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OPTIMISATION OF LAND RESOURCE USE IN THE SUBURBAN AREA OF ODESA FOR RECREATIONAL NEEDS

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Abstract. The article discusses topical issues of optimising the use of suburban areas in the context of developing tourism and recreational infrastructure, using the example of the Odessa region. It is emphasised that in the context of decentralisation, urbanisation pressure and the need to diversify the economy, suburban areas are becoming strategically important as potential centres of tourism and hospitality. The study is based on an analysis of natural resource potential, functional zoning of territories, existing buildings and engineering infrastructure. A methodological approach to assessing the suitability of land for the location of tourist and recreational facilities is proposed, taking into account landscape, environmental, legal and social factors. The results of spatial analysis revealed a significant reserve of degraded and underutilised areas that could be adapted for the creation of recreational facilities, glamping sites, cultural and educational clusters, and gastronomic clusters. Directions for integrating such territories into regional tourist routes and transport accessibility networks have been proposed. The priorities of sustainable planning in the formation of new tourism infrastructure are justified, in particular through mechanisms of public-private partnership, investment zoning and the involvement of local communities (hromadas). The scientific novelty lies in the formation of a multifactorial model of spatial transformation of suburban areas into functional centres of tourist activity, which takes into account the current challenges of urban development, environmental safety and the demands of the target audience. The practical significance of the results lies in the possibility of using the proposed approaches by local authorities, developers and investors to improve the efficiency of planning, attract capital and strengthen the competitive position of the region on the tourist map of Ukraine.

Keywords: land resources, recreation, tourism, suburban area, management, infrastructure.

JEL Classification: L83, O13, O18, Q24, Q26

1. Introduction

Sustainable socio-economic and environmental development of large cities and surrounding areas, as well as the effectiveness of their interaction, are becoming particularly relevant. The issue of interaction between cities and suburban areas is of both general scientific and practical importance, requiring a comprehensive solution at the national and local levels. Research in this area could stimulate scientific inquiry and practical solutions to pressing issues concerning the rational use and optimisation of natural resources, as well as improving interaction between levels of government and co-operation between authorities.

It is evident that cities interact with surrounding areas, forming a suburban zone that provides them with agricultural, tourist, recreational, industrial, and other resources. The suburban zone also serves as a reserve for urban development, which involves the removal of land from agricultural or recreational use. Particular attention should be paid to so-called "green areas", which perform recreational, sanitary, hygienic and protective functions (Ivanyuk, 2019). As a rule, green areas are divided into two parts – forest parks and

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forestry areas. When allocating such land, consideration is given to the concentration of industrial facilities, the presence of public recreation areas, appropriate accommodation facilities and natural conditions. At the same time, there is a catastrophic shortage of such land in suburban areas, which necessitates the development of mechanisms for replenishing it.

Studying the development of cities and suburban areas, particularly land relations, requires a comprehensive approach that combines methods from economic theory, regional economics, urban planning, and territorial planning. Classical political economists such as A. Smith and D. Ricardo laid the foundations for resource allocation and the functioning of a market economy (Morar, 2022; Kanash, 2010). A. Smith defined the boundaries of political economy, developed a consistent system for the functioning of the free market, and formulated the concepts of "economic man" and "natural order". D. Ricardo, in turn, substantiated theories of distribution, value, money, and cost.

M. I. Tugan-Baranovsky made a significant contribution to the development of land use theory, developing the investment theory of cycles and predicting the modern concept of "savings-investment" (Shyshchenko, 2021). Among Ukrainian classical economists who studied political economy and production relations, Yu. Pakhomov, A. Chukhno, and M. Chernenko are particularly noteworthy (Martyn, 2015). Contemporary scientists, including V. H. Viun, V. V. Horlachuk, A. S. Danylenko, T. L. Ivaniuk, and A. P. Stadnyk, have developed management methods aimed at improving the use of land resources (Tatarenko, 2013; Tretiak, 2013). Research on optimising land use structures and methodological approaches to the normative monetary valuation of non-agricultural land was conducted by A. H. Martyn, O. M. Chumachenko and S. O. Osypchuk (Novakovskaya, 2016).

G. D. Gutsulyak made a significant contribution to the development of land relations by being the first to develop a landscape and ecological zoning of Ukraine, which became the basis for regional environmental monitoring and rationalisation of natural resource use. His scientific works cover issues of rational agricultural land use, soil protection, and methodologies for assessing land management measures (Gutsulyak, 2012; Dyvko, 2018). Yu. A. Makhortov, based on thorough research on land optimisation in Ukraine, developed recommendations for improving the efficiency of land use structures. The main theoretical provisions of land use economics, issues of land rent formation, methods of land resource assessment, ensuring their rational use and protection were considered in the works of I. Novakovskaya (2016).

It is also worth noting the works devoted to the issue of providing urban populations with green areas. For example, P. H. Shyshchenko, O. P. Havrylenko and Ye. Yu. Tsyhanok, in their work "Accessibility of green areas in a compact city (using Kyiv as an example)", developed an algorithm for assessing the accessibility of green areas that can be applied to other cities (Shyshchenko et al., 2018). Researchers from Romania, Serbia, and Ukraine studied the dynamics of the spatial and functional organisation of green areas in Kharkiv, analysing their transformation from 1867 to 2019. The study used various scientific approaches and GIS tools to visualise changes in the urban landscape. The results can be used in developing strategies for the development of green areas in cities (Dyvko, 2019).

Among foreign researchers who have studied the problems of sustainable land use, Eugene P. Odum (2005), who researched agricultural landscapes and agroecology, should be noted. The functions of land resources and issues of sustainable land use are highlighted in the works of W. Blum (2013). John Coulston (2016) developed models for assessing renewable resources, analysed changes in land use patterns, and identified the main factors influencing them. Grass Waterway and Daniel M. Hellerstein (2017) examined the structure of the US land fund, environmental optimisation, and the financing of land conservation measures in their research. The problems of preserving the productive potential of land resources were studied by Panos Panagos, Anton Imeson, Katrin Meusburger, Pasquale Borrelli, Jean Poesen, and Christine Alewell as part of the international programme "The Conservation Reserve Program" (Panagos et al., 2019).

Despite a significant body of scientific research devoted to the rational use of land resources, most of it is theoretical in nature. At the same time, practical approaches to the conversion of land plots into recreational areas remain underdeveloped. Therefore, research devoted to the development of a recreational zone project based on abandoned land resources is relevant and has practical value.

2. Analysis of Regulatory and Legislative Documents on the Rational Use of Natural Resources and Research on the Recreational Infrastructure of the Odessa Region

The regulatory and legislative documents of Ukraine governing the rational use and protection of land resources, as well as the structure of agricultural landscapes, contain a number of key concepts: "optimisation of land use structure", "optimisation of land use", "optimisation of the structure of agricultural landscapes", "optimisation of land protection and use". The Law of Ukraine "On General Scheme of Territorial Planning of Ukraine" pays considerable attention to issues of optimising land use structures to ensure

sustainable development of rural areas and efficient use of land resources (The Law of Ukraine "On General Scheme of Territorial Planning of Ukraine", 2002).

According to the Concept of Sustainable Development of Settlements, "optimisation of land use structure" implies the use of land resources in a way that promotes their rational distribution and ensures the sustainable development of rural areas. Analysing the interpretation of the concept of "rational land use" in accordance with the Law of Ukraine "On Land Management", it can be concluded that this term includes a set of measures aimed at achieving optimal economic, social and environmental parameters for the functioning of territories (The Law of Ukraine "On Land Management", 2003).

This paper considers the possibility of optimising the use of land in the suburban area of Odesa.

The Odessa region has a favourable geographical location, significant economic potential and developed infrastructure, which determines its priority areas of development:

– Development of the agro-industrial complex;
– reforming the housing and utilities sector;
– improvement of social and living conditions of the population;
– support for small and medium-sized businesses;
– increasing employment among the population;
– stabilisation and improvement of the labour market;
– ensuring innovative development of the real sector of the economy;
– development of tourism and recreation.

Based on these areas, a study was conducted to justify the feasibility of implementing a project aimed at improving the economic and social well-being of the population of the district and the city of Odesa. The Odesa region regularly hosts events that stimulate the development of tourism and recreation, as well as contribute to the development of tourism infrastructure by attracting domestic and foreign investors. In the future, this territory is expected to become one of the leading resort areas in the Odesa Oblast.

The Odessa region has a number of unique natural characteristics that contribute to the development of recreational activities:

– Favourable geographical location and proximity to Odesa;
– favourable climatic conditions;
– access to the Black Sea coast;

The presence of nature reserves – the Tylihul and Kuialnyk estuaries. The natural sand spit of the Tylihul estuary near the village of Sychavka has a well-developed network of seasonal health resorts. The areas around the settlements of Kordon and Kalynivka offer favourable conditions for the development of eco-tourism. The creation of routes in the Tylihul Landscape Park, including the Petrivka nature reserve, will contribute to the expansion of the region's tourism potential.

The Black Sea coast from the village of Sychavka to the village of Kryzhanivka is an important centre for medical and health tourism. There are a number of health resorts here, which blend in well with the natural landscape. However, during the high season there is a shortage of accommodation for tourists, due to the local authorities' lack of financial resources to modernise existing facilities and the lack of available land for new construction. Given the size of Odessa and its importance as a tourist centre, there is an urgent need to create a new recreational area that will provide additional accommodation for holidaymakers.

An analysis of the physical and geographical location of the territory and land resources of the Odessa region revealed a significant number of land plots that are in a state of neglect. These include:

– Beams;
– depleted quarries;
– closed mines;
– slag heaps;
– industrial waste dumps.

According to the current regulatory and legal acts of Ukraine (The Land Code of Ukraine, 2001; 2015), the priority of state policy is the rational use of natural resources, the creation of conditions for the development of recreational infrastructure and the improvement of the ecological condition of territories.

In view of this, it is proposed to redevelop one of these industrial land plots, which is currently unused, to create a recreational area. This will not only allow for the effective use of existing resources, but will also contribute to the development of the tourism sector, the creation of new jobs and the improvement of the socio-economic situation in the region.

3. Optimisation of the Land Fund of the Odessa Region for Recreational Needs of the Population

The methodology for researching the optimisation of land resources and the development of land plots in suburban areas for recreational purposes consists of the following stages:

First stage. Analysis of the area of the object, relief and transport-geographical location (TGL). In this research, the focus is on the spatial relationship of the object to regional centres, transport networks and international transport corridors (ITC). The transport-geographical factor was analysed according to:

– Proximity to water bodies;
– location relative to the settlement (centre–periphery);
– passage of transport routes and international trade centres. passage of transport routes and international

trade centres. passage of transport routes and international trade centres.

Each component of the TGL is analysed and evaluated on a scale of 0 to 5 using expert assessments. The maximum score is 15 points.

Second stage. Analysis of the infrastructure of the settlement.

Third stage. Calculation of the normative monetary value (NMV) of a land plot based on the normative monetary value. The normative monetary value of a land plot (MV_{lp}) is determined by the formula: MV_{lp}

$MV_{lp} = A_{lp} \times R_{lp} \times C_P \times C_l \times C_t \times C_d \times C_i$

where A_{lp} – area of the land plot, as accepted according to the State Land Cadastre or land management documentation, sq. m;

R_{lp} – rental income per square metre of area for the relevant category of land, determined according to the rental income standards for the relevant category of land in accordance with the Procedure, hryvnias per year;

C_P – capitalisation period determined in accordance with paragraph 2.2 of this section, years;

C_l – coefficient that takes into account the location of the land, as determined by the Procedure;

C_t – coefficient that takes into account the type of land use, determined in accordance with the Procedure;

C_d – coefficient that takes into account whether the land plot belongs to land designated for nature conservation, health improvement, recreation, or historical and cultural purposes, as determined in accordance with the Procedure;

C_i – indexation coefficient of the normative monetary valuation of land, determined in accordance with Article 289 of Section XIII of the Tax Code of Ukraine.

Fourth stage. Proposal (project) for rezoning a land plot.

As a result of research and referring to the main directions of the "Five Ts: tourism, transport, technology, trade and trust" strategy for the development of the Odesa region, which includes tourism, taking into account the proximity of the city of Odesa and the insufficient number of recreational facilities in the suburban area, the authors propose to consider a land plot within the village of Vyzyrka with the aim of repurposing an inactive quarry (Fig. 1).

Research results:

1. The area of the property is 10 hectares, the terrain is flat with minimal elevation changes. The transport and geographical location is quite advantageous. The land plot is located in the suburban area of Odesa, within the village of Vyzyrka. There is a network of access roads, motorways and water facilities.

2. The village of Vyzyrka is located on the upper reaches of the small Adzhalyk (Hryhorivka) estuary, 18 km from the district centre of Dobroslav (Kominternivske) and 28 km from the city of Odesa. On both sides of Vyzyrka, there are regional and international motorways. A railway track for freight trains runs through Vyzyrka, leading to the Transinvestservice enterprise and the Pivdennyi Seaport. The village of Vyzyrka covers an area of 2,628.5764 hectares and is the centre of the village council. The population is about 10,000 people. The village has a preschool and a school that meets the highest standards and has modern equipment (about 200 students study there). The village has good roads and well-lit streets. There is a library, a modernly equipped outpatient clinic, a chain of shops, and a catering establishment (café). Thus, this settlement is a comfortable place to live for local residents and holidaymakers.

3. Land plot NMV calculation

The monetary value of the land plot located in cadastral quarter 5122780500:01:001, under industrial development, will be:

$MV_{lp} = 108054{,}0 \times 0{,}6637 \times 33 \times 8{,}6804 \times 0{,}1680 \times 1.0000 \times 1{,}0000 = 3451243{,}69$ UAH. The cost per square metre is 31.94 UAH. Since the quarry is currently inactive and closed, its value is practically zero.

For comparison, the NMV of this land plot was calculated after its re-profiling, taking into account its recreational use.

The monetary value of the land plot located in cadastral quarter 5122780500:01:001 under recreational development will be:

$MV_{lp} = 108054{,}0 \times 0{,}0627 \times 33 \times 91{,}4945 \times 1{,}0000 \times 1{,}3200 \times 1{,}0000 = 27001708{,}75$ UAH. The cost per 1 m^2 will be 249.89 UAH.

Calculations show that optimising the land plot and repurposing it for recreational needs is promising.

Table 1

Meaning of the NMV indicator

Indicator	Total NMV value (UAH)	NMV value per 1 m^2 (UAH)
NMV of industrial land plots	3451243,69	31,94
NMV of recreational land plots	27001708,75	249,89

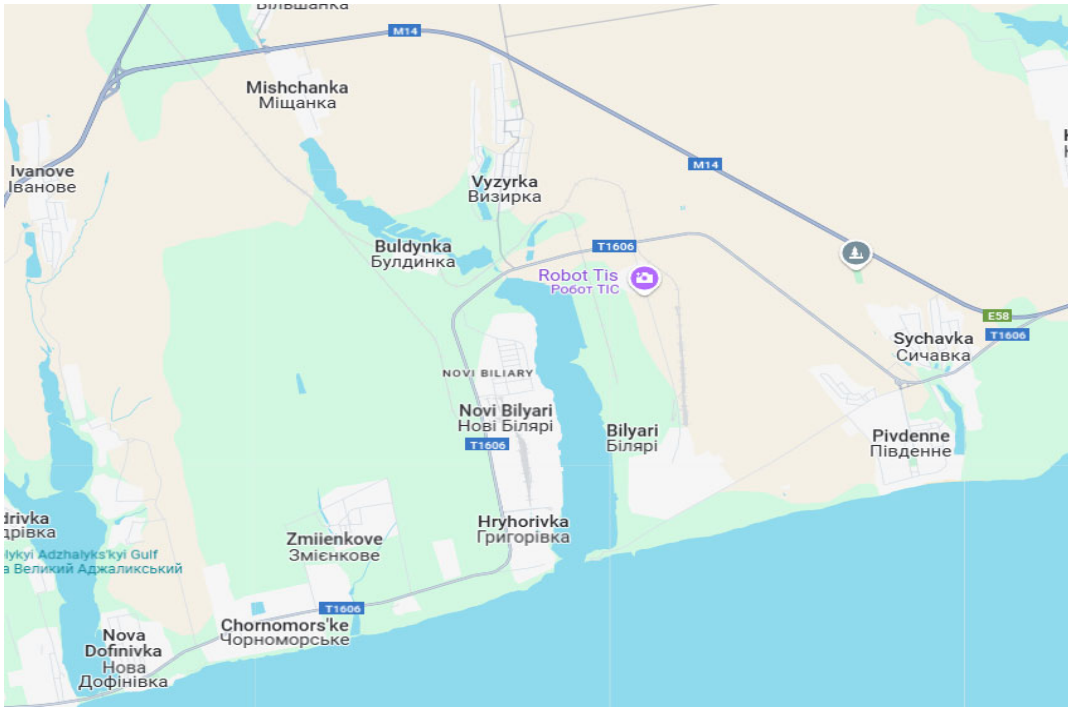

Figure 1. Location of Vyzyrka village

Recreational area project.

Consequently, it is recommended that the land be redeveloped for recreational purposes, such as camping. The local residents will be presented with augmented employment prospects, whilst the municipal budget will be the beneficiary of financial proceeds. The primary motivation for the initiation of this project would be the attraction of investors. It is important to note that during the peak season, the city experienced a shortage of affordable accommodation options. In addition, the Odesa region needs free accommodation to house displaced persons from other regions of the country, at least temporarily, for the summer season, which lasts six months in the region, so this accommodation facility will help to resolve this issue in the future.

Camping is a seasonal activity for motorists, providing limited domestic and technical services. It also offers overnight accommodation and parking in designated areas. Campsites were first established in the United States in the 1930s. Camping is one of the most popular forms of recreation in Europe and the United States, and is now becoming popular in Ukraine as well. The distinctive feature of this type of holiday is the freedom to travel in one's own vehicle. Tourists' holidays do not depend on the availability of hotel rooms. Campsites are typically self-service, with administrative and residential buildings or tents, shared sanitary facilities, rental points and car parks. The number of places in a campsite is allocated according to the following requirement: 100-120 m^2 per tourist. Campsites are usually located in the suburbs of large cities and along well-known tourist routes.

There are five campsites in the Odessa region, located near the settlements of Pivdenne, Hrybivka, and Sanzhiika. All of them are small in size and minimally equipped. Consequently, it is considered prudent to construct a campsite characterised by a closed territory, favourable living conditions, and proximity to the tourist city of Odesa, which boasts a plethora of appealing sites.

The land plot is located 30 minutes' drive from Odesa, near Small Adzhalyk Estuary, local road M14. It takes 20 minutes to get to the Black Sea, and there is also a lake nearby for those who enjoy fishing. The land plot covers an area of approximately 10 hectares, which will allow for the accommodation of 800-1000 tourists.

4. Conclusions

Thus, as a result of calculating the normative monetary valuation (NMV) of an industrial land plot that is currently inactive (not used for its intended purpose and not applicable in economic activity), as well as similar calculations of the NMV after re-profiling this plot for recreational needs, the results obtained indicate the economic and social feasibility of such a transformation process.

A practical example of effective land use through the creation of a recreational area in the form of a campsite has been proposed. The project involves

Table 2

Camping infrastructure model

Infrastructure block	Element descriptions	Technical and regulatory requirements
Accommodation	Places for tents, campers, glamping tents, mini-houses	Compliance with State Building Standards for temporary structures; safe distance between locations
Sanitary and hygiene area	Showers, toilets, washbasins, washing machines, stations for campers	Sanitary standards in accordance with State Sanitary Rules; availability of ventilation, water supply and sewerage
Catering	Food courts, mini-restaurants, bars, catering services	Food licence; compliance with Hazard Analysis and Critical Control Point standards, availability of refrigeration equipment
Leisure area	Sports grounds, children's areas, bonfire sites, open-air cinema	Presence of shaded areas, injury-proof flooring, lighting, noise restrictions
Technical support	Electricity, water, internet (Wi-Fi), charging stations, generators	Stable power supply, compliance with safety standards, overload protection
Administrative block	Reception, administration, security, information centre	Fire safety, accessibility for people with reduced mobility, documentation in accordance with State Building Standards
Environmental solutions	Waste sorting, solar panels, rainwater collection system	Energy efficiency, environmental monitoring reports, eco-labelling
Security	Video surveillance system, emergency exits, first aid kit, fire shields	Certified security system, alarm system, evacuation plans, inspection logs
Additional services	Bicycle rental, shuttle service, excursions, shop, co-working areas	Transport licences, equipment maintenance records, contracts with partners

Source: authors' own development

the construction of 10 light-type buildings, an administrative building, a canteen, a medical centre, sports and children's playgrounds, as well as a parking area, which will allow for the simultaneous accommodation of 800–1,000 people.

The current land use system is often characterised by insufficiently justified distribution of land according to its intended purpose, high levels of land development, low efficiency of land use, and a lack of mechanisms for the regeneration of land resources. In this regard, it is advisable to propose the following measures:

– Ensuring strategic planning for land use, especially in suburban areas of large cities;

– justifying the distribution of land resources by sectoral purpose;

– maintaining territorial proportions in the development of industrial production with the appropriate infrastructure for the uniform development of the territory, rational use of land resources and preservation of the ecological balance;

– bringing regional programmes and master plans for the development of settlements into line with state regulations;

– providing legal mechanisms for rapid response to current challenges in order to meet the socio-economic and environmental needs of the population;

– conducting an inventory and certification of the country's natural resources, including all land, water resources, subsoil and territories within settlements, with the definition of an effective land fund structure;

– developing an optimal model, legal norms and standards for the use of natural resources.

The results of the study can be used to develop recommendations for improving the efficiency of land resource management in suburban areas, optimising their functional purpose and developing recreational infrastructure.

References:

The Law of Ukraine "On Land Management" of 08.08.2025 No. 858-IV. The Official Bulletin of the Verkhovna Rada (BVR), 2003, No. 36, Article 282 Available at: https://urst.com.ua/act/pro_zemleustrii

The Law of Ukraine "On Regulation of City Planning Activity" of August 8, 2025 No. 3038-VI. The Official Bulletin of the Verkhovna Rada of Ukraine (BVR), 2011, No. 34, Art. 343. Available at: https://zakon.rada.gov.ua/laws/show/3038-17

The Land Code of Ukraine of 25.10.2001 No. 2768-III (Article 121). The Official Bulletin of the Verkhovna Rada of Ukraine (BVR), 2002, Nos. 3–4, Article 27. Available at: https://zakon.rada.gov.ua/laws/show/2768-14#Text

The Law of Ukraine "On Local Self-Government in Ukraine" of 21.05.1997 No. 280/97-BP. The Official Bulletin of the Verkhovna Rada of Ukraine (BVR), 1997, No. 24, Art. 170 Available at: https://kodeksy.com.ua/pro_mistseve_samovryaduvannya_v_ukraini.htm

The Law of Ukraine "On Environmental Protection" of August 8, 2025 No. 1264-XII. The Official Bulletin of the Verkhovna Rada of the Ukraine (BVR), 1991, No. 41, Article 546. Available at: https://tax.gov.ua/zakonodavstvo/podatkove-zakonodavstvo/zakoni-ukraini/arhiv-zakoniv-ukraini/zakoni-ukraini-za-1991-rik/print-35908.html

The Law of Ukraine "On Improvement of Settlements" of 30.08.2025 No. 2807-IV. The Official Bulletin of the Verkhovna Rada of the Ukraine (BVR), 2005, No. 49, Article 517. Available at: https://urst.com.ua/act/pro_blahoustrii_naselenykh_punktiv

The Law of Ukraine "On State Land Cadastre" of 08.08.2025 No. 3613-VI. The Official Bulletin of the Verkhovna Rada of the Ukraine (BVR), 2012, No. 8, Article 61. Available at: https://законодавство.com/ukrajiny-zakony/zakon-ukrajini-pro-derjavniy-zemelniy-kadastr2012.html

The Law of Ukraine "On General Scheme of Territorial Planning of Ukraine" of 18.11.2012 No. 3059-III. The Official Bulletin of the Verkhovna Rada of the Ukraine (BVR), 2002, No. 30, Article 204. Available at: http://4ua.co.ua/management/sa3ad68b4d53b88421306c27_0.html

The Order of the Ministry of Agrarian Policy and Food of Ukraine "On Approval of the Procedure for Regulatory Monetary Valuation of Land in Populated Areas" of 06.05.2023 No. 489. Available at: https://zakon.rada.gov.ua/laws/show/z1647-16#Text

The Order of the Ministry of Agrarian Policy and Food of Ukraine "On Approval of the Procedure for Regulatory Monetary Valuation of Non-Agricultural Land (except for Land in Populated Areas)" of 06.05.2023 No. 508. Available at: https://zakon.rada.gov.ua/laws/show/z1573-13#Text

The Resolution of the Verkhovna Rada of Ukraine "On Concept of Sustainable Development of Settlements" of 24.12.1999 No. 1359-XIV. Available at: https://zakon.rada.gov.ua/laws/show/1359-14#Text

Gutsulyak, G. D. (2016). Methodological and methodological foundations of optimizing nature management and land use. *Balanced nature using, 2*, 82–87.

Gutsulyak, G. D. (2012). Forecasting the organization of sustainable land use development in rural areas. *Monograph*. Chernivtsi, Prut Publ., 182.

Gutsulyak, G. D. (2010). Sustainable development of land use: methodological aspects of management. *Monograph*. Chernivtsi, Prut Publ., 156.

Sokhnich, A. Ya., & Zhivko, Z. B. (2018). State management of land resources in the system of managing the economy of Ukraine: an institutional aspect. *Bulletin of Economic Sciences, 1(34)*, 164–170.

Shmyg, R. A., Boyarchuk, V. M., Dobryans'kij, I. M., & Barabash, V. M. (2010). *Green Zone; recreational landscape*. Lviv, Terminological dictionary-reference book on construction and architecture, 100; 116. ISBN 978-966-7407-83-4.

Land fund of Odesa region. Available at: https://odeska.land.gov.ua/info/zemelnyi-fond-odeskoi-oblasti-

Ivanyuk, T. L. (2019). The essence of the concept of "land relations". *Innovative Economy, 3-4*, 52–57.

Tatarenko, N. O. (1999). *History of economic teachings*. Kyiv, KNEU, 564.

Tarasevich, V. M., & Petruni, Yu. E. (2013). *History of economic teachings*. Kyiv, Center for Educational Literature, 352.

Makhortov, Yu. A. (1999). *Ecological and economic problems of land use: monograph*. Lugansk, 416.

Novakovskaya, I. A. (2016). Ecological and economic mechanism of functioning of land use. *Bulletin of Agrarian Science, 10*, 65–67.

Tugan-Baranovsky, M. I. (2003). *Fundamentals of political economy*. Lviv, LNU named after Ivan Franko, 628.

Blum, W. E. H. (2005). Functions of soil for society and the environment. *Reviews in Environmental Science and BioTechnology, 4*, 75–79.

Daniel, M. Hellerstein (2017). The US Conservation Reserve Program: The evolution of an enrollment mechanism. *Land Use Policy,* 63, 601–610.

Coulston, J. W., Wear, D. N., Costanza, J., Brooks, E. B., & Walker, D. (n.d.). Projecting the forest dynamics of the United States. Available at: https://unece.org/fileadmin/DAM/timber/meetings/2020/20201117/RUS_pdf/11_US_Forest_Sector_Modelling_Coulston.pdf

Odum, E. P. (n.d.). *Ecology and Our Endangered Life Support Systems*. Available at: https://www.amazon.com/Ecology-our-endangered-life-support-systems/dp/0878936351

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