

## ECOLOGICAL ASSESSMENT OF NATURAL COMPLEXES IN «SEREDNIE POBUZHZHIA» REGIONAL LANDSCAPE PARK: THEORY AND PRACTICE

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У статті запропоновано методикку визначення екологічної оцінки природних комплексів регіонального ландшафтного парку «Середнє Побужжя» за психолого-естетичними і географо-естетичними критеріями. Репрезентативні ландшафти парку, площею 2618,2 га, який створено у 2009 р., знаходяться в межах Тиврівської і Сутиської селищних територіальних громад Вінницької обл. Парк створено для збереження цілісності унікальних ландшафтів та біотичного різноманіття долини, а також акваторії річки Південний Буг у межах Вінницької обл. Окрасою парку є порogi на р. Південний Буг, що сформувались у тих місцях, де на поверхню виходять гірські породи Українського кристалічного щита, які часто утворюють каскади і простягаються на відстань до кількох кілометрів. Окремі брили граніту піднімаються над водою до 1,5 м, що формує відповідну естетику ландшафту. У парку зростає бореальна, неморальна і понтична рослинність, що представлена рідкісними, зникаючими, вразливими, ендемічними і реліктовими видами. Долина р. Південний Буг, що має велике значення для збереження біотичного і ландшафтного різноманіття, потребує захисту й раціонального використання своїх ресурсів. Одним із антропогенних видів впливу на природні комплекси парку є значне рекреаційне навантаження. Тому авторами встановлено максимальне рекреаційне навантаження на природні комплекси досліджуваного парку за розподілом типів ландшафтів — паркових, лісових, нелісових. На основі проведених досліджень аргументовано, що для збереження репрезентативного та унікального біотичного і ландшафтного різноманіття парку в структурі Бузького довготного природного коридору національної екологічної мережі необхідно запровадити комплекс заходів, враховуючи рекреаційне навантаження. З метою збереження репрезентативного біотичного і ландшафтного різноманіття в структурі екологічної і Смарагдової мереж, необхідно площу парку «Середнє Побужжя» розширити і до його складу включити регіональний ландшафтний парк «Немирівське Побужжя», площею 5678 га, створивши єдиний суцільний національний природний парк.

**Ключові слова:** оцінка впливу, ландшафтні комплекси, біотичне різноманіття, рекреаційне навантаження, екологічний стан.

### INTRODUCTION

Conservation of biotic diversity, unique and representative natural and anthropogenic landscapes, development of scientific foundations for rational nature management, functional and spatial optimisation of the nature reserve fund and implementation of the

regional ecological network should be one of the priority areas for the development of nature reserves in Eastern Podillia [1].

Regional landscape parks (RLPs) are environmental and recreational institutions of local or regional significance that are created to preserve typical or unique natural complexes and objects in their natural state, as well as to provide conditions for organised recreation.

They are organised with or without withdrawal of land plots, water and other natural objects from their owners or users. The main tasks of the RLP are preservation of valuable natural, historical and cultural complexes and objects; creation of conditions for effective tourism, recreation and other types of recreational activities in natural conditions in compliance with the regime of protection of protected natural complexes and objects; promotion of environmental education and upbringing [2].

The centre of conservation, restoration and rational use of biotic and landscape diversity of Eastern Podillia (Vinnytsia region) is «Serednie Pobuzhzhia» RLP, with an area of 2618.2 hectares. The theoretical substantiation, scientific and methodological development and solution of problems of protection of representative landscape and cenotic diversity due to the intensive impact of recreational pressure remain relevant and important for establishing its current ecological state, forming tourist routes, developing ecological trails, identifying threats and factors of influence, conservation and restoration measures [3].

The purpose of the research is to determine the ecological assessment of the natural complexes of «Serednie Pobuzhzhia» regional landscape park according to psychological-aesthetic and geographical-aesthetic criteria and based on the proposed criteria calculate the recreational load on the park's natural complexes by distribution of landscape types.

#### ANALYSIS OF RECENT RESEARCH AND PUBLICATIONS

Many works are devoted to the creation of «Serednie Pobuzhzhia» RLP, functional zoning, conservation of its biotic and landscape diversity, formation of an ecological network, efficient use of recreational potential and balanced nature management [3–6; 7; 8].

However, within «Serednie Pobuzhzhia» RLP, three types of natural complexes such as park, forest and non-forest have been identified, which require determining the maximum

recreational load. Therefore, we propose to determine the ecological assessment of the natural complexes of «Serednie Pobuzhzhia» RLP according to psychological, aesthetic and geographical and aesthetic criteria.

#### MATERIALS AND METHODS OF RESEARCH

Based on cartographic materials, local lore, stock and literary sources, catalogues, practical (field) survey, field diaries, methodological recommendations, an ecological assessment of the natural complexes of «Serednie Pobuzhzhia» RLP within the boundaries of Tyvrivska and Sutyska village territorial communities of Vinnytsia region was carried out.

**Research methods** – analytical, descriptive, comparative, expeditionary, statistical, field, cartographic, key sites, landscape and ecological.

**Object of study** – existing natural (natural), natural-anthropogenic, anthropogenic ecosystems and landscapes of structural elements of the ecological network of «Serednie Pobuzhzhia» RLP within Eastern Podillia.

#### RESULTS AND DISCUSSION

**According to the physical and geographical zoning of Ukraine** (2005), «Serednie Pobuzhzhia» RLP is part of the Middle Buh forest-steppe region of the Dniester–Dnipro forest-steppe edge of the forest-steppe zone of the Eastern European plain landscape country [9].

**According to the geobotanical zoning of the territory of Ukraine** (2003), «Serednie Pobuzhzhia» RLP belongs to the Central Podilskyi District of hornbeam-oak and oak forests and dry meadows of the Ukrainian forest-steppe subprovince of the Eastern European forest-steppe province of oak forests, steppe meadows and meadow steppes of the Forest-steppe subregion of the Eurasian steppe region [10].

**Administrative location.** Sutyska settlement territorial community and Tyvrivska settlement territorial community of Vinnytsia district, Vinnytsia region. «Serednie Pobuzhzhia» RLP was established by the decision of

the 27<sup>th</sup> session of Vinnytsia Oblast Council of the 5<sup>th</sup> convocation No. 903 of 10.12.2009 [3].

**The area** is 2618.2 ha. The actual area is 2527 hectares. «Serednie Pobuzhzhia» RLP (2618.2 ha) includes 5 nature reserve objects and territories (NRT) with an area of hectares (*Table 1*) [3].

**General description.** Based on the results of landscape and ecological studies, we note that the original decoration of the Pivdennyi Buh river bed is the rapids that form in places where crystalline rocks of the Ukrainian shield come to the surface of the riverbed. They often form cascades of 3–5 separate parts and stretch for a distance of 1–3 km. In the hollow sections, the channel slope is 1–30, and the flow speed is 3–4 m/s. The vegetation is characterised by blue-green algae, pondweed, and sometimes overgrown reeds and sedges. The rapids of «Serednie Pobuzhzhia» RLP are partially destroyed, especially by the construction of hydraulic structures: Tyvriv village. At the same time, the Pivdennyi Buh is the only river not only in Ukraine but also in Central Europe where the rapids have been preserved in their unaltered natural state. Individual blocks of granite rise up to 1.5 m above the water, often so close to each other that you can walk across them from one bank to the other. Rapids are found not only in the riverbed, but also in the floodplain adjacent to them. Only here is the space between the granite blocks filled with gravelly sand and clay deposits. The first time you see such a floodplain, it seems that you are in a 'cemetery' of rapids. During floods, stone and clay floodplains resemble ordinary

rapids on a river. There are also islands in the channel of the Southern Buh. Their shapes are varied, their height above the water's edge is up to 3–3.5 m, and their area is small – up to 0.1–0.2 hectares. The islands are based on granite rocks overlain by sand and clay deposits, sometimes by silt. During spring floods, they are flooded, and a lot of ice accumulates here. The flora of the islands is not rich in species: there are various types of willow, black alder, aspen, blackberries, dioecious nettle, creeping wheatgrass, wild hops, etc. The islands are used for grazing cattle, harvesting firewood and vines, and gathering blackberries and medicinal plants. Sometimes their territory is used for recreation. The slopes of the Southern Buh Valley are richly endowed with picturesque areas with valuable forest and plant communities, ancient geological outcrops, groundwater sources, and ancient and exotic tree species [4; 5].

**Vegetation and flora.** The vegetation cover of the park is represented by the following vegetation types: forest, meadow, wetland, rocky steppe. It is formed by the representatives of boreal (taiga), non-moral (broad-leaved forests), and pontic (steppe) flora.

Boreal flora elements include: double-leaved vesnevka, fluffy honeysuckle, common quinceañera, medicinal bush, thin broom, common eagle's-eye, common pine, European spruce, etc.

Among the non-moral species are common: warty cowberry, European birch, common hornbeam, common pear, common oak, field maple, heart-leaved linden, hazel, forest apple, sycamore, common ash, dark lungwort, hairy sedge, scopolia carniolensis, etc.

Table 1. Objects of the nature reserve fund that are part of «Serednie Pobuzhzhia» RLP

	List of protected areas included in the territory of «Serednie Pobuzhzhia» RLP	Area, ha
«Serednie Pobuzhzhia» Regional landscape park	«Zakruta» Botanical reserve of local importance	44.0
	«Krutoskhyly» Botanical reserve of local importance	25.5
	«Sutys'kyi Park» Park-monument of landscape art of local significance	20.0
	«Beech Grove» Local botanical nature monument	1.0
	«Beech forest» Local botanical nature monument	0.7
	Number of objects, pcs: 5	91.2

The forest ecosystems of the park occupy about 1/3 of the area, where representatives of non-moral flora dominate, subdominant plants are boreal flora (subora), and in some places there are alder trees. The forests here include: birch forests dominated by oaks and hornbeams, oak forests dominated by common oak, oak and birch groves, pine and oak forests (pine and spruce are found mainly in artificial plantations), and alder forests found in wetlands and waterlogged areas. Forest vegetation is spread in relatively small areas. The most common species in the forests are: common oak, rock oak, hornbeam, sharp-leaved maple, warty birch, common ash, heart-leaved linden, birch, black alder and others. The hornbeam-oak forests, or chestnut forests, are confined mainly to elevated relief elements. In older areas, they have two-tiered stands. The first tier is composed of common oak with an admixture of common ash, sharp-leaved maple, and common sycamore. The second tier is based on common hornbeam. It is mixed with heart-leaved linden, field maple, birch and rarely aspen, cherry and wild apple. But most often, the stands of this formation are secondary, single-tiered, with the undivided dominance of the common hornbeam. The undergrowth of hornbeam-oak and hornbeam forests is formed by: warty cowberry, European cowberry, pigweed, hazel, blood-red hawthorn, true turf, less often Tatar maple, dog rose, black elderberry, common bird cherry, etc. Grass cover (projective coverage of 20–30%) is formed by: hairy sedge, mountain sedge, parva sedge, common fescue, female bindweed, forest starflower, fragrant daisy, collective bentgrass, European undergrowth, double-leaved springwort, common quackgrass, European bindweed, which act as dominants and condominiums in the respective clump associations. Oaks (oak forests) have two-tiered stands. The first tier is dominated by common oak. It is accompanied by common ash, warty birch (with a significant amount of the latter, forests are called clumps), and sycamore. In the second, sparse layer, there are common hornbeam, heart-leaved linden, field maple, sharp-leaved maple, smooth elm, and forest apple. The undergrowth is formed

by blackthorn, tatar maple, warty cowberry, European cowberry, black elderberry, hazel, and less commonly by such mediterranean species as true turf, viburnum, scumpia, and swede. The dominant and dominant species of the grass cover include hairy sedge, mountain sedge, river gravelat, female bindweed, fragrant violet, common fescue, may lily of the valley, grey blackberry, broad-leaved bramble, European bentgrass, dark lungwort, etc. The park is characterised by oak forests of swede-mountain ash and hazel-mountain ash, which are confined to the birch terraces of the Pivdennyi Buh. They are often 80–100, 95–125 and 160–200 years old [6; 7].

The park protects phytocoenoses listed in the Green Book of Ukraine (GBU). These are typical associations of oak forests of svydynsko-hirsko-osokovy oak and svydynsko-parvsko-osokovy oak. Groups of rare associations of oak-hazel forests with common oak are subject to conservation here. These are old forest areas with predominance of hairy sedge, May lily of the valley, common fescue, forest starflower, common boreal species such as common quinceanera and double-leaved vesper, which are located on the southern border of the habitat, and rare mediterranean species such as parva sedge and purple-blue sparrow. Rare status is also given to the associations of the hornbeam-oak forest with hair sedge and the hornbeam-oak forest with ash. These are old areas of central European forests growing in the Serednie Pobuzhzhia. Its eastern border reaches the left bank, and the southern border coincides with the steppe zone [11; 12].

Subora are pine and oak forests. Their stands are two-tiered. In the first tier there is common pine, sometimes warty birch, and in the second tier there is common oak. Undergrowth consists of warty birch, European birch, dyeing ditch, russian zinovita, common mountain ash, brittle buckthorn, black elderberry and others. In the herbaceous and shrub layer, there are common eagle's-eye, double-leaved vernalis, wild strawberries and others [7].

Alder forests are one of the indigenous plant communities of the Pivdennyi Buh

floodplain. They are formed mainly by black alder and only occasionally by grey alder. The composition of the stand distinguishes between pure black alder forests, with a small admixture of other species and shrubs, and complex forests, with a significant admixture of other tree species and well-developed undergrowth. Pure black forests are more common. They are often found in swampy and waterlogged areas and are confined to river floodplains and depressions with a high groundwater table.

Meadow vegetation in the middle reaches of the Pivdennyi Buh and its tributaries is distributed in small areas in floodplain terraces and gully bottoms. It occupies 11.7% of its total area. According to the phytotopological classification of meadows adopted in Ukraine, they are divided according to their location on relief elements, similarity of plant growth conditions, composition of grass stands and crops, and technical condition of the land. According to this classification, the park's meadow communities include: steppe and meadow pastures on the slopes of beams, lowland meadows, lowland bogs, floodplain meadows of medium and large rivers, floodplain meadows of small rivers and beams.

Steppe vegetation is preserved on the slopes of ravines, gullies, and specific granite outcrops. It has a meadow-steppe character and is typical of the forest-steppe zone. The steppe elements include: spring mountaineer, russian zinnia, slender keleria, fescue (fescue), false cartilaginous milkweed, mountain sedge, low sedge, steppe timothy, pannonian chyna, drooping sage, etc. The vegetation of steppe and meadow pastures on the slopes of the gullies is largely determined by environmental conditions. On the wetter and cooler northern slopes, the following are common: red fescue, furrowed fescue, narrow-leaved bluegrass, slender keleria, thin bentgrass, creeping wheatgrass, ground clover, meadow clover, creeping clover, horned lambsquarters, yellow alfalfa, hop alfalfa, meadow chin, and many herbs. On the dry southern slopes grow: tuberous bluegrass, annual bluegrass, furrowed fescue, early sedge, yarrow, austrian wormwood, steppe sage, ukrainian thyme, common

thyme, caustic stonecrop, vine spurge, etc. [3; 6].

Lowland meadows are not widespread and are confined to the lowlands of the floodplain terraces of the Pivdennyi Buh. They are moistened by precipitation and runoff water, temporarily waterlogged, and often swampy. The main species that form the grass stands of these meadows are: eastern fescue, fescue furrow, white bentgrass, creeping wheatgrass, various sedges, Gerard's sytnik, meadow fox-tail, spaced mowing grass, etc.

The floodplain meadows of the Pivdennyi Buh and its tributaries are located on the elevated elements of the floodplain relief, mostly dry, insufficiently moist, on the middle elements — more levelled, sufficiently moist, and on the lower elements — often waterlogged. The grass stands of these meadows are formed by sheep fescue, meadow kekeriac, bluegrass, awnless bentgrass, and collective bentgrass, and in wet areas — meadow foxtail, meadow timothy, white bentgrass, red fescue, soddy bentgrass, hybrid clover, meadow clover, creeping clover, and many herbs.

Sedges, reeds, beckmania and other grasses are common in the marshy elements of the floodplains. Lowland bogs are common in the floodplain of the Southern Buh and in the gullies, which provides them with rich mineral nutrition and diverse floral composition. Among the phytodiversity there are many valuable forage species (marsh bluegrass, multicoloured bluegrass, slender keleria, meadow clover, creeping clover, thin bentgrass, meadow chin, creeping wheatgrass, awnless fescue, common beckmannia), ornamental (marsh cocksfoot, meadow loosestrife, marsh forget-me-not) and medicinal species (river gravelat, marsh samples, marsh puddleweed, three-parted succession). The lowland bogs are dominated by sedge vegetation with an admixture of common backmania, soddy pike, common reed, big bentgrass, umbelliferous susan, plantain and other moisture-loving plants. In some places, large areas are covered with common reed. For some types of wetland ecosystems, there is a problem of establishing scientifically sound haymaking.

**Fauna.** The site was originally characterised by a wide variety of aquatic, near-water, forest and meadow fauna, some of which is part of the hunting and fishing fauna. The geographical location and biotopic diversity of the territory of «Serednie Pobuzhzhia» RLP determine the richness of its fauna. The core of the fauna is made up of representatives of forest, aquatic and shrub complexes with a significant participation of open space species (inhabitants of agrocenoses, open slopes of ravines, gullies, hills), as well as synanthropic species. The dominant typical and more or less evenly distributed species in the study area are mammals: grey hare (rusak), red fox, squirrel, stone marten, forest marten, european roe deer, spotted deer, wild pig, hedgehog, muskrat, European mink, river beaver, badger, forest ferret, steppe ferret, polecat, hamster, weasel, mole, field mouse, bats [3].

The avifauna is quite rich and diverse, especially in forest areas. The dominant species in the forests are: great woodpecker, lesser woodpecker, variegated woodpecker, black woodpecker, blackbird, song thrush, great tit, blue tit, shepherd's pigeon, black-headed warbler, field sparrow, eastern nightingale. Typical species include chaffinch, sheepfinch, nuthatch, nuthatch, bullfinch, common fescue, vireo, flycatcher, jay, and cuckoo. Birds of prey include buzzard, great hawk, and in some places, harrier, black bunting, osprey and pygmy eagle. Among the synanthropic avifauna, it is appropriate to distinguish the following: urban swallow, rural swallow, white stork, grey crow, rook, eider, sparrow, nightingale, and grey pigeon. A significant group of rare bird species appears in the core area during seasonal migrations [8].

The fauna of reptiles and amphibians has been studied insufficiently. It is known that the common boa constrictor, nimble lizard, green lizard, and copperhead, which are listed in the Red Data Book of Ukraine (RDBU), occur in the core area. Amphibians are represented by grass frogs, pond frogs, lake frogs, sharp-finned frogs, red-bellied toads, grey toads, green toads, garlic toads, common newts and crested newts [13].

More than 20 species of fish can be found in the Pivdennyi Buh river, its tributaries and ponds. The most common fish species are the carp family: silver crucian carp, common crucian carp, white crucian carp, common silver bream, common bluegill, russian silver bream, European carp, lake tench, common silver carp, common carp, common rudd, common chub, common dace, common silver bream, common roach, common white dace, common roach, common roach, common roach, common roach, common roach, roach family: common ruff, common pincer; perch family: common loach, river perch, pike perch; pike family: common pike; catfish family: common catfish.

A significant number of vertebrates are valuable commercial and hunting animals. Mammals include martens, muskrats, beavers, badgers, deer, wild boars, roe deer, wolves, foxes, hares, and birds include the goose, white-fronted geese, great geese, ducks, coots, water hens, pheasants, mink, shepherds, waders, pigeons, and others.

The modern vertebrate fauna of the park is represented by the following families: amphibians – frogs, toads; reptiles – lizards; birds – pigeons, shepherds, ducks, herons, cuckoos, grey-headed cuckoos, hoopoes, woodpeckers, crows, starlings, finches, swifts, thrushes, swallows; mammals – moles, shrews, martens, martens, dogs, deer, hares, squirrels, mice, hamsters. Among the rare insects that require protection, it is appropriate to mention dragonflies, common mantis, bumblebees, rhinoceros beetle, deer beetle, mahogany, peacock eye, horn beetle, and podaliria. The centuries-long exploitation of faunal resources has led to their depletion. The list of animals subject to protection includes: common beaver, european elk, steppe ferret, river otter, podilsky blind, kibchyk, great and lesser grey heron, osprey, grey goose, black stork, mute swan, some species of ducks, steppe viper, forest snake, and a significant number of insects [3].

Using the guidelines for the aesthetic assessment of the park's territory, we assessed the landscapes, taking into account psycho-aesthetic and geographical-aesthetic criteria [14].

According to the psycho-aesthetic assessment, the average score for each criterion was determined:

1) calmness (C) – 4 points (very picturesque landscape that promotes long-term calmness, relaxation and contemplation);

2) admiration (A) – 2 points (the landscape is quite expressive, but it does not evoke admiration, awe, or a sense of sacredness);

3) virginity (V) – 2 points (there is a sense of remoteness from civilisation, but no sense of wildness or virginity);

4) spiritual upliftment (E) – 2 points (sounds and smells of nature are mixed with sounds and smells of civilisation, which causes a certain spiritual upliftment).

The sum of the average scores for all criteria is 10.

According to the geographical and aesthetic assessment, the average score for each criterion was determined (Table 2).

The total score of the aesthetic assessment is 24, including the psychological and aesthetic assessment – 10 points, geographical and aesthetic assessment – 14 points.

According to the methodological recommendations [15], three types of landscapes of natural complexes such as park, forest and

non-forest are defined on the territory of «Serednie Pobuzhzhia» RLP.

The *park type of landscape of natural complexes* includes natural complexes and objects of the nature reserve fund that have appropriate arrangement (a network of paths and tracks with different surfaces – asphalt, gravel, or soil arrangement). This type of landscape of natural complexes includes: the equipped park-monument of landscape art of local importance «Sutys'kyi Park» (20 hectares), dendrological plots, forest park areas, monuments of historical and cultural heritage, green spaces of healthcare facilities, forest ecosystems of green areas.

The *forest landscape type of natural complexes* includes forest and shrub ecosystems, forested coastal protection zones, and forest belts. Recreational digression stage 2, recreation coefficient 6–10%. During the Sheshory-Podilski, ArtPole, and Mlynomania ethno-festivals (8–10 thousand people create a recreational load every year in May–July), the recreational digression stage is 3, and the recreation coefficient is 11–30%.

The *non-forest landscape type of natural complexes* includes: steppe and meadow phytocoenotic fund, pastures, hayfields,

Table 2. Geographical and aesthetic criteria for landscape assessment in «Serednie Pobuzhzhia» RLP

№	Criterion	Score
1	Harmony of natural and anthropogenic objects	2
2	Presence of picturesque tracts, secluded corners on the territory, where it is pleasant to relax, enjoying the beauty of nature	2
3	Presence of sights on the site: bizarre rocks, rapids, centuries-old trees, clusters of charming plants, flowers, historical and cultural monuments	2
4	Presence of observation platforms on the territory with beautiful views	2
5	Expressiveness of the terrain	1
6	Expressiveness of water bodies	2
7	Diversity and alternation of phytocoenoses: forest, herbaceous-shrubby, meadow (marshy, floodplain, grass-grass, dry), coastal-water, psammophytic, xeromesophytic, agrophytocoenoses (segetal and ruderal types)	2
8	Diversity of fauna of the territory	1
<b>Total score by criteria</b>		14

glades, floodplains of the Pivdennyi Buh river and its tributaries within the RLP, floodplain terraces, slopes, non-forested coastal areas, ravines, beams, hills, and canopies. Recreational degradation stage 2, recreation coefficient 6–10%. During the Sheshory-Podilski, Art-pole, and Mlynomania ethnofestivals, in some

places, the stage of recreational digression is 3, and the recreation coefficient is 11–30%.

The maximum recreational load on natural complexes within «Serednie Pobuzhzhia» RLP according to the methodological recommendations [14] is presented in *Tables 3 and 4*.

**Table 3. Maximum recreational load on natural complexes within «Serednie Pobuzhzhia» RLP by distribution of landscape types**

Distribution of natural landscapes Type of landscape	Degree of sustainability	Maximum recreational load depending on the stage of degradation, person-day/ha				
		I	II	III	IV	V
Park	1	44.4	35.2	20.2	10.8	4.4
	2	27.8	22.0	12.6	6.8	2.8
	3	13.9	11.0	6.3	3.4	1.4
	4	4.4	3.5	2.0	1.1	0.4
	5	2.2	1.8	1.0	0.5	0.2
Forest	1	22.4	17.8	10.2	5.5	2.2
	2	14.0	11.1	6.4	3.4	1.4
	3	7.0	5.6	3.2	1.7	0.7
	4	2.2	1.8	1.0	0.5	0.2
	5	1.1	0.9	0.5	0.3	0.1
Non-forest	1	31.7	25.2	14.4	7.7	3.2
	2	19.8	15.7	9.0	4.8	2.0
	3	9.9	7.9	4.5	2.4	1.0
	4	3.2	2.5	1.4	0.8	0.3
	5	1.6	1.3	0.7	0.4	0.2

**Table 4. Maximum recreational load on the territory of «Serednie Pobuzhzhia» RLP in the organised form of recreation**

Normalised component of the landscape and type of its use	Man-day/ha
<b>I. Road and alley system:</b>	
1. With hard surface and viewing platforms:	
a) 8–12% of the area	120
b) 12–15% of the area	150
2. Paved without observation platforms:	
a) 8–12% of the area	100
b) 12–15% of the area	130
3. Unpaved with observation platforms:	
a) 8–12% of the area	70
b) 12–15% of the area	90
4. Ground without observation platforms	
a) 8–12% of the area	50
b) 12–15% of the area	30



## CONCLUSIONS

The criteria for assessing the natural complexes of «Serednie Pobuzhzhia» RLP, which are subject to special protection, should be based on ecosystem, landscape-ecological and zoological approaches. The theoretical and methodological basis for these approaches is the determination of the recreational load on the park's landscapes, as their components – rocks, various forms of relief, climatic conditions, surface and groundwater, soils, biotic diversity – are in constant interaction at the material and energy level. They are constantly interconnected, so we must take into account all types of ecosystem services in order to preserve and take into account the specifics of recreational nature use.

The main criterion for assessing the territory should be the biotic and landscape (uniqueness criterion) geozological representativeness of «Serednie Pobuzhzhia» RLP, which is ensured by: 1) the presence of all natural components, partially degraded, where the process of renaturalisation is taking place, characterising a certain natural or anthropogenic landscape; 2) the diversity of natural and anthropogenic landscapes as carriers of biogenetic and coenotic diversity and historical and cultural heritage. The problem of preserving the biodiversity of agricultural landscapes, which account for about 50% of the park, and the use of an ecosystem approach to the formation and implementation of a sustainable local ecological network is of particular importance; 3) a high degree of self-regulation and self-restoration of low-anthropogenic landscapes.

The basins of small rivers, which are tributaries of the Pivdennyi Buh river, have a great

potential for the rehabilitation of natural complexes and the formation of an ecologically safe framework for the park's ecological network. Therefore, the implementation of a programme to optimise land use and ecological stabilisation of small river basins based on the basin management principle, in accordance with the EU Water Framework Directive, can become the basis for the formation of an ecological framework for the entire Eastern Podillia. In order for this area to be scientifically coherent and represent representative biotic and landscape diversity within the structure of the Buh longitudinal natural corridor of the National Ecological Network, and in the future the Emerald Network, it is necessary to expand the area of «Serednie Pobuzhzhia» RLP to include «Nemyrivske Pobuzhzhia» RLP (5678 ha), creating a national nature park (NNP). It is advisable to include the existing reserves: 3 landscape reserves (362.3 hectares), 1 forest reserve (295 hectares), 3 botanical reserves (86.7 hectares), 1 ornithological reserve (133 hectares), for a total of 8 reserves (877 hectares); 1 botanical nature monument (0.8 hectares), and 3 protected areas (66 hectares). The total area of protected areas should be 943.8 hectares. According to the results of the research, the area of the NNP should be 16730 hectares. According to the administrative division, the territory of the newly created NNP will be located within Vinnytsia (from the village of Sutisky) and Haisyn (Rayhorod village) districts of Vinnytsia region; according to the geomorphological division, it will be located within the Volyn-Podilskia Upland and stretches along the valley of the Pivdennyi Buh River.

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