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## **INFRASTRUCTURE OF RECREATION AND SPORTS RESOURCES AS A COMPONENT OF ECOSYSTEM SERVICES**

**Abstract.** The paper considers the potential of recreational and sports resources as a component of ecosystem services provided on the territory of communities for the development of recreation and sports, the implementation of regional marketing and advertising, as well as the coordination and management of infrastructure at the regional level. The peculiarities and essence of recreational ecosystem services provided by the infrastructure of recreational and sports resources of the region, its influence on the development of physical culture and health activities of the population and the economy of the community have been highlighted. The current state of development of the sports infrastructure network and its place in the system of offering recreational ecosystem services in the region has been analysed using the example of Lviv region. The role of open sports and recreational facilities (sports grounds, training facilities, bicycle and running tracks) located in the green areas of populated areas of Lviv region for the popularization and organization of healthy physical activity of all categories of citizens through recreational activities is substantiated.

**Key words:** recreational and sports resources, recreational ecosystem services, sports infrastructure.

### **Худоба Володимир, Кучер Павло. ІНФРАСТРУКТУРА РЕКРЕАЦІЙНО-СПОРТИВНИХ РЕСУРСІВ ЯК КОМПОНЕНТ ЕКОСИСТЕМНИХ ПОСЛУГ**

**Анотація.** В роботі розглянуто потенціал рекреаційно-спортивних ресурсів як складник екосистемних послуг, що надаються на території громад, для розвитку рекреації та спорту, впровадження регіонального маркетингу та реклами, а також координації та управління інфраструктурою на регіональному рівні. Висвітлено особливості та сутність рекреаційних екосистемних послуг, що забезпечуються інфраструктурою рекреаційно-спортивних ресурсів регіону, її впливом на розвиток фізкультурно-оздоровчої діяльності населення та економіку громади. Проаналізовано на прикладі Львівської області сучасний стан розвитку мережі спортивної інфраструктури та її місце в системі пропозиції рекреаційних екосистемних послуг регіону. Обґрунтовано роль відкритих спортивних та рекреаційно-розважальних споруд (спортивні майданчики, бази для тренувань, велосипедні та бігові доріжки), що розташовані в зелених зонах населених пунктів для популяризації та організації оздоровчої рухової активності усіх категорій громадян шляхом здійснення рекреаційної діяльності.

**Ключові слова:** рекреаційно-спортивні ресурси, рекреаційні екосистемні послуги, спортивна інфраструктура.

**Relevance of the research topic.** Recreational and sports resources are an important element of the natural capital of territorial communities and as such represent key assets that provide various benefits for residents. Rich and diverse recreational and sports resources are a prerequisite for the development of various types of activities, such as recreation and sports, but these activities also have a negative impact on some components of the environment. The concept of ecosystem services (ES)

has the potential to bridge the gap between conservation and exploitation needs. This paper proposes an approach to the definition of ecosystem services provided by the infrastructure of recreational and sports resources of the region.

**The state of studying the issue with the analysis of the main works.** During the last decade, the number of scientific publications devoted to various aspects of ecosystem services research is constantly growing. This is evidenced by the number of publications containing the keywords "Ecosystem Service" in the international scientometric database Scopus. As of April 1, 2024, Scopus indexed 26,370 scientific articles, in particular, 50% of which were published within the last five years.

Ecosystem services have become the object of scientific research by scientists from all over the world, including Costanza R., Daily G., Brown T., Solon J., Haines-Young R., Kulczyk S., Kalamucka W. and others. Research on the problems of ecosystem services is reflected in the publications of Ukrainian scientists, in particular Varyvody E., Havrylenko O., Deghtyar N., Lukavenko Y., Fedorenko M., Shishchenko P. and others. It is worth of attention are studies devoted to the assessment of the value of ecosystem services for recreation and tourism (Hermes J. [8], Solon J. [12], Kulczyk S. [9]), as well as cartographic methods for assessing the potential of ecosystem services for recreation (Vallecillo S. [13]). Despite the significant number of publications, a number of questions regarding the importance of recreation and sports in the structure of ecosystem services contain the perspective of further research.

**The purpose and objectives of the research.** This work aims to assess the potential of recreational and sports resources as a component of ecosystem services provided on the territory of communities for the development of recreation and sports, the implementation of regional marketing and advertising, as well as the coordination and management of infrastructure at the regional level.

**Research methods and materials.** Materials of the youth and sports department of the Lviv regional military administration has been used for the research, the main statistics department in the Lviv region, as well as data from the electronic register of sports facilities of Ukraine.

For geoinformation the analysis of the sports infrastructure organization of the Lviv region has been used QGIS software and OpenStreetMap data.

**Presentation of the main material with justification of the obtained scientific results.** In essence, recreational and sports resources are objects natural heritage. Recreation is one of the few permitted types of anthropogenic activity. However, it should not lead to changes in the state of geoecosystems and the quality of ecosystem services provided, but should be consistent with them.

Considering the sustainable development of regions, the assessment of the potential of recreational and sports resources should be consistent with the ability of ecosystems to provide appropriate ecosystem services for recreation and sports development. Recreational services are part of the cultural ecosystem services that people receive from nature in the form of various intangible benefits.

According to the international classification of EP (CICES v .5.1) under the concept of recreational ecosystem services, we understand the set of products and functions of ecosystems that are useful for human society, which includes all physical and intellectual interactions with ecosystems to meet the physical and health needs of people [7]. Recreational ecosystem services include: use of ecosystems for sports and recreation; using nature to support people's physical form; aesthetic pleasure from observing ecosystems, etc. The condition for the emergence of recreational ecosystem services is the mandatory presence of consumers of these services in the ecosystem and their physical or intellectual interaction with them. Therefore, when evaluating recreational ecosystem services, it is necessary to take into account two groups of elements: natural resources (their nature and availability) and demand for specific services [9].

It is also important to consider the priority of ecosystem services, especially in the context of management decision-making. As Mitova R. (2020) notes, the priority of ecosystem services aims to identify and rank them according to their importance for recreation and sports [10]. The identification of relevant services involves the selection process and their differentiation by priority groups based on certain criteria that meet the needs of ensuring the sustainable development of the community. Accordingly, they are divided into:

– functional-technological services, which represent a complex of recreational benefits provided by ecosystems to people, in connection with their needs and motivation to visit, as well as for the development of differentiated recreational and sports products. They provide favourable conditions for certain types of active recreation, tourism, sports and entertainment from the point of view of the technology of this activity. For example, for ski tourism, stable snow covers with a thickness of at least 20 cm, northern exposure, steep slopes, forestless areas, etc.;

– physiological (health) have a beneficial effect on human health, stimulate a healthy lifestyle, ensure safety, healing properties, and a clean environment;

– economic and technological – they provide economic and effective opportunities for the economic development of the territory;

– aesthetic – bring aesthetic pleasure and have a positive effect on the psychological state of people;

– spiritual – stimulate spiritual development and creativity, provide a connection with tangible and intangible heritage (religion, beliefs, art, traditions, folklore, crafts, etc.), related to ethnic identity, local culture;

– ethical – they stimulate understanding of the need for nature protection and encourage responsible behaviour;

– knowledge – they satisfy the need for knowledge and its transmission to future generations (science, education, curiosity) and have a positive cognitive effect on people [10].

American scientists Boyd J. and Banzhaf S. (2006) draw attention to the fact that the benefits that people receive from ecosystem services are actually a complex good consisting of components of nature and ordinary goods and services made by man. Citing the example of recreational fishing as a type of recreation, they argue that the benefits that a person receives from ecosystems during the implementation of this activity consist of the following elements: direct ecosystem services, such as water and fish and partial development of the shore; direct ordinary services (travel, partial arrangement of the shore) and indirect (fishing equipment, etc.) [6].

When evaluating ecosystem services for recreation and tourism, it is necessary to take into account not only natural resources and the demand for them, but also the availability of appropriate infrastructure, goods and services that contribute to obtaining these ecosystem benefits.

The infrastructure of recreational and sports resources belongs to those components of ecosystem services that should not cause a negative impact on the environment due to pollution, increased erosion, damage to wildlife or habitats, loss of biodiversity, etc. The answer to these problems can be the approach of sustainable development of the region, which aims to balance the ecological, economic and socio-cultural features of the development of the territory, the livelihood of the host communities and providing benefits for interested parties.

The development of the infrastructure of recreational services can be presented in the form of a system of relationships between the main entities that implement state policy in the field of sports, tourism and directions of development of the infrastructure of the ecosystem services market in the system of development of recreation as a whole. Under such conditions, an active role in the development of the ecosystem services market infrastructure in the region should be played by local governing bodies (which follows from the main goals of the decentralization reform), as well as associations (associations, agencies, federations, etc.) for sports and health development at the local and at regional levels, entities that carry out or provide such activities.

The development of the infrastructure of recreational and sports resources depends on a number of factors in each community, including: general economic (level of financing in the creation of new and updating existing recreational and sports infrastructure facilities, problems of ownership of existing recreational infrastructure facilities); socio-geographical (territorial differentiation in the provision of recreational and sports spheres with objects of social and industrial infrastructure; seasonality of infrastructure; orientation to a specific target segment); socio-cultural (violation of the historical appearance of individual recreational facilities; preservation of culture and traditions); environmental factors (inconsistency of the regional recreational and sports infrastructure with the level of capacity of the territory, excess of the level of anthropogenic load in certain recreational zones).

In the context of the current emphasis on the greening of European economies, the development of green infrastructure is at the forefront of popularity. One of the latest trends implemented by central or local governments in various regions of the world is to pursue infrastructure policies that include as much green space as possible, combined with sports and recreational facilities that must be integrated into the space of the settlement. This is important not only from the point of view of ensuring the stability and sustainable development of residential landscapes, but also from the point of view of the increased demand for recreational ecosystem services, in particular by city dwellers. City dwellers declare their desire for direct contact with nature, but at the same time look for easily accessible places with adequate infrastructure to meet their recreational needs.

An important component of the provision of recreational ecosystem services is the sports infrastructure, which ensures the effective use of recreational and sports resources (objects, complexes, territories) to meet the needs of the population in physical culture and health activities.

Sports infrastructure – is a set of sports facilities, objects and organizations that are intended for the implementation of physical culture and sports and recreational and health activities. The term "sports infrastructure" is also related to the presence and type of sports facilities in a community (for example, parks or recreation centres used for sports purposes). Sports activities of various kinds are considered to be one of the important recreational services that many people turn to. Various groups of the population are involved in the classes, various forms of family leisure are developed, the importance of informative classes and communication, and mass events increases. Also, sports facilities are of great importance for the development of sports event tourism, because they provide various cultural and sports events attended by tourists and fans from different parts of the world.

Let's consider the current state of development of the sports infrastructure network and its place in the system of offering recreational ecosystem services in the region using the example of the Lviv region. Lviv region belongs to the area, which are distinguished by a developed and diverse sports infrastructure, which is constantly undergoing reconstruction and modernization. According to the Youth and Sports Department of the Lviv Regional Military Administration, in 2022, about 5,840 sports facilities were operating in the region. Most of the large flat sports facilities are located in cities, in particular in Lviv, Chervonohrad, Drohobych, Stryi, Sambir and others.

The large sports facilities of the region include stadiums with a capacity of more than 1,500 people. There are 56 stadiums in Lviv region. In terms of the administrative districts of the region, Lviv (42%), Stryi (21%), and Sambir (13%) districts are the best equipped in terms of the number of such facilities, while the smallest number of stadiums is in Drohobych (5%), Chervonograd (5%), Yavoriv (5%) and Zolochiv (9%) districts (table 1). However, the best equipped stadiums are residents of Stryi, Sambir, and Zolochiv districts, where 26,625, 31,700, and 39,725 people per stadium, respectively. The least equipped stadiums are the residents of Drohobych district, where 77,633 people per stadium, Chervonogradskyi – 75,367 people, –59,233 people in Yavorivskyi and – 47,546 people in Lviv.

Another type of sports infrastructure facilities, as a component of recreational and sports resources of Lviv region, are swimming pools. In total, there are 41 swimming pools in the region. The largest number of swimming pools is located in Lviv, Chervonograd and Stryi districts, the smallest in Yavoriv, Zolochiv, Drohobych districts, and there are no swimming pools in Sambir district. Residents of the Chervonograd district are best equipped with swimming pools, where 25,122 people per swimming pool, in Zolochiv – 39,725, Stryi – 39,938, Drohobych – 58,225, and in Lviv – 76,073.

Olympic, Paralympic and De-Olympic training bases are extremely important facilities of the sports infrastructure of the Lviv region. There are eight such facilities and they are located in Lviv, Stryi and Sambir districts. Shooting ranges, football fields, tennis courts, sports halls, sports clubs, children's and youth sports schools, etc., are also of great importance for the development of physical culture and sports activities of the population of the region.

The sports and recreation infrastructure of the Lviv region also includes sports facilities that simultaneously have a sports-training and recreational-entertainment function: sports palaces "Ukraine"

and "Halychyna"; sports complexes "Dynamo", "Olympic", "Eurosport", "Gladiator", "SportLife", NU "Lviv Polytechnic", sports complex of Ivan Franko Lviv National University; Kavalier Tennis Club and others. All of them operate with different levels of infrastructure and a set of basic and additional services.

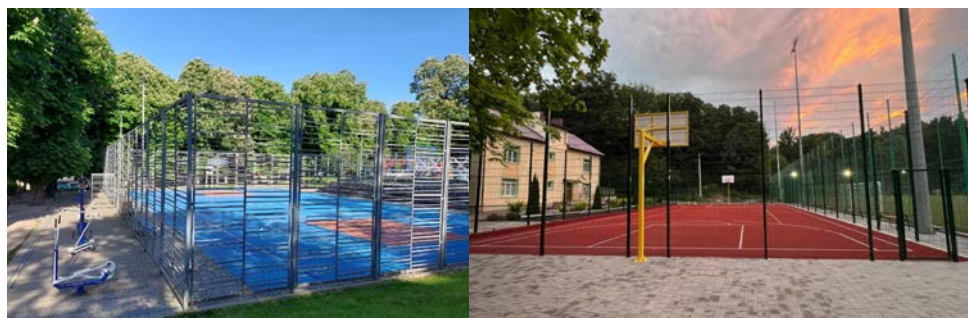
Table 1

**Sports infrastructure of the Lviv region as of January 1, 2022**

Sports infrastructure	Drohobych raion	Zolochiv raion	Lviv raion	Sambir raion	Stryi raion	Chernograd raion	Yavorivskiy raion	Lviv region
Stadiums	3	4	24	7	12	3	3	56
Swimming pools	4	4	15	-	8	9	1	41
Shooting ranges	28	22	61	16	40	23	16	206
Football fields	49	91	268	105	149	118	82	862
Tennis courts	17	-	39	-	6	2	1	65
Sports halls	66	79	287	82	110	89	54	767
Bases of Olympic, Paralympic and De-Olympic training	-	-	5	1	2	-	-	8
Children's and youth sports schools	14	10	150	7	38	14	8	274
Sports clubs	4	2	34	2	4	3	-	50

*Compiled by the author based on the materials of the LRMA Youth and Sports Department*

In today's difficult conditions in the sports infrastructure of the Lviv region and Ukraine in general, the construction of large sports facilities is not planned in the near future, but a steady trend towards the construction of small sports facilities in local communities has been planned [2]. This is especially relevant for rural settlements where indicators of the population's provision of sports infrastructure facilities are insufficient. Also, for residents of urban settlements, open sports facilities such as sports grounds, training facilities, cycling and running tracks are important for obtaining recreational ecosystem services. It is precisely such sports facilities that enable consumers of these services to be in direct physical or intellectual interaction with ecosystems by visiting green areas of settlements.



a

b

**Fig. 1.** Multifunctional sports grounds in the city of Lviv, str. 4 Vinnychenka (a), str. Kryvchytska Road, 1 (b)

In this research, we pay special attention to the current state and prospects for the development of small sports infrastructure, namely to open sports grounds, in particular playgrounds measuring 42 m by 22 m, with artificial grass or polyurethane covering, training grounds, sports and games complexes, etc. (Fig. 1). The radius of accessibility of such buildings is 500 m, which corresponds to their placement in a residential area, in microdistricts and residential groups.

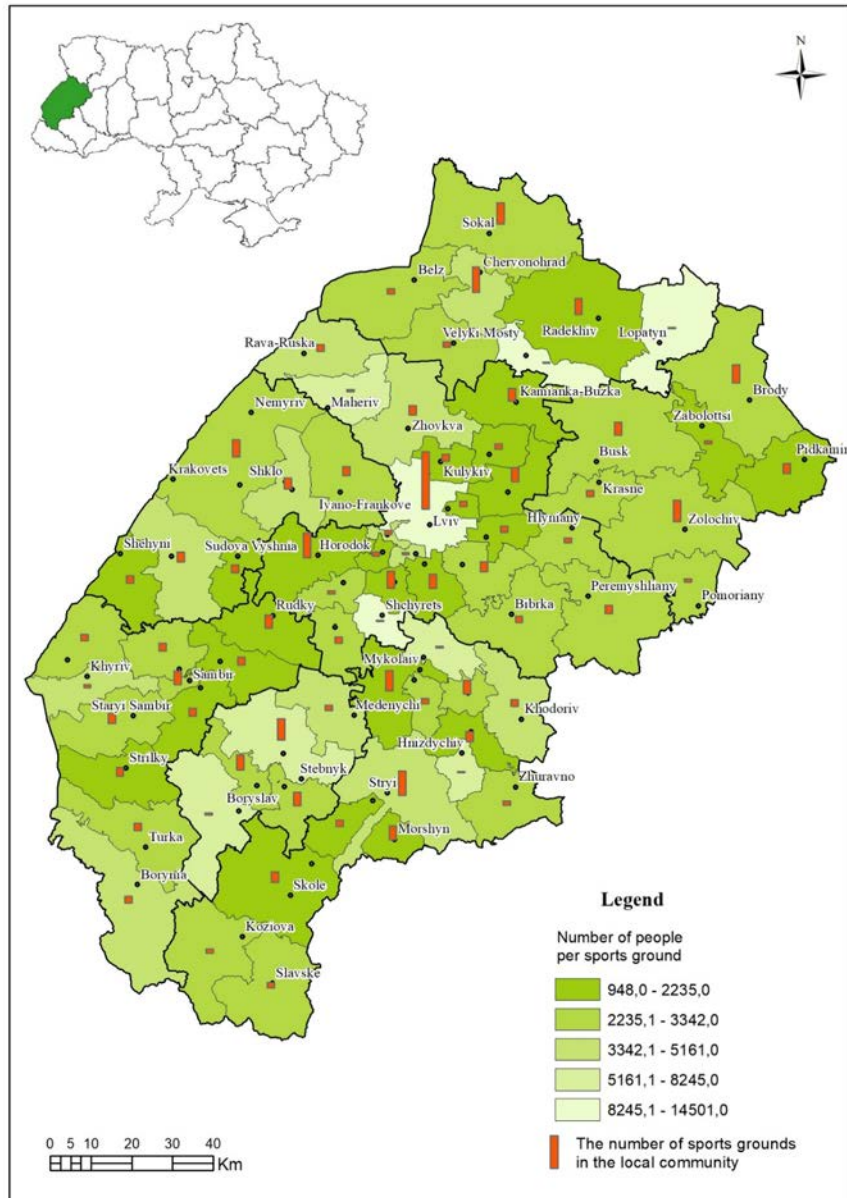


Fig. 2. To provide territorial communities of the Lviv region with small open sports facilities

After analysing the geospatial organization of the sports infrastructure of Lviv region in terms of territorial communities, significant disparities were revealed in terms of providing the communities of the region with small open-type sports facilities, namely sports fields with artificial grass and liquid covering, training grounds, sports and game complexes, multi-functional playgrounds, running tracks. There are 673 such sports facilities in the Lviv region, the largest number of them is located in the Lviv territorial community, – 54 facilities, Chervonohradska – 24, Horodotska – 23, Stryiska – 23, Zolochivska, Drohobyt'ska, and Sokalska 20 each (Fig. 2). However, residents of Pustomyiv'ska territorial community, where one such facility has 948 people, are best provided with small forms of sports infrastructure. Pidkaminska, Horodotska, Kuliv'ska, Murovanska also belong to the communities provided with sports grounds at the rate of 1,000 to 2,000 people per sports ground. Novoyarychiv'ska, Obroshyn'ska, Pidberiztsiv'ska, Solonkiv'ska, Raliv'ska, Striliv'ska, Zhydachiv'ska, Mykolaiv'ska, Morshyn'ska, Kamianka-Buzka and Shegyniv'ska.

Among the communities of the Lviv region whose residents are provided with the fewest sports grounds are Lviv – 14,500 people have one such sports facility, Skhidnytska – 8,244 people, Dobrosyn'sko-Mageriv'ska – 8,119, Trostyanetska – 7,278, Gnizdychiv'ska – 7,220 and Drohobyt'ska commu-

nity – 6,145. The communities listed above need to expand the network of sports infrastructure, in particular, sports, game and training grounds.

State policy in the field of physical culture and sports promotes the development of small sports infrastructure through the implementation of various social projects, one of which is "Active parks – locations of healthy Ukraine".

The main goal of the social project is the popularization and organization of healthy physical activity of all categories of citizens through recreational activities. The concept of active parks is to provide citizens with the opportunity to engage in elementary physical exercises in public squares and parks. Each such active park has sports infrastructure and stands with QR codes. By scanning these codes using the mobile app, you can see which exercises can be performed using the installed sports equipment. In the Lviv region, 21 sports grounds (16 with artificial surfaces and 5 with bulk surfaces) and 22 training grounds were built within the framework of the project "Active Parks – Locations of a Healthy Ukraine".

The arrangement of sports and training grounds in squares and parks within the framework of the project "Active parks – locations of a healthy Ukraine" contributes to the receipt of recreational ecosystem services for residents of the settlements of the Lviv region.

During the formation of a holistic system of functioning of the recreation and sports industry, it is necessary to highlight the main factors related to its infrastructural support: improvement of the management system of the components of the recreation and sports infrastructure; balanced development of its components; development of sports infrastructure in the context of the concept of ecosystem services, which will contribute to the quality of services and competitiveness of recreation and sports facilities.

**Conclusions.** In the context of scientific understanding, it is possible to form such a definition that the primary basis for the provision of recreational ecosystem services and their important component is infrastructure – a set of industries, means and types of activities, specialized enterprises whose functional purpose is to ensure the effective use of recreational and sports resources (objects, complexes, territory) to meet the needs of vacationers. The task of this infrastructure is to provide recreational services, to promote the comprehensive reproduction of human health in the process of realizing personal and social needs through the provision of various recreational and sports services and spiritual benefits.

Each of the components of the recreational and sports infrastructure of the region requires a separate, comprehensive approach to improvement and reform. Greater involvement in sports activities of the local population and the creation of initiatives aimed at supporting sports will contribute to the formation of a healthy and active lifestyle of the population, as well as have a positive impact on the economy of the community.

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