2017) «Об охране окружающей среды»]
- Romanov N.V. (2004). Protective forest belts are an environment-forming element landscape. In: *Proceedings of the interregional scientific-practical conference, Samara, 2004*. [Романов, Н В. (2004). Защитные лесополосы – средообразующий элемент ландшафта. Сборник докладов межобластной научно-практической конференции, Самара, 2004.]
- Santos, J.S., Claros Leite, C.C., Cândido Viana, J.C., dos Santos, A.R., Fernandes, M.M., Souza Abreu, V., do Nascimento, T.P, Santos, L.S., Moura Fernandes, M.R., Silva, G.F., Mendonça, A.R. (2018). Delimitation of ecological corridors in the Brazilian Atlantic Forest. *Ecological Indicators* 88, 414–424.
- Semenyutina A.V., Svintsov I.P. (2015). Land management for recreational purposes in sparsely forested regions: principles and measures. *Journal of Modern Science: Actual Problems of Theory and Practice* 5–6: 66–78 [Семенютина А.В., Свинцов И.П. Обустройство земель рекреационного назначения в малолесных регионах: принципы и мероприятия. современная наука: актуальные проблемы теории и практики. Серия: естественные и технические науки издательство: Научные технологии (Москва) Номер: 5-6 год: 2015 страницы: 66-78]
- Tyutyunnik Yu.G. (1990). The concept of the urban landscape. *Geography and natural resources* 2: 167–172.
- Zelenskaya O.Yu. (2016). Prospects and ways of economic development of Zhirnovsk region Volgograd region. In: *II All-Russian Scientific Forum of Young Scientists "Science of the Future - Science of the Young"*, Kazan, Russia.
- Vatlina T.V., Voitenkova N.N. (2018). Features of formation and development prospects green forest belt of the city of Smolensk. *Bulletin of Ryazan State University named after S.A. Yesenina Scientific journal* 3/60: 120–128 [Ватлина Т.В., Войтенкова Н.Н. Особенности формирования и перспективы развития зеленого лесопаркового пояса города Смоленска. Вестник Рязанского государственного университета имени С.А. Есенина Научный журнал № 3/60, 2018, С. 120–128]

## Извод

Савремени приступи развоју природе усмјерени су на формирање система одрживог развоја који се односи на стално побољшање утицаја друштва на стање природе на такав начин да тај утицај остаје унутар економске способности биосфере, тако да природна основа за функционисање човјечанства није уништена (Razgulyaev, 2010 ). Једна од главних компоненти природе су шуме. Шуме дјелују као специфични “едификатор”, што има глобални утицај на стање свих екосистема у условима повећаног антропогеног притиска, смањења биолошке разноликости и смањења продуктивности природних екосистема. Еколошки оквир великих регија обично представља комбинација његових екосистема са индивидуалним режимом управљања за свако подручје па се тако формира просторно организована инфраструктура која подржава еколошку стабилност територија, спречавајући губитак биолошке разноликости и деградацију животне средине (Narbut, N.A. 2015). Концепт развоја еколошких оквира састоји се од мреже подручја њихових екосистема која су међусобно повезана али под јаким економским утицајима како би се осигурала одржива обнова ресурса и биолошка разноликост. При стварању еколошких оквира територија предлажу се различите истраживачке методе: информацијско-аналитичка, компаративно-географска, метода рутинског прегледа територија и картографска. Еколошки оквир чини скуп био-гео-система који осигурава развој територија кроз очување еколошких функција елемената скупа и разних природних комплекса укључених у овај скуп. У еколошким оквирима шумских подручја биодиверзитет је веома значајан јер подржава следеће начела: пејзажне разноликости, одрживости, развоја природних процеса, планирање и организацију екосистема. На примјерима истраживања у Русији констатовано је смањење подручја природних екосистема (посебно шумских) што доводи до значајног смањења биолошке разноликости најразличитијих група организама. Изумирање и значајно смањење врста доводи до смањења генетске односно биолошке разноликости а то настаје и као посљедица поремећаја еволуционих процеса. На планети Земљи као резултат природних а посебно антропогених утицаја у посљедњим деценијама стално се смањује површина шума. С тим у вези, стварање примјерених различитих еколошких оквира несумњиво ће допринијети рјешавању једног од главних проблема нашег времена - очувања биолошке разноликости шумских екосистема.

**Кључне ријечи:** еколошки оквири, конзервација, шумски екосистеми