

==== **METHODS OF SUSTENANCE AND RESERVATION OF ECOSYSTEMS** ====
AND THEIR COMPONENTS

UDC 574.2

**ASSESSMENT OF THE “ELK ISLAND” NATIONAL PARK’S
ECOSYSTEM FUNCTIONS**

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The role of ecosystems’ functions produced by specially protected natural territories is increasing under constantly growing anthropogenic pressure. It is necessary to identify these functions and assess their contribution to ensuring a high quality of people’s life, especially, from the point of their “competitiveness” comparing to other benefits of natural origin. The “Elk Island” National Park is the largest undisturbed natural site in the vicinity of Moscow, which strongly affects the regulation of the local and regional natural processes. The park’s providing services are presented by limited timber harvesting, licensed fishing, wild plants and non-wood forest products harvesting, as well as by the function of genetic resources storing. Regulating functions include control over the flows of substance and energy, together with air and water quality, as well as habitat conservation, pollination, biological control, etc. The park’s most demanded functions are recreation and tourism development from the group of cultural services. The assessment of ecological services produced by the natural ecosystems of the “Elk Island” was based on the theory of total economic value, which helps to monetize the benefits received by society from specially protected natural areas, taking into account the direct and indirect use of natural goods and the maintenance cost of the park’s territory. As a source materials for the study region we used statistical data, results of our field researches that took place in 2019-2020, data of a sociological survey, official materials of the “Elk Island” National Park and satellite images for the said area. The obtained estimations of the direct and indirect costs of the park’s services confirmed the prevalence of indirect cost due to the strict nature protection regime of the territory and its significance as a recreation site. Also, we based our conclusion about high socio-ecological value of the “Elk Island” on the data from the sociological survey: the residents of the region almost unanimously believed that this park should be preserved within its current borders.

Keywords: national park, Elk Island, ecosystems’ functions, economic appraisal, concept of total economic value.

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Under the constantly growing anthropogenic load, especially in the urbanized territories with high population density, the specially protected natural areas (SPNA) are almost the last pieces of native nature. Therefore, the ecosystems natural functions are significantly important. In the recent years researchers have become more and more interested in their identification and assessment of their role in provision of the high life quality for society. Generally, it means assessment of significance of ecological functions in the natural complexes to confirm their “competitive ability” among the diverse goods of natural origin (Pakina, 2018; Timokhina et al., 2017). So, the most attention is paid to the “ecological services”, which are the ecosystem properties that define their usefulness, i.e. their ability to satisfy human needs.

It is interesting to note that “ecological services” term was previously used as a metaphor, and only when the concept of nature capital (Costanza, Daly, 1992) started spreading in the scientific community, the term became an analytical tool to identify connections between ecosystems preservation and human wealth (Iniesta-Arandia et al., 2014). This change of its meaning can be

explained; in the market economic the material products of ecosystems are considered as goods, while the non-material ones are called services. Therefore, ecological functions of natural ecosystems are features of ecosystems to produce so-called “ecological services”, the value of which has been already proven to the society; however the methods of their classification and assessment still require some improvement.

So, the “ecological services” (ES) are the complex of material and non-material goods that society receives from ecosystems. Along with the material ones, such as clean air, fresh water, food and fuel, the ES include some non-material goods, such as erosion and flooding protection for the lands, climate regulation, pollination of agricultural plants and some more, as well as a spectrum of possibilities for cultural, moral, scientific and recreational activities (De Groot et al., 2010). Therefore, the literature usually defines the “ecological services” as a contribution that ecosystems structures and functions (together with other factors) make to human wealth (Bobylev, Zakharov, 2009), essentially representing a possible interpretation of the role that ecological functions of nature play in the market relations.

To this day some classifications of ecological services have been developed. For example, in the “National Strategy for Biodiversity Preservation in Russia” (2001) there are 4 groups of life-supporting functions of biological diversity: productive (production of biomass which is taken from the ecosystems for human use), environmental (support of biogeochemical cycles, gas balance and atmospheric humidity, formation of stable hydrological regime in the territories), informational, and spiritual-aesthetical (information valuable for humans and some other non-material goods). The classifications created by the international project “The Economics of Ecosystems and Biodiversity” (TEEB, 2008), the report “Millennium Ecosystem Assessment” (2005) and others are also widespread. According to classification data, the grouping of ecological services by their characteristics can be carried out the following way (table 1).

Table 1. Ecological services classification by their main characteristics (Millennium Ecosystem Assessment, 2005).

Group of services	Characteristic	Services
Providing	Material or energetic result of ecosystems functioning	production of food, fiber, fresh water, fuel and genetic resources
Regulating	Profits of ecosystems processes regulation	– regulation of air quality, climate, hydrological regime and erosion processes – water filtering – pollination
Cultural	Non-material profits obtained by humans during the straight interaction with ecosystems	– cultural diversity – spiritual and religious values – knowledge systems – educational values – aesthetical values – recreation and ecological tourism
Supporting	Support of processes necessary for production of other ecological services	– soil formation – nutrient cycle – water cycle – photosynthesis

The peculiar thing about SPNA is their ability to preserve usually unique and irreplaceable ecosystems which are a powerful source of ecological services. The main part of these services structure plays regulating, supporting and cultural roles, because in the territory of SPNA the agricultural activities are limited. For the same reason, the contribution of the specially protected areas to the direct provision of wood, food and medical raw material is relatively small. Meanwhile, the regulating and supporting SPNA services keep the profit flowing to the population of the adjoined territories; it is the maintenance of environment quality, of resource base for fishing, hunting and other ways of biological resources utilization. The confirmation of these profits produced by SPNA was found in the works of the Russian scientists even in the 1980s (Balatskiy et al., 1989) and is still studied today.

Ecosystems Functions of the “Elk Island” National Park

The “Elk Island” National Park is the largest undisturbed massif of natural ecosystems nearby Moscow. It significantly affects regulation of the local and regional natural processes, improving the ecological situation and life quality of human population. The classification of ecological services provided by SPNA can be seen above, divided into 4 groups by their functions: productive, environmental, informational, spiritual-aesthetical. The analysis of the “Elk Island” territory showed that the range of ecological services provided by its natural complexes functioning is traditionally wide, which is determined by its relatively undisturbed ecosystems on the one hand, and high demand for most of its functions due to the park location on the other (table 2).

Table 2. Ecosystem services of the National Park «Elk Island».

No.	Group of services	Services
1	Providing	– fibers (wooden and non-wooden forest products);
2		– food forest resources;
3		– genetic material
4	Regulating	– water regulation functions;
5		– regulation of air quality (carbon dioxide depositing);
6		– pollination;
7		– biological control;
8		– preservation of habitats and conditions for the rare and agriculturally valuable wild animal species
9	Supporting	– photosynthesis;
10		– soil formation;
11		– regulation of energy streams and nutrients
12	Cultural	– recreation;
13		– scientific value;
14		– educational value;
15		– aesthetical value;
16		– spiritual value;
17		– healthy impact of recreation

Within the boundaries of the “Elk Island” its providing services are represented by the very limited possibilities of wood harvesting, licensed fishing, wide plants and non-wooden products

harvesting. And yet all of them are more or less put into use, for recreation activities in particular, which are common in the national park due to its protection status. The more significant is its function of genetic resources preservation; genetic data contained in the natural complexes is the main condition of the regional biodiversity preservation.

The regulating functions of the park are represented primarily by regulation of energy streams, local climate (through carbon dioxide depositing as well), air and water quality. Moreover, habitats and conditions preservation for the rare and agriculturally valuable species of wild animals, as well as pollination and biological control (of pests population) are very important. Along with the regulating functions of SPNA the supporting ones are used by society indirectly, so usually they remain unnoticed, while being realized during the most significant functions of ecosystems.

The “Elk Island” is located in the slightly wavy plain of the southern slope of the Klin-Dmitrov Ridge. The most of its territory (more than 80%) is covered with forests of the southern sub-zone of mixed forests (Karpukhina et al., 2013). A significant area of the park is occupied with extremely humid soils and thick network of rivers, lakes and ponds (photo). The main water bodies are the Yauza River with its left inflow Ichka and the Pekhorka River. The Yauza flows out of the large Mytishchi Bog, which was used for the long-term peat digging. In the Yauza and its inflows valley the low bogs are prevalent, while the high ones are widespread on the watershed elevations.



Photo. Torfyanka Lake in the «Elk Island» National Park (photo by A. Pakina).

The most noticeable functions of the “Elk Island” are recreation and tourism; thus, the ecological services from the cultural category are also represented well enough. Diverse forest sceneries, abundance of water bodies and valleys of small rivers and good accessibility for vehicles make the park an attractive place for mass tourism.

The park provides a variety of educational and entertainment projects. It has 8 ecological centers, including an arboretum and an Elk Biostation, and offers 10 routes for sightseeing on the eco-trails, 2 historical museums of Russian everyday life, ecological quests and entertainment programs (National Park ..., 2006). Aside from the direct good impact of recreation, the guests also

receive an indirect healthy effect from visiting the park. The exploratory and educational values are also considered as cultural services, which the park provides. The “Elk Island” works with other organizations to carry out some researches; students from Moscow and Moscow Region do their internship in the park. The scientific workers of the park consult and lecture on history and natural features of the “Elk Island”. It is also worth noting that the aesthetical value of this territory is very high, providing the possibility of spiritual enrichment.

Considering the wide spectrum of ecological services, the territory of the park can be called heterogeneous. The variety of services in different parts of the “Elk Island” depends on the nature protection regime. According to the functional zoning of the park, it has 5 zones with individual set of ecological services (fig. 1):

- protected and specially protected zones with regulating functions prevailing (carbon dioxide depositing, water regulation, habitats preservation);
- agricultural zones and areas of protected historical-cultural objects with cultural functions prevailing (recreation, its healthy impact, spiritual value);
- recreational zone with the full range of ecological services (providing, cultural and regulating).

We should also emphasize that carbon dioxide depositing and regulation of ground waters take place everywhere around the park, regardless to one specific functional zone. Moreover, the entire territory is of high spiritual value, although the profits of ecological functions, providing the so-called “cultural services”, are mostly pronounced in the functional zones where the constant presence of big amount of people is supposed; these are the areas of protection of historical and cultural objects and agriculture. In the areas with limited access (protected and specially protected zones) the producing of regulating ecological services comes to the fore.

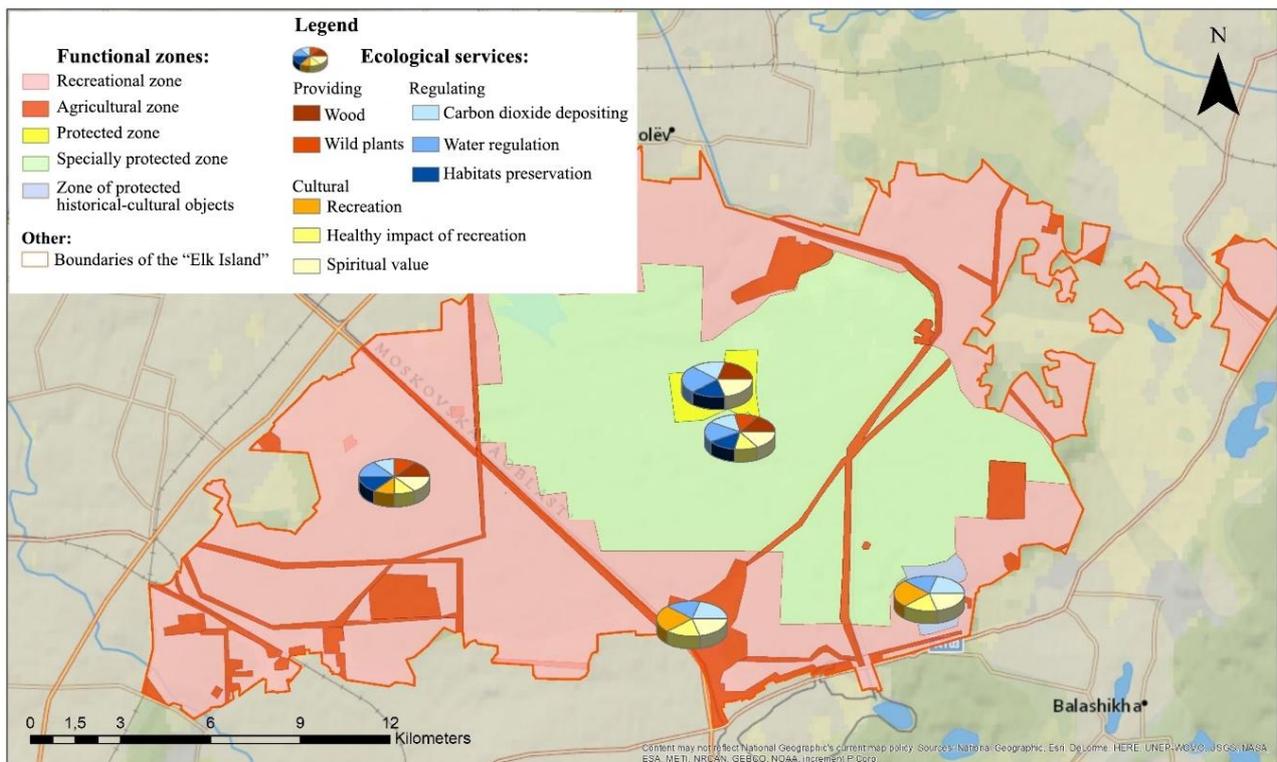


Fig. 1. Prevailing groups of ecosystem services in different functional zones of the «Elk Island» National Park.

Materials and Methods

To assess the ecological services, produced by the natural ecosystems of the park, we used the concept of total economic value. It allowed us to monetize the profits that society receives from the existence and functioning of the specially protected natural areas, considering the direct and indirect utilization of natural goods and the cost of the territory. The cost of direct utilization was assessed with the method of direct market-based valuation (method of market prices); the cost of indirect utilization was assessed with the methods of alternate value, benefits transfer, substitution method and conversional-volumetric method. The cost of existence was calculated with the method of subjective estimation of the population's readiness to pay for preservation of the territory in its original state. All calculation proved the prevalence of the indirect cost of natural goods utilization in the territory of the park, which corresponds with the already existing estimations carried out in other local and foreign SPNA (Zavadskaya et al., 2017; Payment for ..., 2009) and established the necessity to preserve natural complexes due to their ecological significance.

The source materials for our assessment were the public statistic data of the research region, results of field studies that we carried out in 2019-2020, sociological survey data, obtained through Internet and "Google.Forms" service, materials from the official web-page "National Park Elk Island" (2006), satellite imagery for the research territory, and methodical works, such as "Guidelines for National Greenhouse Gas Inventories" (2006), "Methodology for Calculating the Amount of Harm Caused to the Hunting Resources" (2011), methodical guidelines for "Assessment of Water Protection and Regulation Role of Forests" (Lebedev, Neklyudov, 2012), etc.

Results and Discussion

Assessment of Direct Cost of Ecosystems Functions. In this work the cost of natural goods direct utilization are the benefits obtained from the direct use of resources of the park's natural complexes. According to the accepted approaches, this cost includes the cost of wood and wild plants stocks and implementing of recreational function.

Cost estimation of wood stocks was made on the basis of data on the area covered with forests, which is 8464 ha. The dominant species are birch, linden, pine and spruce. According to the current legal system, every forestry activity within the boundaries of SPNA aim to preserve and increase the ecological, scientific, recreational and cultural values of natural complexes and objects (Federal Law ..., 1995). As the regulations of the "Elk Island" National Park state, the clear and partial cuttings of mature and overmature forests are forbidden in its territory. The cuttings carried as part of forest maintenance are scheduled according to the "Rules for Forest Maintenance", approved by the Ministry of Natural Resources and the Environment of the Russian Federation, No. 185, 07/16/2007. Therefore, we assessed the benefits of wood harvesting in the park with the method of market prices, i.e. calculating the value of the wood, subjected to the annual sanitary cutting. We took into account the data provided by the forestry regulations for the "Elk Island" National Park concerning the amount of sanitary cuttings (Federal Forestry ..., 1993), market prices of different wood species (Informational and Trading ..., 2012), and generally accepted amounts of production costs of wood harvesting (Tikhonova, 2018), and estimated the benefits of wood harvesting. An example of estimation for some wood species is shown in the Table 3.

Considering the diversity of wood species in the park, the annual allowable amount of their harvesting and production costs, the net benefit of wood harvesting in the territory of the "Elk Island" was about 650 thousand rubles per year.

The cost of wild plants was estimated the same way. Due to the absence of data on their stocks in the territory of the park, we used the survey data, which showed that the average volume of forest food resources is 0.3 kg/human for berries and 2 kg/human for mushrooms. Wild plants in the park

are harvested by 10% of the total amount of respondents, excluding Moscow residents. After interpolating the data on the total population of the nearest cities of Moscow Region (Shchyolkovo, Mytishchi, Balashikha and Korolyov) and considering the production costs of wild plants harvesting (35% of selling price; Zavadskaya et al., 2017), the potential cost of provisioning people with forest food resources was estimated as 27.7 million rubles/year.

Table 3. Wood harvesting costs in the «Elk Island» National Park.

Wood	Annual allowable amount of wood harvesting, m ³	Market price of 1 m ³ of wood, rubles/m ³	Value of production costs, rubles/m ³ *	Net benefits of wood harvesting, rubles
Birch	373.8	2040	1734	114383
Linden	24.2	2800	2380	10164
Aspen	52	1260	1071	9828
Spruce	324.4	2700	2295	131382

Notes to table 3: * – production costs of wood harvesting are considered 85% of its implementation cost.

A large share of the direct cost of the park is the cost of its ecological services that maintain its recreational significance. We already mentioned that due to its location in a highly urbanized region, the “Elk Island” is very recreationally attractive for the people from the nearest settlements. To determine the demand for its recreational resources, we also used the survey data, according to which the park was visited by 96% of respondents, while 24% of them visited it weekly (fig. 2).

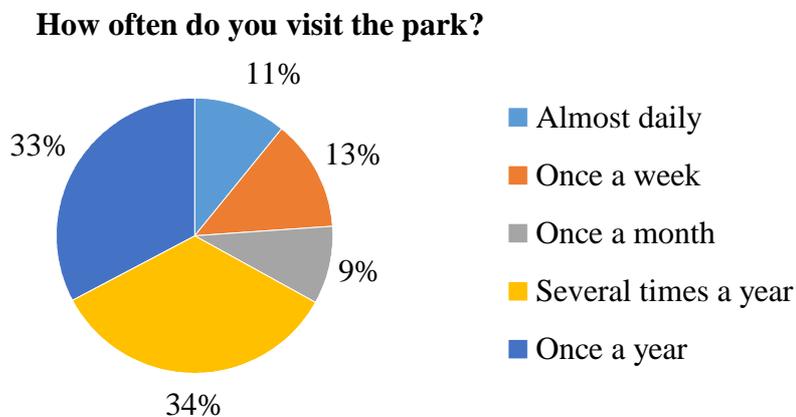


Fig. 2. Distribution of responses to the question about the frequency of visiting the «Elk Island» National Park.

To assess the benefits of recreation, obtained during the implementation of the park’s ecological functions, we used the method of market prices. In the “Elk Island” the benefits are received primarily by the regional residents. The net benefit of the park was calculated as a difference between the income from the ecological-educational programs made for the visitors, and expenses on the organization of these programs. We considered that the expenses on the organization of sight-seeing routs and educational tourism are 85% of the total income (Zavadskaya et al., 2017).

According to the data of the “Elk Island” National Park, 42,778 visitors attended the

educational programs in 2018. On the basis of the survey results, we calculated the percentage of visitors who attended every program in the park. The most popular was “The Elk Biostation” program, attended by 21% of survey participants, while the other programs were mentioned by 8 to 2% of visitors. The other popular ones were the eco-trail “Such a Familiar Forest” and ecological centers “Tea Party in Mytishchi” and “Peat Enterprise”. The obtained data was also interpolated to the total amount of visitors who engaged in the paid programs, so we were able to determine the potential income from the ecological-educational activities in the park. Considering the production costs to organize the said programs, the recreational benefits were 2.3 million rubles/year. Since the average readiness of the local residents to pay to visit the park is 50-100 rubles/day, we concluded that the locals have zero consumer surpluses. Therefore, the total cost of the direct (implemented and potential) utilization of the “Elk Island” National Park, is about 30.7 million rubles/year.

Assessment of Indirect Cost of Ecosystems Functions. It is harder to monetize the benefits from the indirect ecosystem services utilization in SPNA than from the direct one. In the “Elk Island” National Park some ecological functions are undoubtedly valuable, including deposition of carbon dioxide, water regulation, preservation of animal habitats and healthy recreation impact. In the current conditions of changing climate and increasing human population, these functions of natural ecosystems become more and more important. Despite the controversial reasons for global changes (either anthropogenic or natural), the growing concentration of greenhouse gases is considered to be a proven cause of increasing air temperature. Apart from water vapor, CO₂ has a large share in the ratio of greenhouse gases, and therefore carbon dioxide depositing in the natural processes is often seen as a significant benefit from the prevented economic damage. Thus, the “Elk Island”, most of which territory is covered with forests, is a natural reservoir absorbing carbon from the atmosphere. Since the natural forests are more capable of depositing than the artificial ones, the role of the “Elk Island” as well as of other SPNA with forest ecosystems, will grow with time. Considering that the base for environmental management is the analysis of the modern condition of ecosystem cover and its dynamics under climatic changes (Kuzmina, 2017; Pakina et al., 2019), the assessment of the role that ecosystem functions play is an important condition for their preservation.

We already mentioned that in the territory of the “Elk Island” there are 8,464 ha of natural forests. With the help of the available data on the local species composition and indicators given in the “Guidelines for National Greenhouse Gas Inventories” (IPCC, 2006), we estimated the carbon stocks in the wood phytomass in the study area. According to our preliminary results, 1 ha of forest in the park territory accumulates about 90 tons of carbon on average, or 329 tons of carbon dioxide. So, the park forests deposit 21.4 thousand tons of carbon or 78.3 thousand tons of CO₂ per year. Considering that 1 ton of CO₂ is 5.9 USD/year on the world market (State of ..., 2013), the total cost of carbon depositing in the ecosystems of the “Elk Island” is 34.9 million rubles per year or 462 thousand USD.

The regulation of hydrological regime is another important function of natural ecosystems. One of the options to assess the ecosystems role is to calculate the forests contribution to the average annual increase of groundwater flow. When forests transform the surface flow to the ground one, they decrease the risk of flooding during the high water period, increase the rivers flow during the low-flow period, prevent bogging and improve soil drainage, which can be considered as water regulation. We assessed the forests water regulating function in the “Elk Island” using the method of determining the groundwater flow increase (Lebedev, Neklyudov, 2012). Generally, the value of its average annual increase (ΔS) is a difference between the actual flow on the watershed covered with forest and the theoretical ground flow on the territory without forests. The calculations were carried out, taking into account the coefficient of the river flow and its increase, the level of territory bogging, and the coefficients that correct the data on the forests by their age, quality of locality and stand density.

We used satellite imagery to estimate the thickness of forest cover. The precipitation increase

(0.1) and some other coefficients were used as shown in the “Methodical Guidelines” (Lebedev, Neklyudov, 2012). The value of ground flow increase was calculated separately for coniferous and deciduous groups, then the economic effect was determined.

To estimate the economic effect produced by the said function of the forest, the economic equivalent should be determined, i.e the cost of 1 m³ of water. Considering the time index, the effect can be calculated as shown below:

$$\Theta_B = \Delta S \cdot t_i \cdot d_i \cdot r \quad (1),$$

where t_i is the duration of the i -group of age; d_i is the discount factor; r is the cost (water rent) of 1 m³ of water.

The results of ground flow increase and value of economic effect are presented in the Table 4.

On the basis of this approach, we calculated the cost of water regulating function for each age group of coniferous and deciduous forests. The data on the forest areas, covered with one of each species, was verified with satellite imagery and field researches. The total cost of water regulation in the “Elk Island” was 1.97 milliard rubles or 26.7 million USD.

The next stage was to assess the benefits from the preservation of habitats. The national park plays a major role in preservation and producing of rare and game species in Moscow Region. The assessment was carried out through determination of reproduction value of populations.

Table 4. Changes in groundwater flow for different age groups of coniferous and deciduous forests within the boundaries of the «Elk Island» National Park.

	Coniferous forests				Deciduous forests			
	young	average	ripening	mature	young	average	ripening	mature
$\Delta S, m^3/ha$	104	692	982	1199	56	548	796	926
$\Theta_B, rubles/ha$	44168	232670	350667	489623	19685	150407	256127	368941

The main mammals of the park are elk, wild boar, Mustelids (weasel, marten, ermine), mountain hare and squirrel. The rare species and the ones in need of protection are represented with hazel dormouse, owls (brown owl and boreal owl), bats, pigeons, woodcock and grey-headed woodpecker (Specially Protected ..., 2004). We estimated their preservation cost on the basis of the population reproduction cost in case of any losses. All calculations were carried out according to the “Methodology for Calculating the Amount of Harm Caused to the Hunting Resources” (Methodology ..., 2011). Therefore, the amount of harm caused by extermination of a certain species can be calculated as shown below:

$$Y = T \cdot K \cdot N \quad (2),$$

where Y is the amount of harm, in rubles; T is the tariff to calculate the amount of harm done to the game animals, in rubles; K is the recalculation coefficient; N is the amount of exterminated individuals of game animals.

For our estimation we used the data on the population numbers of the main mammals of the “Elk Island” (elk, wild boar, spotted deer, fox, mountain hare, squirrel), provided by the park itself. Thus, the elk population is represented with 42 individuals, its cost standard is 80 thousand rubles/head, and the harm in case of its loss would be 20,160 thousand rubles. The total cost of preservation of the main species population is 84.1 million rubles/year. It is obvious that these results are underestimated, since the final cost of preservation and reproduction of rare and game species does not consider all aspects of their preservation significance. At the same time, these estimations allow us to determine the effect of the ecological service in the research territory to a first approximation.

We assessed the healthy impact of recreation, which is another part of the park’s indirect cost,

provided by its ecological services, by taking into account the data on its effect on people's efficiency: the number of days of temporary disability is reduced by 3.5 after the 20-day-long outdoor recreation (Bobylev, Zakharov, 2009). As we showed above, the number of park's visitors is about 3.2 million people/year. Considering the amount of the working-age population in the group of people who use the park's recreational services (57%), and the average wages in the Moscow Region (Federal State Statistic Service, 2019), we calculated the additional income for the 3.5 days which were not spent on sick leave. This approach is used worldwide and allows, at least to a first approximation, to justify the importance of outdoor recreation for people. The total cost of this service was 15.8 billion rubles or 211.3 million USD; the total cost of the indirect use of the "Elk Island" was 17,938.3 million rubles or 242.4 million USD.

While our calculations are quite conventional, which is mainly determined by the availability of required data and conjuncture of approaches developed to date, the result estimations showed a significant prevalence of the indirect cost of natural goods, located within the boundaries of the "Elk Island" National Park and represented with a range of ecological services. More than 99% of the park's total value is made up of the services produced by the ecological functions of its natural complexes; less than 1% are the resource services (providing and cultural), which is primarily determined by the environmental regime of the territory. A more complete evaluation can be obtained if a so-called cost of living is taken into account, but it also requires additional research. Nevertheless, on the basis of the available survey data we can already conclude that the "Elk Island" has a high social significance for the regional residents. For example, almost all residents of the adjacent territories think that the park should be specially preserved; 94% of survey participants agreed that the territory should be preserved (fig. 3).

**Do you think that the "Elk Island" National Park
should be specially protected?**

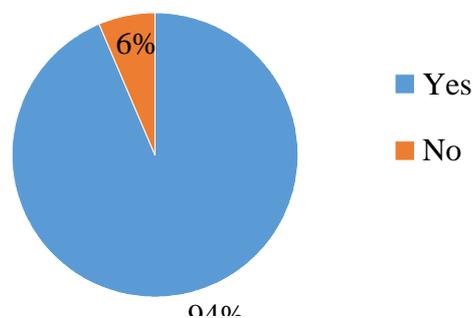


Fig. 3. Distribution of responses to the question about the need to preserve the "Elk Island" National Park.

We can conclude that most of respondents value the national park in a biocentric way, which indicates a high level of people's environmental responsibility, of their desire to preserve natural territories and improve ecological situation in the region, which is quite common for the residents of large cities.

Conclusions

This research showed that the structure of the total economic cost of ecological services of the park mostly has the features common for the specially protected natural areas. The main part of its cost (about 60%) is composed of the indirect ecological services, while the cost of direct utilization

is less than 1%, which can be definitely explained by the regime of nature protection common for SPNA. An important feature that emphasizes the social significance of the park is a high share of its existence cost in the structure of total economic cost (40%).

The “Elk Island” National Park plays a very important social-ecological role, providing the locals with clean air while absorbing most of transport pollutions, regulating hydrological regime of the territory, helping to preserve its biodiversity. The park’s contribution to improvement of environmental situation and maintenance of health of the local population, as well as prevention of harm caused by negative anthropogenic impact is expressed in a great amount of money – about 18 billion rubles/year; therefore it is another reason for preservation and development of the park. Its significance is also proved with the result of a survey, showing that people value the very existence of the “Elk Island” and are ready to help with its further preservation.

The results of our research show the important role of the park in the sustenance of ecological balance and life quality of regional population. The results of the ecological services assessment in the territory are a reason for improvement of economic methods of environmental management and territorial schemes of Moscow Region development, with the preservation of the “Elk Island” Nature Reserve being the main priority.

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