










## Integrating Spatial Planning and Land Use Administration for Sustainable Development

Saule Kuanyshbayeva<sup>1</sup>, Gylshat Rakhmetova<sup>1</sup>, Ilyos Abdullayev<sup>2</sup>, Oleg Levichev<sup>3</sup>, Svetlana Levicheva<sup>4</sup>,  
Madina Aitkazina<sup>5\*</sup>, Rustem Shichiyakh<sup>6</sup>

<sup>1</sup> Department of Civil Law, Mukhtar Auezov South Kazakhstan University, Shymkent 160012, Kazakhstan

<sup>2</sup> Department of Business and Management, Urgench State University, Urgench 220100, Uzbekistan

<sup>3</sup> Department of Remote Sensing and Digital Cartography, State University of Land Use Planning, Moscow 105064, Russia

<sup>4</sup> Department I-11, Moscow Aviation Institute, Moscow 125993, Russia

<sup>5</sup> Department of Accounting and Finance, Almaty Technological University, Almaty 050012, Kazakhstan

<sup>6</sup> Department of Management, Kuban State Agrarian University Named After I.T. Trubilin, Krasnodar 350044, Russia

Corresponding Author Email: [aitkazina.m@mail.ru](mailto:aitkazina.m@mail.ru)

Copyright: ©2025 The authors. This article is published by IETA and is licensed under the CC BY 4.0 license  
(<http://creativecommons.org/licenses/by/4.0/>).

<https://doi.org/10.18280/ijstdp.200339>

### ABSTRACT

**Received:** 23 September 2024

**Revised:** 20 January 2025

**Accepted:** 14 February 2025

**Available online:** 31 March 2025

#### Keywords:

*land resource management, land use  
management, sustainable development,  
land use administration, land  
management design, spatial planning*

The purpose of this article was to analyze key methods and tools of spatial planning and land resource management in Kazakhstan, aimed at achieving sustainable economic development. The study focuses on the role of land use administration and land management design, examining their potential to address critical issues such as land conservation, rational use, and ecological safety. A mixed-methods approach was adopted, combining a qualitative review of scientific literature and a quantitative expert survey. The expert survey involved 42 professionals with relevant academic publications, ranking the significance of various administrative and planning tools. The results identified the most effective tools in land use administration, including differentiated land taxes, lease payment differentiation. In terms of land management design, the study highlighted the importance of spatial planning, zoning, and the development of land-use regulations. The analysis of global best practices, including those from the United States, China, and Europe, further informed the recommendations. The conclusion emphasizes that by enhancing and integrating these methods, Kazakhstan can improve land resource management, leading to more effective and sustainable economic development. Additionally, the adoption of international strategies, such as zoning, is crucial for achieving long-term sustainability goals in the context of both urban and rural development.

## 1. INTRODUCTION

The definition of management methods is a central issue in the theory and practice of land resource management (land use). Each land use management method forms a set of measures, a system of tools, the composition and content of which create tasks specific to that method and define the tools for solving them [1]. This allows each individual management method to be relatively distinct as an area of managerial activity in the use and protection of land resources [2].

In modern conditions, these methods are not only technical in nature but are also increasingly influenced by socio-political, environmental, and economic contexts, which require land resource policies to be adaptive and multifunctional [3, 4]. The growing complexity of land-related challenges - such as urban sprawl, agricultural land degradation, and competing stakeholder interests - necessitates management approaches that are integrated, interdisciplinary, and capable of responding to both short- and long-term goals [5]. Moreover, land resource management methods must accommodate digital transformation trends,

including the application of geographic information systems (GIS), remote sensing technologies, and e-governance platforms, all of which are reshaping traditional practices [2, 6, 7]. As countries strive to meet sustainability goals, land management methods must balance efficiency, equity, and environmental resilience [8].

The objectives of management must be fundamental when determining methods for land resource use management. Additionally, the presence of two interconnected forms of environmentally rational land use, such as organization (an indirect form) and its economic exploitation (a direct form), influence the choice of management method [9].

Organization as an indirect form often relates to planning frameworks, legislative support, and institutional coordination, which set the stage for more effective implementation of direct economic activities. On the other hand, economic exploitation directly pertains to how land is utilized for agricultural, industrial, residential, or conservation purposes, all which demand tailored regulatory oversight. These dual components are intricately linked and must be aligned within a coherent strategic framework to maximize

land productivity while safeguarding ecological integrity. Management decisions must therefore reflect a multidimensional understanding of land systems that include ecological sensitivity, demographic trends, economic feasibility, and cultural heritage [10, 11]. Ignoring these interdependencies often leads to fragmented governance and suboptimal outcomes.

However, many issues related to the use of land and other natural resources arise due to ineffective regulation, and the success of attempts to resolve these issues depends on the quality of management. Inefficient management negatively affects social stability, the sustainable use of land and other natural resources, investment, and economic growth.

Kazakhstan was selected as the focus of this study due to its vast territorial expanse, rich natural resource base, and its role in regional land use dynamics. As a post-Soviet state transitioning toward market-based governance, it faces complex challenges in reforming outdated land administration systems while pursuing sustainability goals. The country is also marked by significant ecological concerns, including land degradation and desertification, which underscore the urgent need for integrated and adaptive management strategies [12].

Therefore, a key direction for the further development of land use management systems in Kazakhstan should be the creation of a system of management methods and tools based on the use of global best practices. In this regard, the study of improving both existing management methods and the implementation of new ones is relevant, as this will increase the efficiency of land resource potential usage in the country and contribute to the sustainable development of land use.

## 2. LITERATURE REVIEW

In Kazakhstan, the use of land resources is an important element of the economy, as land resources are a fundamental and determining natural resource, directly and/or indirectly involved in virtually all types of economic activities [13]. However, it should be noted that the legal definition of this term in Kazakhstan has not yet been fully and unambiguously formed.

In scientific literature, land use is considered as an element of:

- The institutional-behavioral mechanism of the country's economy, its regions, and territorial communities [14];
- The investment-innovation mechanism [15];
- Enhancing the natural resource potential of the territory [16];
- The socio-ecological mechanism [17];
- The organizational and legal mechanism for managing land and other natural resources and land-property complexes [18];
- The financial-credit mechanism [19].

At the same time, the analysis of literary sources showed that there is no unified and comprehensive approach among scholars regarding the interpretation of the concept of "land resource use." The common scientific approaches to revealing its content are presented in Table 1.

**Table 1.** Approach to defining the essence of the term

No.	Source	Approach to Formulating the Essence of the Term
1	[20]	A system of economic and other land use formed in the country under the influence of objective factors or

		introduced by the state to obtain the maximum benefit and highest effect from the land while meeting the requirements of its preservation and improvement.
2	[21]	A process by which humans (society) use the integrated potential of a territory, including all resources on the relevant geospatial site, which forms part of the socio-territorial complex at the regional level and leads to the complication of its structure, manifesting in the regulation of land relations.
3	[22]	A long-term process of human land use for the production of goods or benefits, as well as the structure of human relations regarding land ownership, determined by a combination of cultural, historical, institutional, and other factors of use.
4	[23]	1) The use of land according to legally established procedures (land parcel); 2) A part of the unified land fund provided by the state or acquired into ownership or lease by an individual user for economic or other purposes, limited geographically; 3) An object of rights, economic, environmental, urban planning, agricultural, and other land relations, for which the land user is issued a document certifying land rights with specific boundaries, area, land composition, property objects, and, if necessary, geodetic coordinates of boundary markers defined on the ground.
5	[24]	The process of using land resources for various needs (placement of settlements, various communications, industrial facilities, agricultural production, extraction of minerals, recreational purposes, etc.) based on legal and regulatory acts.
6	[25]	A unique natural asset defining the space where economic activities take place and environmental processes occur, within which ecological and economic assets are located.

As shown by the analysis of scientific literature, spatial planning of land resource use, being a more complex process than simple land use regulation [26], involves disagreements and contradictions existing in policies conducted across different sectors, such as conflicts between economic development policies and environmental protection policies [27]. However, its implementation ensures the granting of status to land use development measures [28], the granting of status to territorial restrictions (encumbrances) on the use of land and other natural resources and their boundaries [29], the granting of status to land management regulations (land users' obligations, limitations, and encumbrances on rights) [30], and other management activities.

The main methods of spatial planning for land resources, according to researchers, are land use administration [31] and land management design [32].

According to Enemark et al. [33], land use administration involves processes related to land ownership, the cost of land use, land utilization, and land use development, carried out by the state through the use of public or private sector institutions. Sustainable development policies require that these four functions be integrated.

Land management design is a relatively independent direction for organizing the rational use of land resources [34]. At the same time, individual measures related to direct biotechnological impacts on land and productive human labor influencing the land are not included in the land management design method [35].

The purpose of this article is to define the main methods and tools of spatial planning for land resources and land use to achieve sustainable economic development in Kazakhstan.

### 3. METHODS

In accordance with the specifics of defining the main methods and tools of spatial planning for land resource use to achieve sustainable economic development in Kazakhstan, a qualitative-quantitative approach was chosen for the study. Data were collected from February 20 to April 20, 2024, through a literature analysis on the research problem and an expert survey conducted via email, followed by the processing and analysis of the survey results.

In the first stage of the study, information sources necessary for achieving the research goal were selected. The data for this study came from monographs as well as articles and reviews published in journals indexed by Scopus and Web of Science. Based on the analysis of the source base, scholars' approaches to defining the concept of "land resource use" (land use) were identified, along with the main tools for land use administration and the primary tools for land management design.

In the second stage of the study, an expert survey was conducted aimed at determining the significance of the main tools for land use administration and land management design. The sufficient sample size for the research was determined to be 46 people, who were invited to participate in the survey via email. The selection criterion for experts was the presence of at least three publications on the research topic in peer-reviewed journals. A total of 42 individuals agreed to participate in the survey, after which they were sent emails asking them to rank the main tools of land use administration and land management design based on their level of significance, assigning scores accordingly. Based on the responses received, the ranking of each tool was determined according to the scores assigned by the experts. The information gathered from the expert survey was then processed to determine the weights of the land use

administration and land management design tools, with the final values reflecting their significance from the experts' perspective.

All survey participants were informed about the purpose of the survey and that the organizers intended to publish the results in an aggregated form.

For a more objective analysis of the data obtained from the expert survey, the degree of agreement among the experts' opinions was measured with the mathematical processing of the results using Kendall's concordance coefficient.

### 4. RESEARCH RESULTS

The analysis of scientific literature and the results of the expert survey allowed for the identification of the main tools for land use administration and their ranking by significance (Tables 2 and 3).

The analysis of scientific literature and expert survey results also allowed for the identification of the main tools for land management design, which are ranked by significance in Tables 4 and 5.

It is also important to note that land cadastre tools are included in land management design tools: the accumulation and systematization of information about the quantity and quality of land, land plots, land ownership, and land use, as well as their condition and other data.

**Table 2.** Main types of tools for land use administration

Type of Tool	Rank	Weight
Economic Tools	1	0.42
Land Management and Legal Tools	2	0.33
Organizational and Land Management Tools	3	0.25

**Table 3.** Main tools for land use administration

Type of Tool	Tool	Rank	Weight
Economic Tools	Differentiation of land tax	1	0.31
	Differentiation of lease payments	2	0.24
	Differentiation of environmental tax	3	0.19
	Stimulation of non-traditional land use	4	0.12
	Stimulation of conservation of degraded land	5	0.08
	Stimulation of land and natural resource protection activities	6	0.06
Land Management and Legal Tools	Imposing restrictions on land use in civil-law agreements	1	0.40
	Territorial planning and zoning of land by types (subtypes) of land use	2	0.34
	Providing conclusions on the allocation of land plots and changes in their designated use	3	0.26
	Spatial planning of land use development (establishing land management regulations)	1	0.44
Organizational and Land Management Tools	Land management (regulating land ownership size, etc.), capitalization of land use, and ecological optimization	2	0.32
	State land cadastre (registration of environmental encumbrances)	3	0.24

**Note:** Compiled based on the expert survey; Kendall's concordance coefficient  $W = 0.73$  ( $p < 0.01$ ), indicating strong agreement among the expert opinions

**Table 4.** Main types of land management design tools

Type of Tool	Rank	Weight
Planning Tools	1	0.43
Land Management and Legal Tools	2	0.35
Organizational and Land Management Tools	3	0.22

**Table 5.** Main tools for land management design

Type of Tool	Tool	Rank	Weight
Planning Tools	Granting status to land use development measures	1	0.39
	Granting status to land use types (subtypes) and their boundaries	2	0.26
	Granting status to territorial restrictions (encumbrances) on land and natural resource use and their boundaries	3	0.20
	Granting status to land management regulations (land users' obligations, restrictions, and encumbrances on rights)	4	0.15
	Scientific justification for land allocation based on state, public, and private interests	1	0.41
Land Management and Legal Tools	Formation of land plots and rational systems of land ownership and use, creation of ecologically sustainable agro-landscapes	2	0.34
	Improvement of the structure and placement of land plots, crop areas, crop rotation systems, changes to hayfields and pastures	3	0.25
	Organization of the territory of agricultural and other enterprises, institutions, and organizations	1	0.58
Organizational and Land Management Tools	Implementation of land management measures to preserve natural landscapes, restore and improve soil fertility, reclaim disturbed and low-productivity lands, and protect land from erosion, waterlogging, etc.	2	0.42

**Note:** Compiled based on the expert survey; Kendall's concordance coefficient  $W = 0.69$  ( $p < 0.01$ ), indicating strong agreement among the expert opinions

## 5. DISCUSSION

Land use administration (see Tables 2 and 3) is a relatively new method in the land resource and land use management system. The results of the study showed that important tools for land use administration by the state include economic, land management-legal, and organizational-land management tools, with spatial planning of land use development and zoning by types (subtypes) of land use [17], land management, and the maintenance of the state land cadastre, regulating environmentally safe and economically efficient land use as their foundation.

Modern land administration theory ensures the regulation of four types of land relations: land ownership relations, land and land use valuation relations, land use relations (land use), and land use development (planning) relations [15]. In the land use administration system, these four types of land relations are interconnected and interact with each other. A single land plot, as the object of land relations, can be subject to all four types of land relations. A single object of land relations can be linked to one or more subjects of land relations through these four types of land relations.

Kazakhstan faces unique challenges and opportunities in its pursuit of sustainable land use administration and spatial planning. While global best practices provide invaluable insights, their application must be tailored to the country's specific socio-economic, political, and environmental contexts [36].

Land use administration covers a problem area that clearly represents a systemic triad: the object - the process of land use - the subjects. This triad represents a general pattern and basic structure of the land use administration problem area. It defines the unity of three distinct parts: the object of land use, the process of land use, and the subjects of land use, all of which are interconnected. Their systemic connections are determined by the interaction of parts within the whole - the triad of the land use administration problem area. Representing the land use administration problem area as a triad forms the basis for the formulation of key postulates for building an effective land use administration system:

- understanding the land use administration problem area as a whole;
- understanding the interdependence and

interconnectedness of all parts of the land use administration problem area;

- clear, unambiguous definition of the meaning, content, and scope of the components of the land use administration problem area.

In land use administration [25], the land use regime is established through the execution of four main functions:

- rationalization of land ownership or its aggregate;
- assessment of the state and changes in land use;
- socialization, environmentalization, capitalization, and institutionalization of land and other natural resource use and protection;
- optimization of land use development (planning).

A key condition of the environmentally rational management paradigm is that the four functions of the land use administration system are considered solely in interaction.

Sustainable development policy requires that the four functions of land use administration be strategically integrated. This is achieved through four main approaches:

1. In theory, these functions are viewed as four parts of a single whole, not as independent activities. This means that each function is not an end in itself, but together, all four serve as a means to promote sustainable development;
2. The processes used to implement the functions must be directed toward sustainable development;
3. The information and results generated by these processes must be mutually shared and widely accessible;
4. All functions must be built on a foundation of cadastral knowledge [26].

As for land management design (see Tables 4 and 5), as a method in the land resource and land use management system, it possesses tools for forecasting land use development, planning (spatial planning of land use development), land management, and the state land cadastre. Furthermore, incorporating the European Union's emphasis on stakeholder engagement into Kazakhstan's land use planning can ensure that policies are socially inclusive and politically feasible.

This method is especially relevant today, given the significant areas of land that, according to researchers, could be transferred to municipal ownership by local self-government bodies [29]. From a political perspective, Kazakhstan's centralized governance structure can benefit from decentralization in land management practices, similar to

models observed in Scandinavian and North America's countries. Empowering local authorities to manage land resources while adhering to national frameworks could strike a balance between flexibility and consistency. This includes not only agricultural lands but also forest, aquatic, and other territories [37]. This could lead, for example, to the creation of forest farms, as practiced in Canada, Sweden, Finland, and the United States, especially in steppe regions, which would be much more efficient than leaving the land unused due to a lack of irrigation. Forest farms play a significant role in the system of combating desertification and in the comprehensive management of forestry. In such cases, the land management design method is indispensable.

The land management design method is applied differently in various countries. In the Americas and Europe, zoning is commonly used to manage land use. Unlike land zoning in Kazakhstan, which establishes functional purposes, construction requirements, and landscape organization of the territory [32], zoning in other countries is a land use management tool [38]. So, zoning regulates the types of activities that can take place on a particular land plot, the volume allocated to these activities, and the ways and forms of building placement. It specifies the permitted use and standards for land parcels. The term "zoning" comes from the practice of defining permitted uses of land plots based on mapped zones (zoning districts), separating one set of land uses from another. Zoning holds the status of a legal document [39]. A zoning ordinance consists of two parts: the zoning text and the zoning map. The text establishes zones (zoning districts) and provisions regulating land use and construction rules. The zoning text includes permitted land use, land parcel development standards, and zoning administration issues. The maps show the location of zones (zoning districts) [40].

Effective land resource management through the land management design method is also implemented in China, where one of the key functions of the Ministry of Land and Natural Resources is to collect resource usage rent, legal and regulatory oversight, and control over the use of these funds. The main land document in China is the general land use plan, which covers the entire country and its regions, is discussed nationwide, legally approved, and subject to mandatory implementation. At the local level, it involves zoning of land use with the designation of each plot's purpose and its assessment. All data are entered into a unified land information system, which can be accessed by any citizen or legal entity. After selecting the necessary option, they submit a request to the authorities, who are required to make the appropriate decision within the established timeframe. In China, approximately 200,000 land surveyors work, 90% of them in the service sector, and the rest in the public sector [22]. The role of officials is reduced to preparing the corresponding decision.

## 6. CONCLUSIONS

Achieving sustainable land resource management in Kazakhstan requires the integration of spatial planning and land use administration methods tailored to the country's unique socio-economic and environmental conditions. Article addresses strategically important issues such as land resource conservation, organizing their rational and efficient use, achieving sustainable economic development, as well as ensuring environmental and food security, is possible through

the improvement and implementation of such land resource management methods as land use administration and land management design. These methods are manifested both in direct legislative or permissive impacts on land users and in the formation of an effective system of economic levers.

The key tools for land use administration include economic, land management-legal, and organizational-land management tools, with the foundation being spatial planning of land use development and zoning by types (subtypes) of land use, land management, and maintaining the state land cadastre, regulating environmentally safe and economically efficient land use.

Land management design, as a method in the land resource and land use management system, is equipped with tools for forecasting land use development, planning (spatial planning of land use development), land management, and the state land cadastre.

Considering global experience, it can be concluded that the creation of a system of methods and tools for land resource management in Kazakhstan will help solve the problems of land resource and land use management. Thus, one of the directions to ensure the successful integration of global best practices, Kazakhstan should consider fostering collaborations with international experts and institutions. Partnerships with organizations like the Food and Agriculture Organization (FAO) or the United Nations Development Programme (UNDP) could provide technical expertise and funding for pilot projects.

## REFERENCES

- [1] Vaslavskaya, I., Vaslavskiy, Y., Stepanova, D., Kochetkov, E., Trukhanov, S., Shakhov, D. (2025). Implementation of ESG principles in business as a tool for managing environmental and social risks. *International Journal of Ecosystems and Ecology Science*, 15(2): 63-70. <https://doi.org/10.31407/ijees15.2>
- [2] Tuleyeva, D., Shaimerdenova, A., Tesalovsky, A., Leontyev, V., Turutina, T., Shoykin, O., Gorovoy, S., Dmitrieva, O., Danilova, E. (2024). GIS technology role in the management of arable lands in Kazakhstan. *SABRAO Journal of Breeding and Genetics*, 56(6): 2441-2450. <http://doi.org/10.54910/sabrao2024.56.6.25>
- [3] Omarbakiyev, L., Kantarbayeva, S., Nizamdinova, A., Zhumasheva, S., Seitkhamzina, G., Saulembekova, A. (2023). Consequences of changing regional integration on environmental development, agricultural markets, and food security. *Global Journal of Environmental Science and Management*, 9(4): 951-966. <http://doi.org/gjesm.2023.04.19>
- [4] Kulanov, A., Tamenova, S., Amenova, K., Karshalova, A., Tussupova, L. (2020). Investment climate and its influence on the development of entrepreneurship: Practice of the Republic of Kazakhstan. *Entrepreneurship and Sustainability Issues*, 8(2): 421-437. [https://doi.org/10.9770/jesi.2020.8.2\(25\)](https://doi.org/10.9770/jesi.2020.8.2(25))
- [5] Yessimbek, B., Mambetov, B., Akhmetov, R., Dosmanbetov, D., Abayeva, K., Kozhabekova, A., Oraikhanova, A., Baibatshanov, M. (2022). Prevention of desertification and land degradation using black saxaul in arid conditions. *OnLine Journal of Biological Sciences*, 22(4): 484-491. <https://doi.org/10.3844/ojbsci.2022.484.491>

- [6] Nugmanov, A., Tulayev, Y., Ershov, V., Vasin, V., Kuanyshbaev, S., Valiev, K., Tulkubayeva, S., Somova, S., Bugubaeva, A., Bulaev, A., Chashkov, V., Tokusheva, A., Nauanova, A., Zhikeyev, A., Yerish, N., Yeleuov, B. (2023). Quantitative assessment of soil condition, basic environmental factors and productivity of *Linum usitatissimum* in the steppe zone of Kazakhstan using the remote sensing method. *Brazilian Journal of Biology*, 83. <https://doi.org/10.1590/1519-6984.277283>
- [7] Gladilina, I., Sergeeva, S., Deputatova, N., Skvortsova, M., Bereznyakovskiy, V., Silaeva, A., Karabayev, G., Mamedov, S. (2023). Prospects for the development of university campuses integrated into urban environment in Russia and Kazakhstan. *Civil Engineering and Architecture*, 11(6): 3347-3354. <https://doi.org/10.13189/cea.2023.110610>
- [8] Akhmetshin, E., Sultanova, S., Shichiyakh, R., Khodjaeva, M., Stepanova, D., Nurgaliyeva, A. (2024). Efficiency in urban management and smart city concepts: A Russian cities case study. *International Journal of Sustainable Development and Planning*, 19(4): 1379-1387. <https://doi.org/10.18280/ijstdp.190415>
- [9] Anarbayev, E., Aitkhozaeva, G., Pentaev, T., Zhildikbaeva, A., Begarip, G. (2023). Improving the criteria for evaluating sustainable land use efficiency. *Izdenister Natigeler*, 2(98): 362-368.
- [10] Arrieta-López, M., Abdrakhmanov, R., Meza, A., Gridneva, Y.E., Anokhina, M., Dzhalilova, N.R. (2020). Formation of the competitive potential of the agricultural territories. *Entrepreneurship and Sustainability Issues*, 7(3): 1921-1936.
- [11] Tleshpayeva, D., Bondarenko, N., Leontev, M., Mashentseva, G., Plaksa, J., Zharov, A., Stepanova, D., Karbozova, A. (2025). Assessment of economic management of land resources to enhance food security. *Qubahan Academic Journal*, 5(1): 159-168. <https://doi.org/10.48161/qaj.v5n1a1048>
- [12] Stybayev, G., Zargar, M., Nasiyev, B., Baitelenova, A., Nogayev, A. (2025). Rotational pasture management for ameliorating productivity and feed value of vegetation, soil quality, and sustainability in dry steppe zone. *OnLine Journal of Biological Sciences*, 25(1): 209-218. <https://doi.org/10.3844/ojbsci.2025.209.218>
- [13] Shanikbayeva, A.O., Nilipovsky, V.I., Sarybayev, O.A. (2022). Rational use of agricultural lands in the southern regions of Kazakhstan. In *Current Issues of Agricultural Education Development: Problems, Searches, Solutions. Proceedings of the Second International Scientific-Practical Conference*, Moscow, pp. 387-391.
- [14] Turganaliev, S.R., Abdygalieva, S.S., Dabyilova, B.E., Beysenbayeva, S.B. (2019). Land circulation in the Republic of Kazakhstan under modern conditions. *Bulletin of KazNU. Series Geographical*, 53(2): 4-15.
- [15] Biggar, J., Siemiatycki, M. (2020). Tracing discretion in planning and land-use outcomes: Perspectives from Toronto, Canada. *Journal of Planning Education and Research*, 43(3): 1-17. <https://doi.org/10.1177/0739456X20904427>
- [16] Kunafina, G.T., Mukhametova, Z.S. (2022). Analysis of the land resource management system in the Region of the Republic of Kazakhstan. *Scientific News*, 26: 197-199.
- [17] Edgington, D. (2019). Comprehensive planning in Japanese large cities. *Planning Perspectives*, 34(1): 115-132. <https://doi.org/10.1080/02665433.2017.1389655>
- [18] Buitelaar, E., Galle, M., Sorel, N. (2011). Plan-led planning systems in development-led practices: An empirical analysis into the (lack of) institutionalisation of planning law. *Environment and Planning*, 43(4): 928-941. <https://doi.org/10.1068/a43400>
- [19] Tkacheva, O.A., Chernova, A.I. (2020). Land management: the inventory aspect. *Economy and Ecology of Territorial Educations*, 4(4): 26-32. <https://doi.org/10.23947/2413-1474-2020-4-4-26-32>
- [20] Shavrov, S.A., Slabodich, K.A. (2018). Tools of territory management and land administration in electronic state. *Ödöäü ÁÄÖÓ*, 5(2): 28-33.
- [21] Artemyev, A.A., Lepekhin, I.A. (2019). Management of agricultural lands in Russia: Experience, problems, and possible solutions. *Bulletin of Tver State University. Series: Economics and Management*, 1: 59-66.
- [22] Komov, N.V. (2015). The role of land resources in the sustainable development of Russia. *Economics and Ecology of Territorial Entities*, 4: 7-14.
- [23] Volkova, T.V. (2020). Mechanism of land resource management: Concept and structure. *Bulletin of Tomsk State University. Law*, 35: 164-170.
- [24] Tatarenko, T.S. (2014). The role of land inventory in land resource management. *Young Science*, 1(2): 59-62.
- [25] Zharnikov, V.B. (2013). Rational land use as a task of geoinformation spatial analysis. *Bulletin of SGGA*, 3(23): 77-81.
- [26] Kurmanova, G.K. (2020). Land resource management in the context of digitalization. *Agrimarket Problems*, 4: 140-146.
- [27] Borrás, S., Franco, J.C. (2010). Contemporary discourses and contestations around pro-poor land policies and land governance. *Journal of Agrarian Change*, 10(1): 1-32. <https://doi.org/10.1111/j.1471-0366.2009.00243.x>
- [28] Dawidowicz, A., Voß, W., Leonard, B. (2013). Land administration systems - development trends - A case study. *Real Estate Management and Valuation*, 21(2): 83-92. <https://doi.org/10.2478/remav-2013-0020>
- [29] Kiseleva, N.A., Tarakanov, O.V. (2013). *Land Resource Management: Regional Aspect: Textbook*. Penza: PGUAS.
- [30] Barry, M. (2018). Fit-for-purpose land administration - Administration that suits local circumstances or management bumper sticker? *Survey Review*, 50(362): 383-385. <https://doi.org/10.1080/00396265.2018.1501130>
- [31] Mustomi, O., Nur, A. (2021). Implementation of regular land administration in the management of certificate of rights land through a full systemic land registration system (PTSL). *Advances in Social Science, Education and Humanities Research*, 590: 124-127.
- [32] Dzhigildieva, Z.G. (2019). *Land Management Design: Textbook*. Almaty: Almanac.
- [33] Enemark, S., Williamson, I.P., Wallace, J. (2005). Building modern land administration systems in developed economies. *Journal of Spatial Science*, 2(50): 51-68. <https://doi.org/10.1080/14498596.2005.9635049>
- [34] Romanyuk, I.A., Chursin, A.I. (2014). *Land Management Design: Textbook*. Penza: PGUAS.
- [35] Shashkova, A.V., Solovtsov, A.O. (2021). Land as a Resource and object of management: Methodological aspects of management, digitalization of land resources. *Izvestiya DVFU. Economics and Management*, 3: 16-32.

- [36] Talen, E. (2013). Zoning for and against sprawl: The case for form-based codes. *Journal of Urban Design*, 18(2): 175-200.  
<https://doi.org/10.1080/13574809.2013.772883>
- [37] Garde, A., Kim, C. (2017). Form-based codes for zoning reform to promote sustainable development: Insights from cities in Southern California. *Journal of the American Planning Association*, 83(4): 346-364.  
<https://doi.org/10.1080/01944363.2017.1364974>
- [38] Rafikov, T., Zhumatayeva, Z., Mukaliyev, Z., Zhildikbayeva, A. (2024). Evaluating land degradation in East Kazakhstan using NDVI and Landsat data. *International Journal of Design & Nature and Ecodynamics*, 19(5): 1677-1686.  
<https://doi.org/10.18280/ij dne.190521>
- [39] Imanbayeva, Z., Mussirov, G., Nurgaliyeva, A., Rakhimov, T., Akhmetova, G., Kaldybayeva, D., Petrov, A. (2024). Enhancing agricultural efficiency and land resource management through information systems. *Qubahan Academic Journal*, 4(2): 342-354.  
<https://doi.org/10.48161/qaj.v4n2a543>
- [40] Yessenbayev, A., Akhmetshin, E., Kurikov, V., Hajiye, H., Chernova, O., Litvinov, A., Shichiyakh, R., Alkhanov, N. (2024). Application of the adaptive approach for forming the concept of an inclusive residential environment in the context of regional differences. *Civil Engineering and Architecture*, 12(5): 3480-3499. <https://doi.org/10.13189/cea.2024.120526>