

Novakovska I.O., Hunko L.A.

**CONCEPTUAL PRINCIPLES
OF LAND PROTECTION IN CONTEXT
SUSTAINABLE DEVELOPMENT**

Kyiv – 2024

УДК: 332.3:502.131.1(1-22)
ББК 65.2
Н.72

The author's team:
Novakovska I.O., Hunko L.A.

Approved for publication by the Academic Council of the National University of Life and Environmental Sciences of Ukraine, protocol No. 14 of 26 June 2024.

Reviewers:

Balyan A. V. - vice-president of the National Academy of Sciences, academician of the National Academy of Sciences, doctor of economics, Professor

Amelina S. M. – head of the department of foreign philology and translation of the National University of Life and Environmental Sciences of Ukraine, Doctor of pedagogical sciences, Professor

Yeysiukov T.O. – Dean of the Faculty of Land Management of the National University of Life and Environmental Sciences of Ukraine, Doctor of Economics, Professor

Stupen R. M.- Head of the Department of Geodesy and Geoinformatics of the Lviv National Environmental University, Doctor of Economics, Professor

H.72 Novakovska I.O., Hunko L.A.

Conceptual principles of land protection in context sustainable development / monograph /
Novakovska I.O., Hunko L.A. – K.: 2024. – 293 c.

ISBN

The essence of the social, economic and environmental foundations of sustainable development of society and urban land use in modern conditions is studied. On the example of the capital of Ukraine - the city of Kyiv, the author analyses the use of land by categories and the methodological principles of functioning of land use of the natural and recreational complex. Additional materials for in-depth study and analysis of topical issues of this problem are proposed.

The publication is intended for researchers, specialists in the field of urban planning, land relations and ecology, employees of state authorities and local self-government bodies, teachers, students, specialists of land management organisations.

The monograph was completed as part of the research work BF/39-2022 "Socio-economic challenges of decentralization processes and land management reform for the Ukrainian countryside

УДК: 332.3:502.131.1(1-22)
ББК 65.2

© / Novakovska I.O., Hunko L.A.

© NULES of Ukraine, 2024

ISBN 978-617-8007-32-4

CONTENTS

PREFACE.....	4
Chapter 1. SOCIAL, ECONOMIC AND ENVIRONMENTAL ASPECTS OF SUSTAINABLE DEVELOPMENT	6
1.1. Theoretical and Methodological Substantiation of the Directions of Development of Land Relations in Ukraine	6
1.2. Land resources are the basis of productive forces	12
1.3. The concept of sustainable development of urban land use.....	25
1.4. Planning organisation of the city in the context of sustainable development	44
1.5. Global experience in shaping integrated urban development	63
Chapter 2. DEVELOPMENT STRATEGY, RESOURCES AND LAND MANAGEMENT OF URBAN LAND USE	82
2.1. Sustainable development strategy for the capital's metropolis	82
2.2. Territorial resources of urban space and their use	103
2.3. Land management support for the maintenance of green spaces.....	119
Chapter 3. MAIN DIRECTIONS OF DEVELOPMENT OF THE SYSTEM OF SUSTAINABLE URBAN LAND USE	145
3.1. Forecasting a sustainable land use system	145
3.2. Basic principles of territory formation and problems of establishing city boundaries	154
3.3. Theoretical and legal basis of special land protection	168
References.....	177
Appendices. Modern research and strategies for preserving land resources as the main wealth.....	187

PREFACE

Land is the basis of human existence, which determines its important role in the socio-economic development of society. As the foundation of the ecosystem, a factor of production and a subject of property rights, it is the basis for sustainable development, a condition for social upliftment and human well-being. The political and economic changes that began in the countries of Central and Eastern Europe in the early 1990s, including Ukraine, also affected the land use sector. In the course of the land reform in the country, the former land system was changed and new principles of land relations development were established. However, this has led to the emergence of acute social, economic and environmental problems. The issue of conservation, rational use and expanded reproduction of land resources as a basis for sustainable development of Ukraine has become particularly acute.

The problem of sustainable development is fundamentally new and primarily concerns the use of land resources. First of all, it should be noted that there is a lack of scientific elaboration of theoretical foundations and identification of practical measures for the development of sustainable land use. Formation of a sustainable land use methodology will allow applying its results not only for economic regulation of land relations, but also for organizing rational and environmentally safe use of land, defining and justifying a system of organizational and economic measures to restore their productivity. In a market economy, one of the main goals in the field of land relations in cities is to transform the land and resource potential into a powerful self-sufficient factor of economic development.

The concentration of the country's production assets and the majority of its population in cities, the operation of high-hazard industries and motorisation have caused an excessive technogenic load on urban areas, which has a negative impact on public health.

Greening of land use involves, first and foremost, public control over the formation and development and the level of environmentally sound use of urban land use. The ecological load on ecosystems as a result of anthropogenic activity should not exceed the level of the normalised maximum permissible scientifically based level in conditions of dynamic natural equilibrium.

Scientific basis for sustainable development of urban land use

The study of the planning organisation of the city in the context of sustainable development, taking into account the world experience of city formation. In connection with the above, it has become a rather urgent scientific task. It is important to identify the territorial resources of urban development, especially those related to the life of its residents, to provide directions for forecasting sustainable land use, and to ensure special protection of land as the main national wealth. The authors of the monograph set out to address the above and other issues of sustainable land use.

At the same time, we understand that in the post-war period, scientists will have to carry out a number of new land protection works that will be necessary to implement the National Target Programmer for the Use and Protection of Land of Ukraine until 2032, the draft of which is being finalized. Since the beginning of the full-scale invasion, the Russian occupiers have caused more than 38 billion in damage to our environment in the first 9 months of 2022, and the direct damage to the climate as a result of the aggression is at least 33 million tones of CO₂ emissions.

The war continues to destroy not only Ukraine's environment, but also contributes to the global warming problem across the globe. It is believed that no previous war has ever caused such extensive environmental damage. The amount of land mined is estimated to be 1/3 of its total area, forest plantations of more than 3 million hectares have been burned and destroyed, and a huge number of residential buildings, industrial buildings, energy and transport infrastructure have been destroyed.

The strategic goal of post-war economic recovery on the basis of sustainable development will be carried out with the aim of creating a clean and safe environment, and is aimed at further moving forward with the European Green Deal, and requires the accelerated launch of the Ukraine Recovery Fund, assistance in assessing environmental damage and compensation, and restoration of the country's land and resource potential.

**CHAPTER 1.
SOCIAL, ECONOMIC AND ENVIRONMENTAL
ASPECTS OF SUSTAINABLE DEVELOPMENT**

**1.1. Theoretical and Methodological Substantiation of the Directions
of Development of Land Relations in Ukraine**

Land relations, by their economic and legal essence, are a component of social relations arising from the appropriation of income as a result of ownership, disposal and use of land. Any changes in the social mode of production are therefore necessarily accompanied by changes in land relations.

The period of the pre-market economy required qualitative changes in land relations. In particular, the search for a real and effective land owner and the determination of its objective market value. It is well known that the foundation of land relations is the form of land ownership.

The new system of land relations regulation envisages improvement of taxation, pricing, financial and credit measures, investment and social development of settlements. The basis for this is the implementation of the principle of payment for land use. The new land relations are based on the structural model of land resources that existed before. It is the combination of different forms of ownership and organizational and legal forms of management that allows for continuous improvement of land relations. The existing land relations between individual landowners and land users also need to be developed.

The prerequisite for the formation of an effective mechanism for the use of land and production of diverse products can only be the deep relations of the economic structure of society - the relations of land ownership. It is the respective form of ownership that determines the specific market system of economic management and the nature of the relations that arise in this regard. Property relations are extremely complex and multifaceted. The concept of "property" is expressed through the object and socio-economic and legal content. The most controversial issues are the definition of the economic and legal essence of property.

Some scholars identify the economic and legal essence of the concept

Scientific basis for sustainable development of urban land use

of property. Others distinguish its various aspects: economic, legal, social and political. At the same time, there is no clear interpretation of the economic essence of property. In particular, the economic essence of land ownership is not fully disclosed. Such a form of land use as lease is analysed mainly based on the experience of other countries.

In the narrowest sense, property means the ownership of a certain object (physical and informational) by a separate entity. In other words, it reflects the relationship of a person (subject) with respect to a certain degree of alienation (appropriation) of a given object from another subject (subjects). From the legal point of view, the degree of alienation (appropriation) is determined by the type of rights of the subject (the right to possession, disposal, use). The latter may apply to the whole object or to a separate part of it. It is the types of rights and their varieties that directly affect the economic efficiency of this form of ownership. This is also evidenced by a retrospective analysis of the forms of ownership and business entities that have undergone structural development from single-level to differentiated appropriation of means and results of production. It is not the special status and privileges of one form of ownership that can increase the efficiency of a particular form of ownership, but their complementarity and integration.

Another deep economic essence of the forms of ownership is that private ownership is the result of the sole appropriation of a given object. If we are talking about the ownership of objects of limited size and that can be either transported or completely processed to meet the owner's own needs, the result of ownership of this object, under certain conditions, can satisfy the owners of other objects to a certain extent.

It is necessary to distinguish between the economic and legal essence of the concept of "property". Thus, in the legal sense, property can be generally defined as the process of appropriation (alienation) of a given object by a subject. In economic terms, property is the process of changing the level of rights to objects of the national economic complex. At the same time, it is necessary to consider structural and economic changes within the subjects themselves. The most significant among these entities are organisational and legal forms of management. Depending on the interests that underlie them, it is necessary to distinguish between individual, collective, family, state and

Scientific basis for sustainable development of urban land use

interstate forms. In this case, the creation of an appropriate material basis (material incentives) is of paramount importance for improving property relations. This can be either a quantitative reduction of the property entities themselves or their qualitative (structural, functional) transformations.

The next way to improve the efficiency of property relations is to choose the optimal level of appropriation of labour results for a given economic situation and form of management. In the most simplified form, structural changes are reduced either to the elimination of "superfluous" property entities or to the redistribution of property rights (even or uneven) among property entities themselves. While in the legal sense property is defined through the right to possess, dispose of, and use, in the economic sense it is expressed through the level of possession, the level of use, and the level of disposal.

It is not just the development of a particular form of ownership and management that is important, but also their effective diversity. The latter can be assessed by the following criteria: general and individual motivation of ownership and management entities; social orientation of the form of ownership and management; compliance of this form with existing economic, social and political relations; specialization, economic activity; optimal level of production concentration; use of scientific and technological progress.

Thus, land relations are a multidimensional problem that covers a wide range of issues, including forms of ownership and management, land payments, land market, rent, land tax, lease, land use management, land protection, reproduction of land productivity, etc.

The land reform has become an integral part of the economic reform underway in Ukraine. Reforming land relations affected all sectors of the economy and spheres of public life, and the transition to a market economy in all sectors of the national economy cannot be carried out without changing them.

The purpose of the land reform was to create conditions for more efficient use of land, labour and financial resources through the equal development of different forms of land ownership and management. The task of the land reform is to redistribute land for its intended purpose with the simultaneous transfer of land to private and collective ownership, for use by

enterprises, institutions, organisations and citizens. [34]

Thus, the central problem at the stage of reforming land relations was the issue of land ownership. After the legislative establishment of three equal forms of ownership - state, collective and private - the political aspect of the problem remains unresolved: which of them should be the basis of the political and economic system of Ukraine. And this is understandable, since its solution requires a differentiated approach, taking into account national traditions, i.e. the mentality of Ukrainians, a number of social and economic factors, and historical and regional peculiarities of land use.

It seems that the purpose of the land reform is to impose exclusively private ownership of land and free purchase and sale of land plots on society. However, as already noted, the reform of land relations was launched in Ukraine with the aim of creating economically sound legal relations that should ensure the effective implementation and restoration of Ukraine's high land and resource potential.

At the same time, it seems undoubtedly appropriate to establish state ownership of land in natural areas with a special protection regime (state nature reserves and national parks, nature reserves, natural monuments, etc.), land plots with natural complexes and objects of environmental, scientific, aesthetic, recreational and health and wellness purposes, forestry, water and defence land.

At the current stage of Ukraine's socio-economic development, the solution of the problem of land relations is very complicated by a number of objective and subjective circumstances. These include the transitional nature of our socio-economic system and the inertia of previously established paradigms and mental values of citizens (contradictions between personal psychology and sociology of society), which determine the acceptability of modern changes in the legal status of land and corresponding changes in land relations. At the same time, the problem of reforming land ownership relations at the current stage is considered by the majority mainly in the political plane and is reduced to a mutually exclusive opposition: either land is a commodity and an object of private property, or it is capital and the national heritage.

In the context of Ukraine's transition to a market economy, land, like

Scientific basis for sustainable development of urban land use

many other natural resources, acquires the status of capital (land-capital) rather than a commodity produced by human labour and remains a universal means of production. Therefore, as an object of property, land should take the form of capital. According to the current legislation of Ukraine, the form of land ownership is determined by the type of business entity that owns it as a means of production - state or private. In both cases, land-capital is used to solve the social and economic problems of its owner.

And when Article 13 of the Constitution of Ukraine reads that "land... is the object of property rights of the Ukrainian people...", it means that we are talking about the establishment of state jurisdiction within the limits defined by the Constitution of Ukraine over the nature of this property. [34]

And "heritage" is a category that is not identical to property, because it essentially expresses socio-economic essence, it expresses socio-economic relations that are different from property relations.

An impartial analysis of land relations in countries with market economies shows that it is there that the category of "land" and its social essence is perceived as an object of economic activity, not an object of property; at the same time, land relations are increasingly closely linked by law in order to subordinate them to public interests.

The right of ownership of products (results) of production remains absolute, but no Western country recognises such a right in relation to land. Improvement of land relations in economically developed countries is increasingly aimed at stimulating and supporting land leasing. In particular, the share of leased land in the United States is about 70%, in the old German lands - 48%, in the new lands - 80%. According to Article 540 of the French Civil Code, the tenant's rights in land relations are so significant that almost nothing remains of the absolute right of the landowner. The Chinese economic system encourages free enterprise on the basis of state land ownership with a lifetime inherited right to use leased land plots. [34]

The experience of these countries suggests that land policy in Ukraine should be based not so much on changing the forms of ownership and redistribution of land as on creating conditions for increasing production efficiency and revenues to the state and local budgets.

Land management issues play a significant role in the problem of

improving land relations. As the experience of land reform in Ukraine and other countries shows, the most serious mistake is to underestimate the role of state regulation of land relations.

Whereas in market economies the functions of the state are limited to regulation or coordination through legal and economic mechanisms and market self-organization, in Ukraine (at the transitional stage) public administration bodies should take over the organizational regulation of land relations reform.

The belonging of land-capital to the objects of national heritage is determined not by its value as a means of production (although the unique quality of Ukraine's land resources also gives grounds for this), but first of all - by the general civilization criteria of its assessment.

From this point of view, the subject of land ownership is the one who currently owns and uses it, but in the full sense, the owner of land is only a subject of economic relations, and the land itself is an eternal wealth, the property of mankind, which "...is under special protection of the state" (Article 14 of the Constitution of Ukraine). [34]

However, this does not mean that the state, represented by state authorities and self-government bodies, is the subject (holder) of property rights, since the Constitution does not define the ownership status of land as an object of economic activity at all, which opens the possibility of misinterpretation and identification of the categories of land ownership and acquisition.

At the same time, the general situation in which land is subject to private and state ownership and is a national treasure is not a contradiction, but requires the establishment of a balanced system of land relations in the state that would ensure the simultaneous realization of national interests in general and satisfaction of the socio-economic needs of the landowner.

The state should legislate the regime of the land market and mortgage (sale and pledge procedures); the procedure for monetary valuation of land; regulate land prices and the amount of land tax; the regime of economic and rational use of land resources; the procedure for including land value in the balance sheet of enterprises, the rates of depreciation charged to the cost of production and directed to the protection of productive land.

Scientific basis for sustainable development of urban land use

Summing up and summarizing the results of the land reform in Ukraine, it should be noted that the situation with the division and privatization of land shares and their economic circulation is particularly difficult.

The focus of Ukraine's agricultural sector development on the creation of small-scale production is controversial. At a time when the world's agriculture is increasingly moving to a higher level of agricultural culture through the use of the latest technologies and improved means of production, the Ukrainian peasant is being pushed back to the Middle Ages.

Small-scale production intensifies the movement of land shares both within and outside a particular farm. One of the forms of this movement is lease, which has taken on a distorted form in Ukraine. Those who lease land believe that they are doing a great good, doing good, making the owner of the land share financially happy. But the person who leases the land does so not because he hopes for a gift income, but because he is put in a position where he is unable to cultivate his land. That is why such leases, although widespread in Ukraine, are essentially just the use of land for nothing.

This problem can be solved by setting new priorities for the theoretical and methodological substantiation of further improvement of land relations in the country with the transition to a new policy of land ownership and land use, which will include

- a) partial revision of the results of land parceling in the context of the cancellation of the moratorium;
- b) involvement of integral land fields or plots (land masses) in public circulation;
- c) improving the management of public (according to the Constitution of Ukraine) land ownership.

The actual involvement of land in quite normal types of market circulation and an increase in the concentration of land among land users can become a real stabilizing factor in environmentally sound land use.

1.2. Land resources are the basis of productive forces

The generally recognized initial concept of economic theory is the concept of *productive forces*, which means *the forces of nature and society that are capable of creating social wealth*. In the general economic sense,

Scientific basis for sustainable development of urban land use

resources are any sources and prerequisites for society to obtain the necessary material and spiritual goods.

The land is the main condition for the existence of human society and the most important source of national wealth, the very first prerequisite and natural basis of social production, and a universal factor in any human activity.

Land can be seen as:
 the basis of habitation;
 the spatial basis for the location of real estate;
 a means of production;
 object of socio-economic relations;
 real estate object (Fig. 1.1.-1.5.) [31]

Efficient and rational use of land resources is important for the national economy of Ukraine, and Ukraine's unique land and resource potential contributes to sustainable economic development. Therefore, the economical, efficient, rational and environmentally friendly use of the land fund and its comprehensive protection are among the most pressing issues of the country's national security in the current environment.

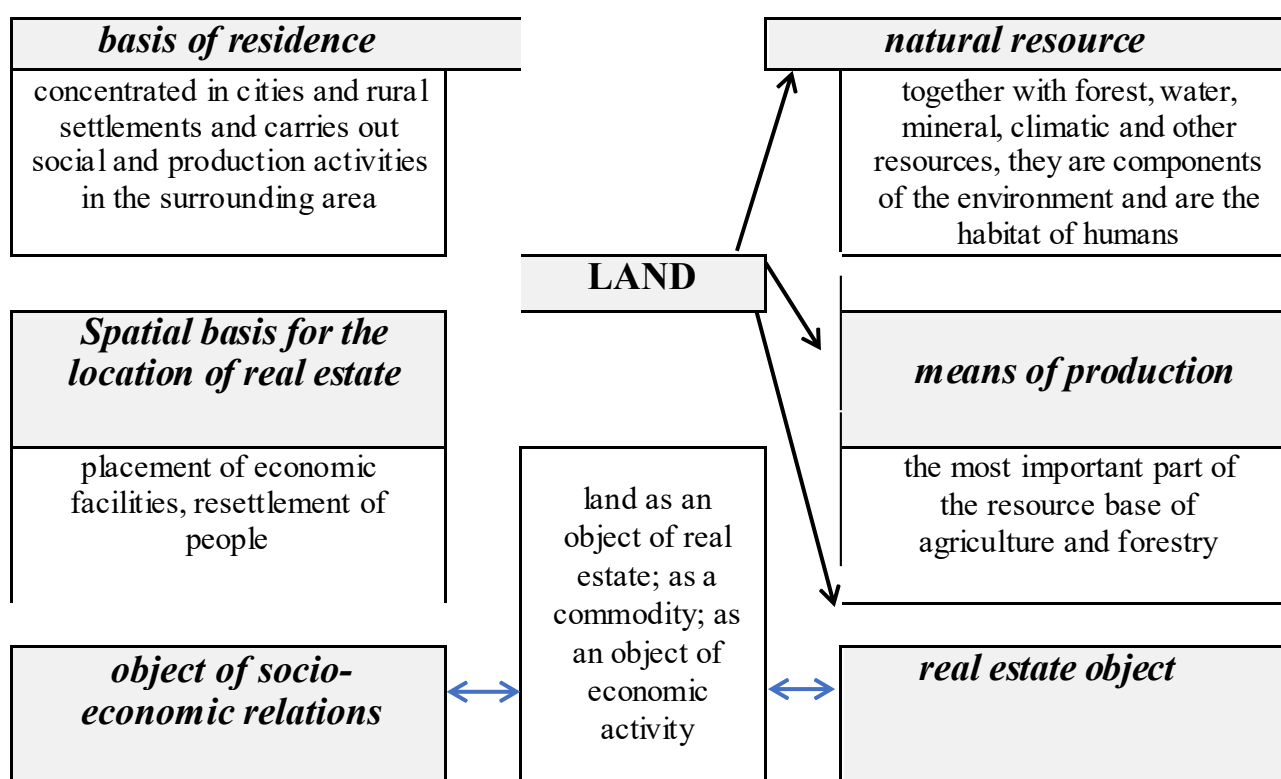


Fig. 1.1. The role of land resources in the development of the country's productive forces [31]



Fig. 1.2. Land is the basis for living*



Fig. 1.3. Land is a natural resource*



Fig. 1.4. Land as a means of production *



Fig. 1.5 Land as an object of real estate*

** Photo from open Internet sources*

The total land area of Ukraine is 60354.8 thousand hectares. Among all the land areas, agricultural land has the highest economic value. As of the beginning of 2018, their area totalled 41489.3 thousand hectares, which is 68.7% of the country's total territory. This figure includes arable land, perennial crops, fallow land, hayfields and pastures. The structure of the land fund of Ukraine and the dynamics of its changes are shown in Table 1.1.

As of 1 January 2018, the land fund of Ukraine consists of land with

Scientific basis for sustainable development of urban land use

various functional uses. (Figure 1.6) As of 1 January 2018, it amounted to 60,354.8 thousand hectares, or almost 6% of the territory of Europe, of which 42.78 million hectares are agricultural land. In particular, agricultural land accounts for about 19% of the total European land area, including almost 27% of arable land.

Table 1.1. Structure of the land fund of Ukraine and dynamics of its changes

	1994		2005		2008		2018	
	Area, thou. ha	%	Area, thou. ha	%	Area, thou. ha	%	Area, thou. ha	%
Agricultural land	41890,4	69,4	41763,8	69,2	41650,0	69,0	41489,3	68,7
Forested areas	10331,0	17,1	10475,9	17,3	10556,3	17,5	10654,9	17,7
Built-up land	2386,2	4,0	2458,3	4,1	2476,6	4,1	3597,8	6,0
Open wetlands	920,8	1,5	957,1	1,6	975,8	1,6	1089,4	1,8
Open land without vegetation cover	1105,6	1,8	1039,0	1,7	1038,2	1,7	-	-
Other lands	1301,2	2,2	1239,6	2,1	1236,3	2,1	1078,5	1,8
Land under water	2419,6	4,0	2421,1	4,0	2421,6	4,0	2425,0	4,0
Total	60354,8	100,0	60354,8	100,0	60354,8	100,0	60354,8	100

Source: State Statistics Service of Ukraine

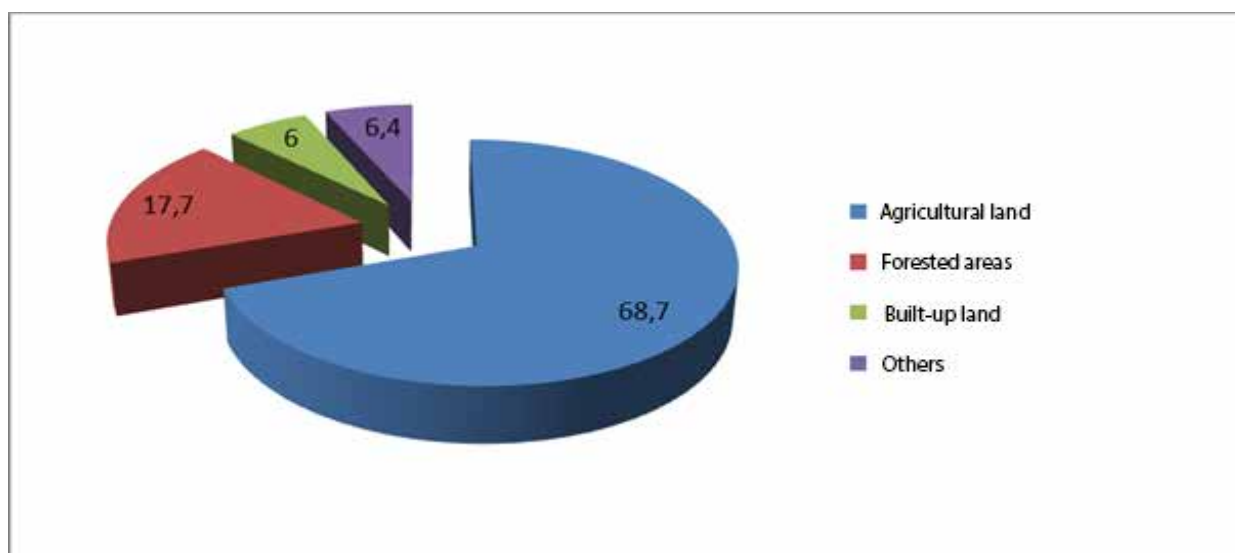


Fig. 1.6 Structure of the land fund of Ukraine as of 1 January 2018, %.

Scientific basis for sustainable development of urban land use

Ukraine's per capita agricultural land area is the highest among European countries at 0.9 hectares, including 0.7 hectares of arable land. The main source of Ukraine's prosperity and viability is its land resources - rich Ukrainian black soil. In total, there are about 800 types of soil in Ukraine, and over 65% of the country's land is made up of unique black soil.

However, according to land experts and scientists, the current use of Ukraine's land resources does not meet many of the requirements for sustainable environmental management.

Soils name	Agricultural land, thousand ha	Arable land, %
Ordinary chernozems	⇒ 10489	88,3
Ordinary chernozems	⇒ 5780	91,8
Clear grey forest, grey forest, dark grey podzolized	⇒ 4333	80,5
Sod-podzolic, podzolic, clayey	⇒ 3850	74,1
Southern chernozems	⇒ 3640	88,8
Podzolized chernozems	⇒ 3419	91,6
Meadow-chernozem and black soil meadow	⇒ 2039	60,0
Dark chestnut, chestnut saline, meadow chestnut saline, saline chestnut	⇒ 1383	80,0
Brownfields	⇒ 1110	43,9
Meadow and marsh and bog	⇒ 975	7,9
Total	⇒ 39823	78,5

Fig. 1.7. Soil types in Ukraine

Natural resources are mainly considered as *natural objects and phenomena used in the past, present and future for direct and indirect*

consumption. They contribute to the creation of material wealth, reproduction of labour resources, ensuring the conditions of human existence, and improving the quality of life.

Similarly to the category of *productive forces*, the general concept of natural resources is gaining an expanded meaning as a result of a better understanding of the relationship between people and the world in which they live.

At the beginning of the 20th century, natural resources were viewed primarily as sources of useful consumer goods, i.e. as raw materials of the environment that were used or suitable for use by people for a specific purpose: minerals, land, water and forest resources, etc. The term is still used in this narrow sense. Later, the concept of natural resources was expanded to include the natural environment.

In recent years, the natural environment has been viewed as a combination of abiotic and biotic components, i.e. everything that surrounds a person and affects his or her life. On this basis, all natural ecosystems and components of the natural environment (air, land, water, forests, soils, flora and fauna, etc.) directly affect human activity. Understanding natural resources, and therefore land resources, as the natural environment is of great importance, as the entire resource group and the environmental components of this environment require careful management to ensure a sustainable future.

Thanks to the work of scientists, a number of criteria inherent in land have been identified that are important for the development of land relations in our country:

- ✓ earth is the place and basis for preserving life in the biosphere;
- ✓ land is characterised by significant variability of properties, has a certain spatial qualitative and quantitative heterogeneity;
- ✓ land is a product of nature, not the result of human activity; only its fertility, as the main biosphere function, can be changed by humans;

1. Specific natural properties and soil regimes determine the peculiarity of the functioning and reproduction of fertility of each land plot. [31]

2. Land is an object of nature and becomes a means of production only in the process of production activity, while other means of production are the result of human labour. The

Scientific basis for sustainable development of urban land use

limited size of the land, the impossibility of its movement in space, and its replacement by other means of production require a special approach to the management and organisation of the territory.

One of the features of the earth is its spatiality. The area of the earth is limited by the boundaries of our planet. At the same time, the spatial limitation of land does not mean that it is limited only by physical boundaries. Spatial limitation is different from the limitation of its productive qualities. Unlike other means of production, land cannot be moved or reproduced. It is irreplaceable and spatially limited.

The functional features of land use (as the material basis for people's well-being, as a territorial basis for the deployment of productive forces, human settlement, as the main means of production in agriculture) have determined its important place among natural resources.

Due to its significance, land is studied from various perspectives. An adequate assessment of land properties helps to improve human well-being and creates conditions for the rational and efficient use of its potential in the economic system.

Land resources - a complex concept to which the definition of natural and social formation can be conditionally applied, which is characterised by the following features *spatial* and *integral resource* by its length, relief, subsoil, waters, soil cover, vegetation, and other biota, as well as being the object of economic activity and settlement, determines the environmental conditions of people's life. [11]

Land, as a natural resource, is characterized by many different functions, land resources have a diverse range of uses. For example, depending on their purpose, some land resources meet the needs of society in ensuring ecological balance and preserving biodiversity, while others are a constant source of food production. Some land resources generate continuous direct annual income (agricultural land, land within settlements, etc.), others generate continuous indirect income (land for environmental protection), and a separate group of land resources generates income over time (mineral land resources). Thus, in a broad sense, they are viewed not only as a natural formation, but also as the basis of human activity.

Scientific basis for sustainable development of urban land use



Fig. 1.8. Soil map of Ukraine

Scientific basis for sustainable development of urban land use

That is why land resources are the environment of real natural and social life.

Land resources are used for many purposes, including agriculture, industry, services, trade, etc. The development of social production, its volume and structure, and the welfare of the people largely depend on the scale and level of use of land and its resources.

1. The place and role of land in different sectors of production are different. In industry, with the exception of mining, it is only the foundation, the spatial base of production; in the mining industry, land is a storehouse of mineral resources. In agriculture, land, being involved in production, in the course of which living and embodied labour is applied to it, becomes both a subject of labour and the main means of production. [34]

Thus, the term *land resources* has several meanings: from the very broad, covering all natural components (including soil, water, subsoil, etc.) to the very narrow, limited to its role as production resource, or the territorial basis for the location of productive forces.

Generally speaking, *land resources* belong to a universal category that expresses a certain set of natural and social objects and their properties.

Understanding *land* as an element of productive forces begins with defining its various characteristics, the most important of which are mainly economic, legal and environmental.

From an economic point of view, land is seen as one of the three elements of production, along with labour and capital. In the legal context, attention is focused on the system of human-land relations. According to the ecological approach, land is seen as a structural and functional system of the biosphere, as a component of the ecosystem.

Land is the main source of social goods that have value and are measured in monetary terms. At the same time, land and the products of its use have value only when they are transformed into goods or services that are useful, desirable and paid for by consumers.

The nature of land use depends on natural conditions (geographical location, topography, climate, natural resources, etc.) and social conditions (population, economic conditions, distribution of productive forces, infrastructure, technology, cultural factors, etc.).

Scientific basis for sustainable development of urban land use

The content of land properties is constantly changing under the influence of both natural conditions and human activity. For example, physical and chemical processes change the surface of the land, biological processes affect the redistribution of life forms, and socio-economic processes cause changes in the characteristics of land resources.

The combination of characteristics of land resources affects the nature of their socio-economic use (location of production, development of infrastructure, etc.). With the development of productive forces, land properties change. In this sense, land resources are a product of interaction with humans.

To sum up, the following should be emphasized:

First, in a general theoretical sense, natural resources in the system of productive forces should be considered as the natural environment, i.e. all natural components and components that have a direct impact on human life;

Secondly, land resources as a component of productive forces is a natural and social entity consisting of components of an integral natural resource (subsoil, water, soil cover, forest, vegetation, other biota), and is also an object of human life and economic activity;

Thirdly, land is an object of property rights, characterised by a system of social relations regarding its ownership and disposal and its use;

Fourthly, land tenure is a real and generally defined concept in the field of land relations. (fig.1.9.)

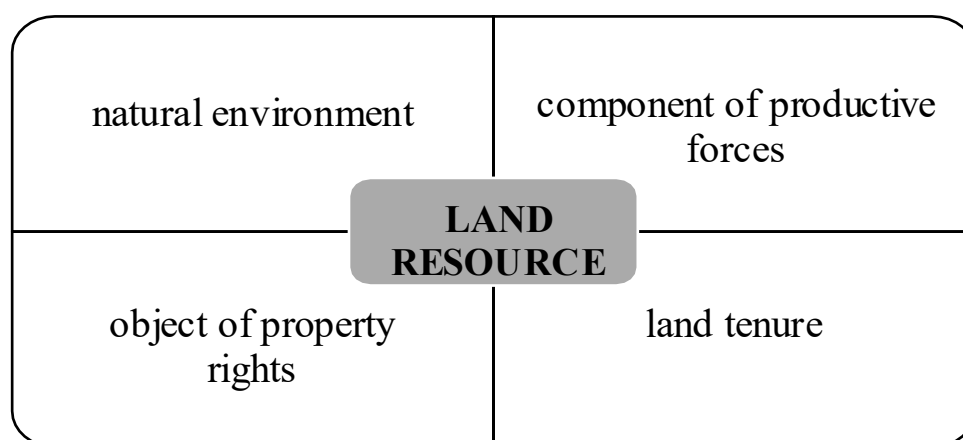


Fig.1.9. A set of characteristics of land resources

Scientific basis for sustainable development of urban land use

The resource of multifunctional use, which in the context of the existence of different forms of land ownership, is characterized by limited availability and, as a spatial and territorial basis for urban development, requires special protection, economical use and prevention of unreasonable anthropogenic impact, is urban land. Strategy and the tactics of harmonious development of the production and natural resource potential of cities, in connection with the above, should be aimed at comprehensive rationalization of land use, the main criteria for which should be: priority of environmental safety requirements, observance of guarantees of land rights, ensuring efficient use and protection of land. The greening of urban land use should focus on the formation of environmentally safe agricultural and industrial zones, the organization of nature reserves and recreational land, compliance with the legal regime for the use, preservation and restoration of landscapes, forests, and water areas. [32]

An analysis of urbanization processes in our country shows that in the year of independence (1991), Ukraine was characterized by a fairly high level of urbanization - 67.8%. In terms of average population density, it was among twelve European countries. The area of urban land per capita averaged 340,4 m².

According to the administrative and territorial structure of Ukraine, as of 1 January 2021, there were 460 cities in total. The number of urban-type settlements was 882, and the number of rural settlements was 28,369. There are 140 districts, 1880 city councils, and 1469 territorial communities.

As of 1 January 2020, the country's population totalled 41,9 million people, including 29,1 million urban and 12,8 million rural residents. [59]

In 1996-2015, the urban population decreased by 5,1 million people, and the area of urban land grew from 1712.5 thousand hectares to 1904.8 thousand hectares, or by 192,3 thousand hectares, which indicates a decrease in the level of land use efficiency.

As the structure of land within a settlement shows (Fig. 1.10), the categories of land defined by land legislation are almost identical in their functions to the functional planning zones established by urban planning legislation, standards

and norms.

A scientific study conducted by the Kyiv Institute of Land Relations on the division of the territory of the capital of Ukraine into zones according to land categories (Article 19 of the Land Code of Ukraine) confirmed the importance and relevance of such zoning for the land management of cities and the development of land management projects for the improvement of territories for urban planning purposes. The privatisation of land in settlements made it possible to bring it into economic circulation. However, as the population declined, its density decreased, and the volume of private households and individual construction increased (Table 1.2). [33]

46% of the growth in the area of built-up land (12,2 thousand hectares) is accounted for by one- and two-storey residential development. This is evidence of the further development of low-rise housing construction in cities, i.e. individual cottage development, which requires large areas. The area of residential development with three or more floors has hardly increased over the decade (from 70,3 thousand hectares to 70,7 thousand hectares).

Overall, built-up land currently accounts for 50,5% of urban areas, agricultural land for 29,7%, and forests and forested areas for 10,2%. specially protected lands (nature protection, health, recreation, historical and cultural) cover 78 thousand hectares, water for 62,9 thousand hectares, and land for recreation (parks, squares, etc.) for 49,4 thousand hectares. Forests and forest-covered areas (137,5 thousand hectares), together with specially protected lands, waters and lands for recreation, constitute a powerful landscape and recreational fund that should ensure the continuous growth of health capital. To do this, it is necessary to properly preserve public green spaces in cities, which have shrunk from 43,6 to 42,7 thousand hectares over the decade. [59]

Thus, *land resources and land are the foundation of productive forces, the subject and means of labour.* As a result of their use by humanity, they acquire economic and legal content. At the same time, the role of land in the development of social production is crucial for all sectors of the economy and population settlement.

Scientific basis for sustainable development of urban land use

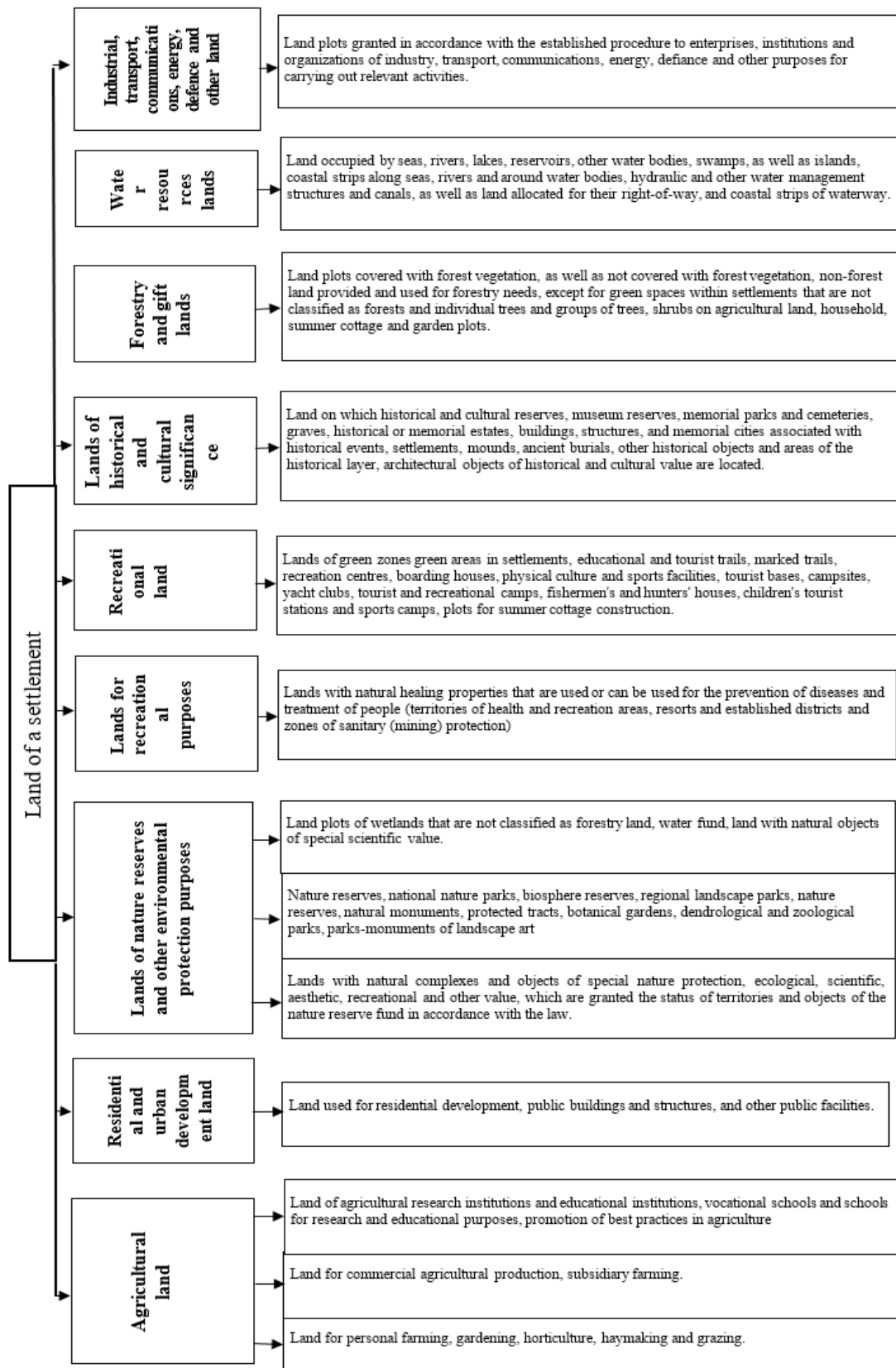


Fig.1.10. Structure of the land fund within the settlement [33]

Scientific basis for sustainable development of urban land use

Table 1.2. Dynamics of urban land area in 2005-2015, thousand ha

№ п/п	Types of land and functional purpose	Land area in 2005.	Land area in 2015	Changes for 2005-2015	
				Area(+,-)	2015 to 2005, %
1	Total land area of cities, <i>including:</i>	1296,4	1341,9	+45,5	103,5
2	Agricultural land	386,1	398,2	+12,1	103,1
3	rests and wooded areas, of which are group I	133,8	137,5	+3,7	102,8
4	Built-up land, <i>including:</i>	651,1	677,6	+26,5	104,1
	one-storey and two-storey buildings	83,8	96,0	+12,2	114,6
	three or more floors	70,3	70,7	+0,4	100,6
	industrial buildings	109,0	106,8	-2,2	98,0
	public buildings	75,7	75,3	-0,4	99,5
	transport and communications	62,3	64,0	+1,7	102,7
	technical infrastructure	16,0	17,3	+1,3	108,1
	for recreation and other open lands, <i>including:</i>	179,4	179,9	+0,5	100,3
	green spaces common areas	43,6	42,7	-0,9	97,9
5	Open land without vegetation cover (rocky places, sands, ravines, etc.)	57,0	55,2	-1,8	96,8
6	Water	58,2	62,9	+4,7	108,1
7	Specially protected lands, <i>including:</i>				
	environmental protection purpose	24,3	29,6	+5,3	121,8
	for health purposes	3,8	4,1	+0,3	108,0
	recreational purposes	35,7	39,5	+3,8	110,6
	historical and cultural purpose	3,7	4,8	+1,1	129,7

1.3 The concept of sustainable development of urban land use

In the twentieth century, humanity realized the need to create a new model of social development that would simultaneously ensure sustainable economic growth and environmental improvement or at least preservation. [38] Sustainable development involves the balanced functioning of three components:

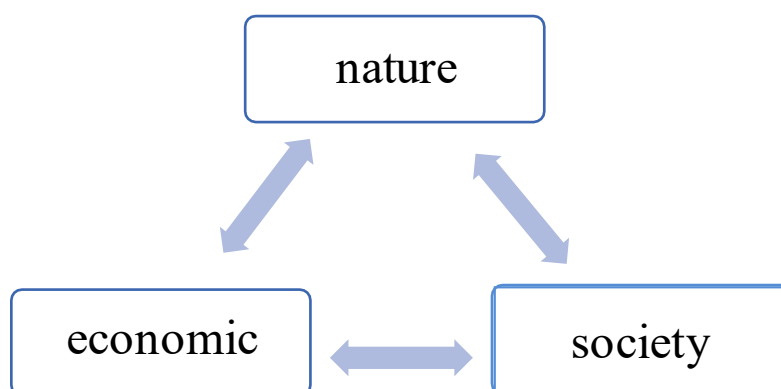


Fig. 1.11. Components of sustainable development : nature, society and the economy

From the economic point of view, development can only be considered sustainable if there is a balance between human economic activity and the natural environment. The social approach is focused on combating inequality of opportunity. The environmental aspect involves directing society's efforts to preserve natural resources by imposing restrictions on various types of activities, taking into account the long-term results of environmental impact.

The model of sustainable development cannot be seen as a universal scheme, as it reflects the objective conditions, historical trends, peculiarity of culture, and spiritual makeup of the population of a country or city. [38]

It should be noted that sustainable development is not a new idea been in place for a long time. For a long time, global civilisations have recognised the need for harmony and interaction between the environment, society and economy, which are all part of a single planet Earth. As it is a system with rather limited resources, the essence of the nature of the relationship between humans and the environment determines the well-being, security, and ultimately the survival of humanity.

Resources cannot be withdrawn before they are restored and accumulated. Global warming, ozone holes, and natural disasters are largely caused by our attempts to use the relevant resources faster and more fully than nature can provide and absorb them. It should not be forgotten that the earth's resources also include intellectual resources, although they do not have strict limits.



Fig.1.12. Strategy for sustainable urban development*

** Photo from open Internet sources*

The Rio Decisions (1992) envisaged a transition to a concept of development based on a balance and integration between the economic, environmental and social needs of humanity, on the one hand, and the ability of the earth's resources and ecosystem to meet current and future needs, on the other. Both components of the concept are essential and urgent for the further successful development of humanity and the continuation of life on our planet. Such an integrated approach is possible if there is the necessary political will, determination, and united action.

The concept of sustainable development has proved to be truly innovative and, like all original ideas, has become the subject of lively debate at the level of governments, non-governmental and academic circles, and the general public. It should be noted that the attempts to define the actual content of the concept of "sustainable development" has not yet been successful. No consensus has been reached. Taking into account the research of Western scholars and international organizations, including the UN and the OECD. Sustainable development can be defined as the integration and balance of economic, social, environmental, institutional, innovative and

Scientific basis for sustainable development of urban land use

technological components in order to maximize human well-being in the present without compromising the ability of future generations to meet their needs.

This wording takes into account, in particular, the ideas of the Brundtland and Rio Commissions. The principle of the Declaration of this forum states:

"Human beings are at the center of concerns for sustainable development. Human beings have the right to a healthy and productive life in harmony with nature." [37] Successful sustainable development requires the preservation and enhancement of the resource base and the elimination of poverty. This is, of course, not only about economic growth, but also about social and cultural development, strengthening of civil society, democracy, and the return of human rights and freedoms.

Modern scientists define "sustainable development" as the interconnection and balance of economic, social, environmental, institutional, innovation and technological components in order to maximise human well-being without compromising the ability of future generations to meet their needs.

Sustainable development expresses a fairly simple idea:
achieving harmony between people,
achieving harmony between societies and nature,
resolving the contradictions that exist today between the environment and the economy, between developed and developing countries, between rich and poor, between the already established needs of people and reasonable needs, between present and future generations, etc.) (fig. 1.13).

Despite all the differences in approaches to sustainable development that currently exist in broad governmental and public circles in different countries, there is a certain general awareness of the necessity of at least three of its fundamental dimensions: economic growth, social progress and environmental protection.

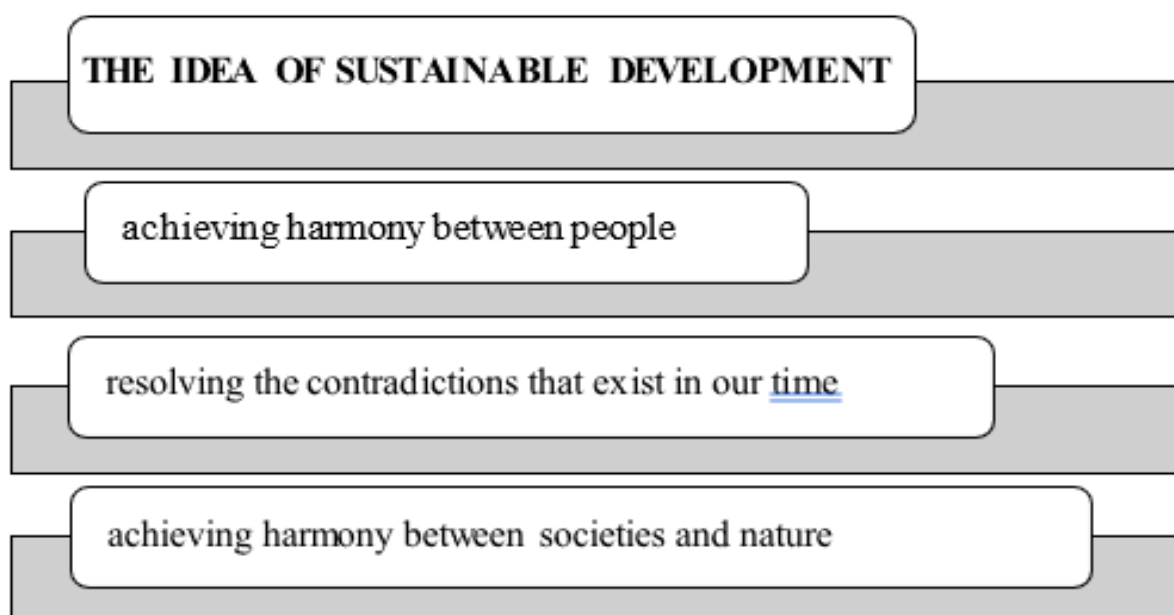


Fig. 1.13. The structure of the idea of sustainable development

The economic dimension means that the welfare of society and each of its members should be maximized through the optimal and efficient use of natural and intellectual resources. The absolute priority is given to minimizing poverty in the modern world. The United Nations Millennium Declaration (September 2000) set a historic task for humanity to halve by 2015 the proportion of the world's population that earns less than \$1 per day, suffers from hunger and has no access to safe drinking water.

The social dimension relates to the relationship between nature and humans and involves improving their well-being, facilitating access to basic social services in healthcare, education and other areas. This dimension also includes the development of civil society and different cultures, respect for human rights and freedoms, and national specificity. The issue of equity, in particular with regard to the distribution of benefits and access to resources, should remain an integral and essential component of both the economic and social dimensions of sustainable development.

The environmental dimension focuses on the preservation of the physical and biological resource base and ecosystem (fig. 1.14). [37]

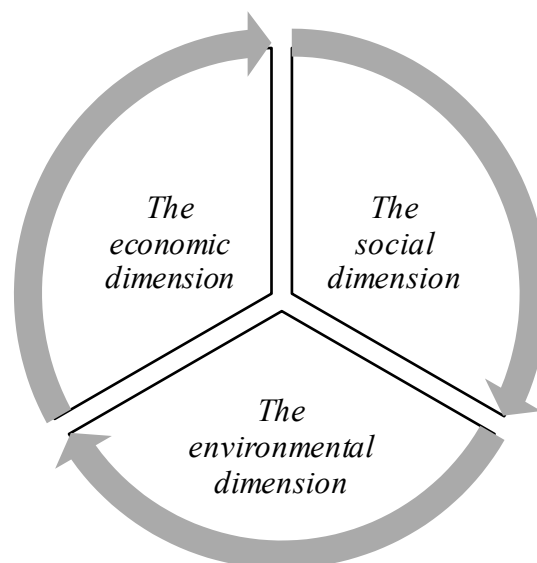


Fig.1.14. Dimensions of sustainable development

The management of sustainable development should be based on the assessment, monitoring and management of the complex interrelationships between environmental, social and economic goals. Economic growth is made possible by the spiritual, creative power of human beings, which facilitates the transformation of nature to serve human needs. But it also happens that these transformations cause air, water, and forest pollution, climate change, and biodiversity loss. [37]

Thus, a policy maker concerned with sustainable development must make difficult decisions that strike the right balance between economic, social and environmental components. Development will be sustainable only when the used natural capital is renewed and replaced with the same new capital. At the same time, it is necessary to ensure fairness and equality in relation to future generations.

It is clear that sustainable development requires vision, endurance and consistency. It is simply not possible when one takes care of one component while forgetting about the others, or working for the present without thinking about the future.

The term "sustainable land use" was first defined at the official level in the Law of Ukraine "On Land Management". Article 1 of the Law "Basic Terms and Their Definitions", as amended in 2003, states that "Sustainable land use is a form and methods of land use that ensure optimal parameters of environmental and socio-economic functions of territories". [46]

Scientific basis for sustainable development of urban land use

At the same time, amendments to this article in 2015 defined sustainable land use as "the use of land determined by long-term use of a land plot without changing its designated purpose, deterioration of its quality characteristics and ensuring optimal parameters of environmental and socio-economic functions of the territories".

The significant narrowing of the object of sustainable development from the system of land use (administrative territory, land ownership, land use, land mass - if they are taken as an object) to a land plot is noteworthy. Thus, the spatial, territorial and temporal dimension of the sustainable development process has been lost. Long-term use of a land plot, as a requirement of sustainable development, has no dimension at all (for lease - up to 50 years, for permanent use - indefinitely, for ownership - for life). The prohibition to change the designated purpose limits the possibility of increasing the level of land capitalization; and should be excluded from the process. As for ensuring the optimization of functions, this should apply not to territories, but to land represented by certain categories.

The term "*land use*" is known to be used in two ways:

Firstly, land use is understood as a system of land use that is regulated for different categories of land fund. This definition refers to legal functions, the provisions and norms of which are established by environmental and land legislation.

Secondly, the term "land use" is also used as territory, land mass, a set of plots provided for ownership or use. Most often, this definition is used to describe the land of a particular land owner or user, categories of land, and the size (area) of a land plot. [31]

Land use is a type of natural resource use. Therefore, the basic features of its principles should apply to the full extent to the use and protection of land resources.

Natural resource management refers to the entire set of measures taken by society to comprehensively study, develop, use, restore, improve and protect the natural environment and natural resources in order to develop productive forces and ensure appropriate conditions for human life. In other words, it is the totality of all impacts of society on nature, including its development, transformation and protection.

Scientific basis for sustainable development of urban land use

The inclusion of territory or land plot in the concept of land use is not justified, as these are different objects. According to the law, *a territory* is a part of the land surface within certain limits (borders) with its inherent geographical location, natural and human-created conditions and resources, as well as airspace and subsoil located under it. However, it is known that only a part of the earth's surface (territory), which, in addition to the established boundaries, has a certain area and a legal regime fixed in the relevant documents, can be the object of civil law relations. [31]

If a land mass is considered, the sum of land plots, the territory of an administrative unit, the term "land" should be used instead of "land use", but the term "land", "lands" should be used.

Land management is a set of measures carried out by society in the process of studying, distributing, using and protecting land as the main national wealth, with the aim of to allocate productive forces, develop the national economy, and ensure favorable conditions for human life. [31]

In recent years, sustainable (*balanced*) *land use* has been used again in scientific sustainable (balanced) land use as a conceptual framework. The term "sustainable (balanced) land use" is interpreted as: "...such a system of organization of use and protection of land and other natural resources and biodiversity and corresponding land relations that correspond to the relations of social development, which achieves an optimal balance between social, environmental and economic factors of land use development, normalisation of the quality of land and other natural resources (neutral degradation), satisfaction of material and spiritual needs of present and future generations". [31]

However, adding the word "sustainable" to the word "balanced" is a controversial issue, as the term "sustainable development" is used in official documents without the word "balanced". Legislation defines 9 main types of land use (categories), and the classical division of land use functions used in North America into 6 types (residential, transport, institutional, open land, industrial, commercial) is considered to be the most common.

Therefore, in order to become "sustainable", "land use" in our interpretation should additionally include the previously mentioned dimensions of sustainable development (economic growth, social progress,

Scientific basis for sustainable development of urban land use

environmental protection) and the provisions of development ideas - achieving harmonisation between people, society and nature, as well as resolving the contradictions that currently exist.

The practice of solving environmental problems of land use shows that the environmental sphere is not the whole sphere of land and nature use, but only that part of it in which the preservation of environmental quality and sustainable production of ecosystems, as well as the saving of non-renewable resources are ensured.

From the point of view of economic science, the environmental sphere is not the natural environment, but nature protection and resource conservation work related to its reproduction. The reproduction of wildlife and its protection is one of the phases of land and nature management. The other two: the exploitation of land and other natural resources and the processing of natural substances - are the real economy.

The system of sustainable land use covers two interrelated subsystems: social production (identification, extraction and processing of natural substances) and the ecological sphere itself (targeted production of ecosystems). Sustainable land use should be seen as the reproduction and rational use of land and other natural resources. In the scientific sense, the reproduction of land and other natural resources is a three-pronged process that includes the restoration (protection) of ecological systems, the exploitation of land and other natural resources, and the processing of natural raw materials. The latter two stages are united by one concept - "use of land and other natural resources". The process of saving natural raw materials and using waste in social production is tantamount to preserving the ecological and resource potential. Thus, the boundaries of the environmental sphere itself are expanding, transforming the process of using land and other natural resources into their reproduction. Hence, the concept of "sustainable land use" also includes the concept of "reproduction of land and other natural resources" (fig. 1.15).

In the event of a violation of the ecological balance, the period of reproduction of land and other natural assets spans centuries and millennia, going beyond economic feasibility. From the point of view of natural science, the biosphere and the ecological sphere are identical concepts. However, with

Scientific basis for sustainable development of urban land use

the increasing interdependence of social production and the environment, with the development of a green economy, the environmental sphere will be considered as an economic category in scientific terms.

The concept of sustainable development has a long history of formation. Starting from Vernadsky's scientific works on the noosphere (early last century), the declaration of the first UN Conference on the Environment (Stockholm, 1972), which indicated the link between economic and social development and environmental problems, the scientific reports of the Club of Rome (1972), which formulated the idea of civilisation's transition to a state of "global dynamic equilibrium", the report of the UN World Commission on Environment and Development in 1987, the UN Conference on Environment and Development in Rio de Janeiro (1992), the World Summit on Sustainable Development in Johannesburg (2002) and the present (Fig. 1.16). [36]

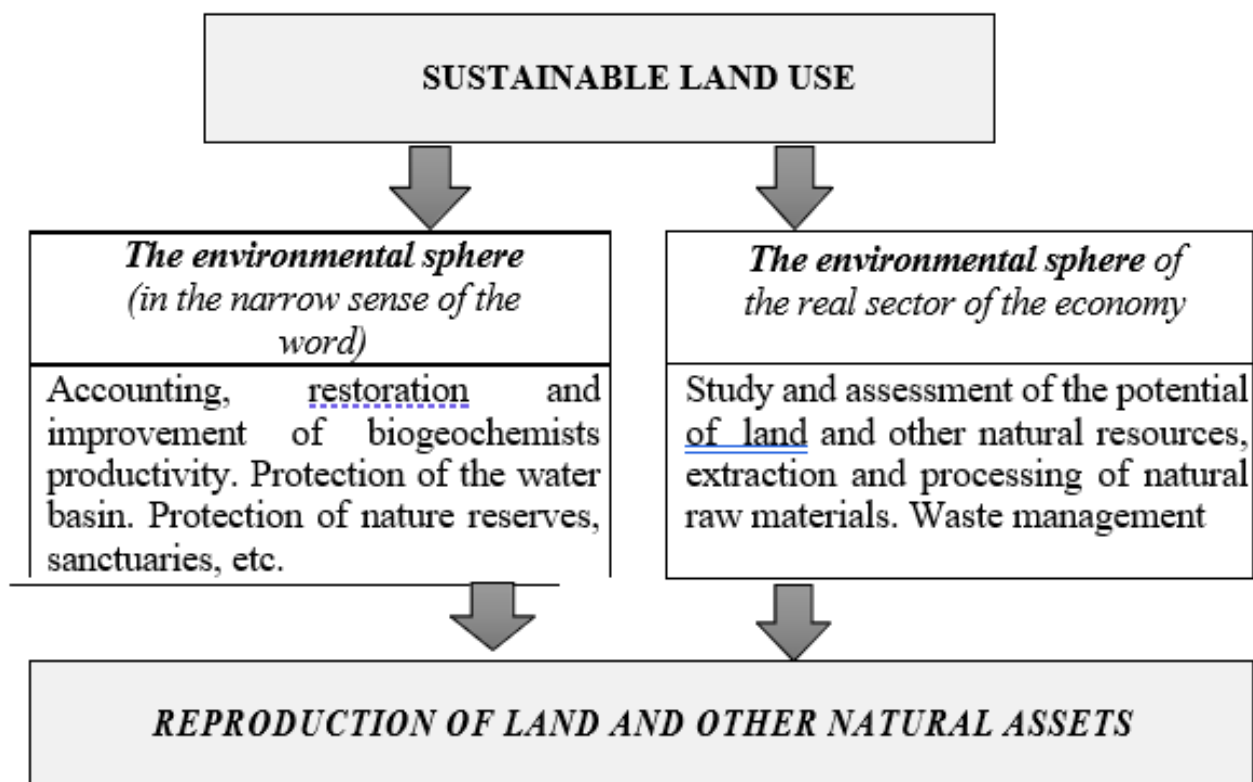


Fig.1.15 Logical and content diagram of the system of sustainable land use [11]

Scientific basis for sustainable development of urban land use



Fig. 1.16. World Summit on Sustainable Development (UNIAN)* [36

The term "sustainable development" is associated with the name of Norwegian Prime Minister Gro Harlem Brundland, who formulated it in the report "Our Common Future", prepared for the UN and published in 1987 by the International Commission on Environment and Development. Sustainable development, as defined by the UN, is the development of a society that meets the needs of the present generation without compromising the ability of future generations to meet their own needs (Fig. 1.17).



Fig. 1.17. The essence of sustainable development

In June 1992, the United Nations Conference on Environment and

Scientific basis for sustainable development of urban land use

Development took place in Rio de Janeiro, where a historic decision was made to change the course of development of the entire world community. This unprecedented decision by the heads of government and leaders of 179 countries was driven by the catastrophic global environmental situation and the predicted global catastrophe that could erupt in the 21st century and lead to the death of all life on the planet.

As a result of the Conference, five final documents were adopted. Among them, the following are of particular importance::

- Rio Declaration on Environment and Development;
- agenda 21 (Action Program – Agenda 21);
- Framework Convention on Climate Change (UNFCCC);
- Convention on Biological Diversity;
- declaration on the direction of development, protection and use of forests. [20]

Agenda 21 was a program document that included 40 chapters describing the programs of activities of the countries of the world aimed at ensuring sustainable development at the regional and local levels. [20] The main directions of its activities are shown in Fig. 1.18.

The UN Framework Convention on Climate Change has been signed by over 180 countries, including Ukraine. The document entered into force 18 months later on 21 March 1994. It defines the principles, objectives, institutions and procedures for action against climate change. The main focus is on the problem of greenhouse gases.

Since the Convention did not provide for specific requirements and indicators, the Kyoto Protocol was signed in December 1997 in Kyoto (Japan) as an additional document to the Framework Convention. It already contained specific requirements for industrialised and developing countries to stabilise and reduce greenhouse gas emissions during 2008-2012. As of the beginning of 2009, 183 countries had ratified the Kyoto Protocol (Ukraine ratified it in 2004), and it entered into force in 2005. [20]

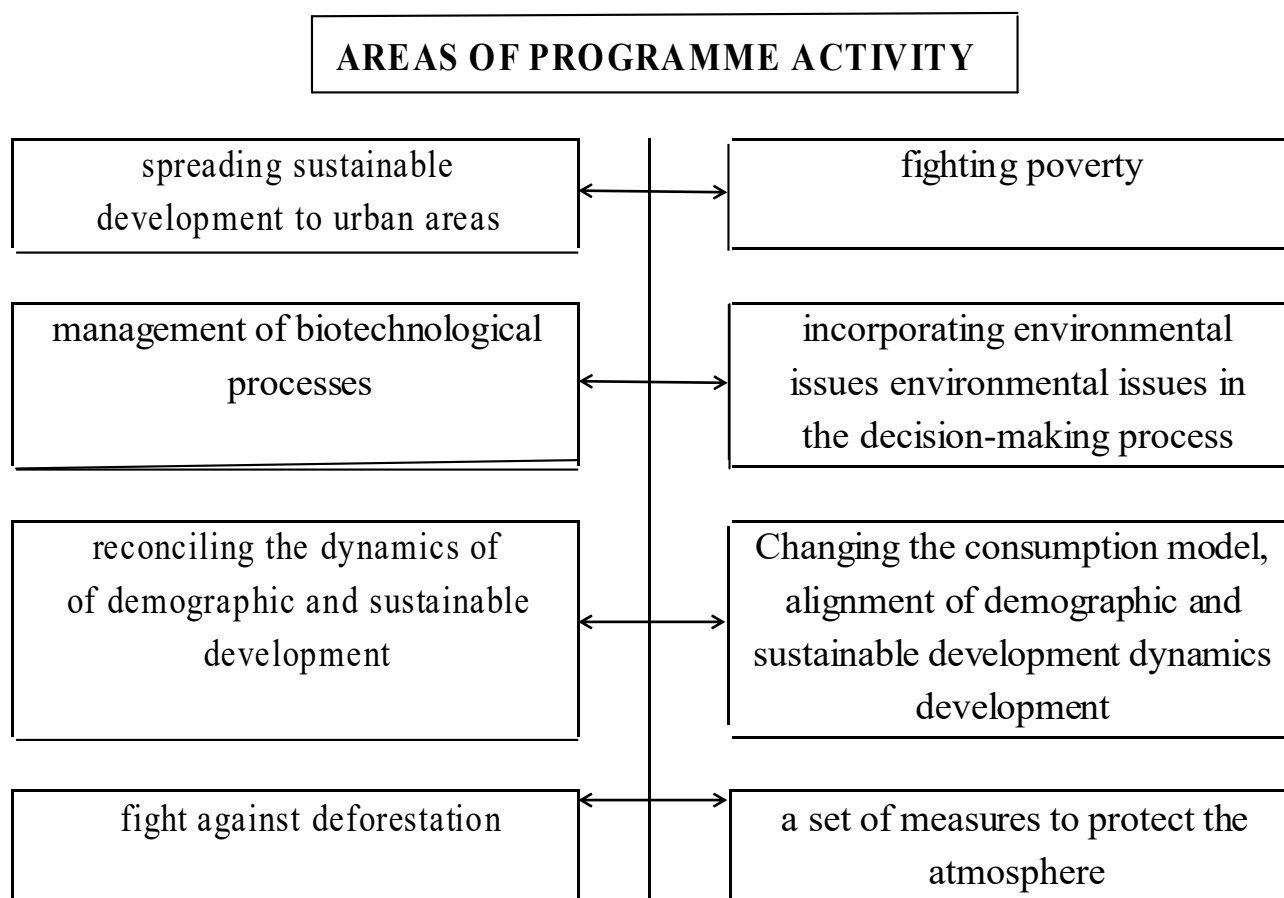


Fig. 1.18. The main areas of activity of the world's programmes under the document «Agenda 21»

In 1992, the UN General Assembly established the Commission on Sustainable Development, which subsequently made important decisions. At the 11th session of the UN in New York (2003), a thematic programme of measures to ensure sustainable development for the period up to 2017 was adopted, based on two-year "cycles of implementation cycles" of individual targets. In 1996, the Commission published indicators of sustainable development, which will help states to determine their level of development and begin to address the problems that impede the transition to sustainable development in a phased manner.

1992 was the starting point for conferences held at 5 and 10-year intervals to summarise the interim results of progress in the designated area. The most high-profile conferences were held in Johannesburg in 2002 (Rio+10) and Rio de Janeiro in 2010 (Rio+20). In Johannesburg, the focus was on the problem of socio-economic inequality in the world. A number of

Scientific basis for sustainable development of urban land use

documents were adopted as a result of the work: The Johannesburg Declaration and Plan of Implementation of the UN World Summit on Sustainable Development (Johannesburg, 2002). The Johannesburg Declaration on Sustainable Development contains a commitment by the leaders of countries to assume collective responsibility for strengthening and reinforcing the foundations of sustainable development - economic, environmental and social - at the local, regional and global levels. Part of the responsibility for achieving these goals lies with businesses, which must be accountable in implementing environmental policies and contribute to the formation of equitable communities.

An important milestone in the formation of mechanisms for implementing the sustainable development goals was reached in 2000, when the Millennium Summit (189 countries participated) took place in New York, where the UN adopted a program to fight poverty and ensure a general improvement in living standards called the Millennium Development Goals.

Achievement of the targets was planned for 2015.

At the global level, 8 goals have been approved:

1. Eradicate extreme poverty and hunger.



Scientific basis for sustainable development of urban land use

2. Ensuring universal primary education.
3. Ensuring gender equality.
4. Ensuring gender equality.
5. Reducing child mortality.
6. Improving maternity care.
7. Fighting HIV/AIDS, malaria and other diseases.
8. Ensuring environmental sustainability.
9. Ensuring global partnership for sustainable development. [36]

The Sustainable Development Summit (New York, 2015) adopted 17 global goals and 169 targets for sustainable development, which are comprehensive in nature and ensure the balance of all three components of sustainable development: economic, social and environmental (Fig. 1.19).

The main sustainable development goals that all countries of the world are currently adhering to include::

Goal 1: Eradicate poverty

Goal 2. End hunger, achieve food security, improve nutrition and promote sustainable agriculture

Goal 3: Ensure healthy lifestyles and promote well-being for all at all ages

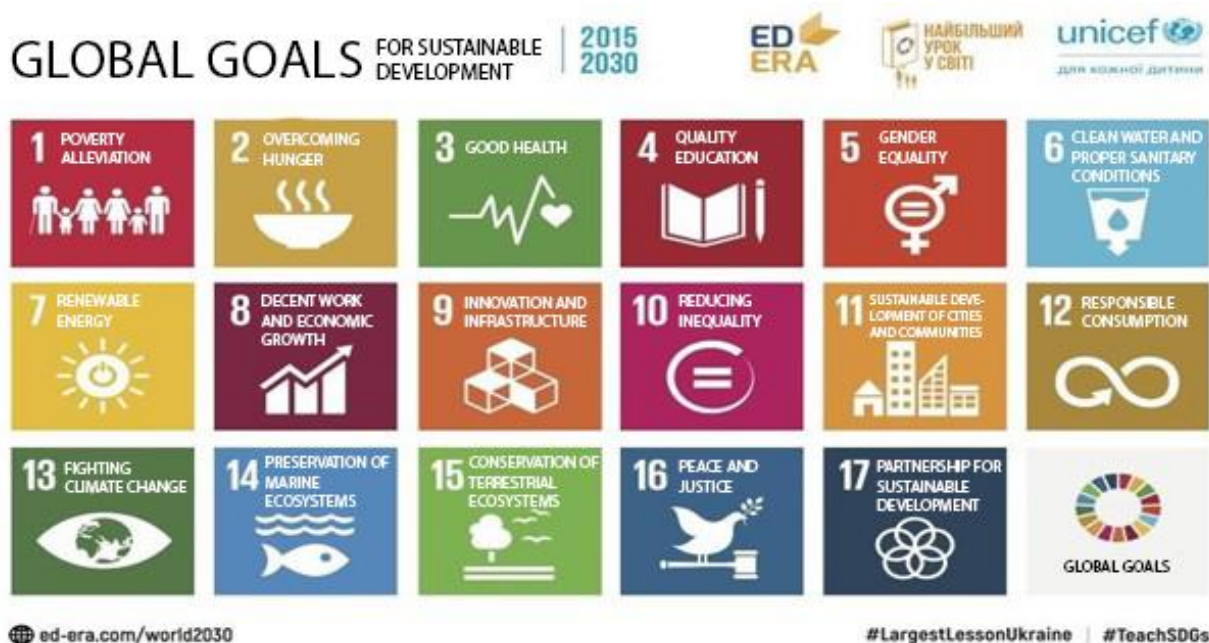


Fig. 1.19 . Global Sustainable Development Goals*

* Photo from open Internet sources

Scientific basis for sustainable development of urban land use

Goal 4. Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all

Goal 5: Ensure gender equality and empowerment of all women and girls

Goal 6: Ensure access to and sustainable management of water and sanitation

Goal 7: Ensure access to affordable, reliable, sustainable and modern energy for all

Goal 8: Promote sustained, inclusive and sustainable economic growth, full and productive employment and decent work for all

Goal 9: Build resilient infrastructure, promote inclusive and sustainable industrialisation and innovation

Goal 10: Reduce inequality

Goal 11: Ensure openness, security, resilience and environmental sustainability of cities and other human settlements

Goal 12: Ensure transition to sustainable consumption and production models

Goal 13: Take urgent action to combat climate change and its impacts

Goal 14: Conserve and sustainably use the oceans, seas and marine resources for sustainable development

Goal 15: Protect and restore terrestrial ecosystems and promote their rational use, sustainable forest management, combat desertification, halt and reverse (reverse) land degradation and halt biodiversity loss.

Goal 16: Promote peaceful and inclusive societies for sustainable development, ensure access to justice for all and build effective, accountable and participatory institutions at all levels.

Goal 17. Strengthen the means of implementation and enhance the global partnership for sustainable development. [36]

One of the main priorities for the implementation of the Sustainable Development Goals for Ukraine is the sustainable development of land use. The model of sustainable land use should be in line with the UN Sustainable Development Goals, which are developed with due regard to the global

Scientific basis for sustainable development of urban land use

challenges facing the modern world. Sustainable land use model is an extremely broad concept and should be considered as a socio-economic and environmental system that covers such type of natural resource use as land use.

A new stage in the greening of social activity is the separation of a "green economy" from national economies - an economy aimed at improving welfare and social equality while significantly reducing environmental risks and ecological deficits. The Global Green New Deal was substantiated by the United Nations Environment Programme in 2008. This idea, as a refinement of the concept of sustainable development, has found support at the national level in Germany, the UK, Japan, Korea and a number of other countries. The difference between the new course and the previous one is that it does not envisage limiting resource consumption and economic growth in general, but rather sustainable growth within new promising markets: innovation, resource saving and waste management technologies, recycling, green tourism, environmental insurance, etc. Leaders of economic growth and exporters of finished products are becoming leaders in these markets, and Ukraine should also move in this direction. [20]

Thus, ensuring sustainable growth in today's environment is the basis not only for economic but also for balanced development in general, including ensuring the quality of social life and environmental sustainability. The concept of sustainable development is based on three components. [20] (fig. 1.20).

The systemic alignment of economic, social and environmental components is an urgent and complex task. They need to be developed on new principles of innovation, modernisation of institutional and spiritual and ethical principles. Thus, reducing the consumption of natural resources and their restoration is possible only on the basis of technical and technological innovations. [30]

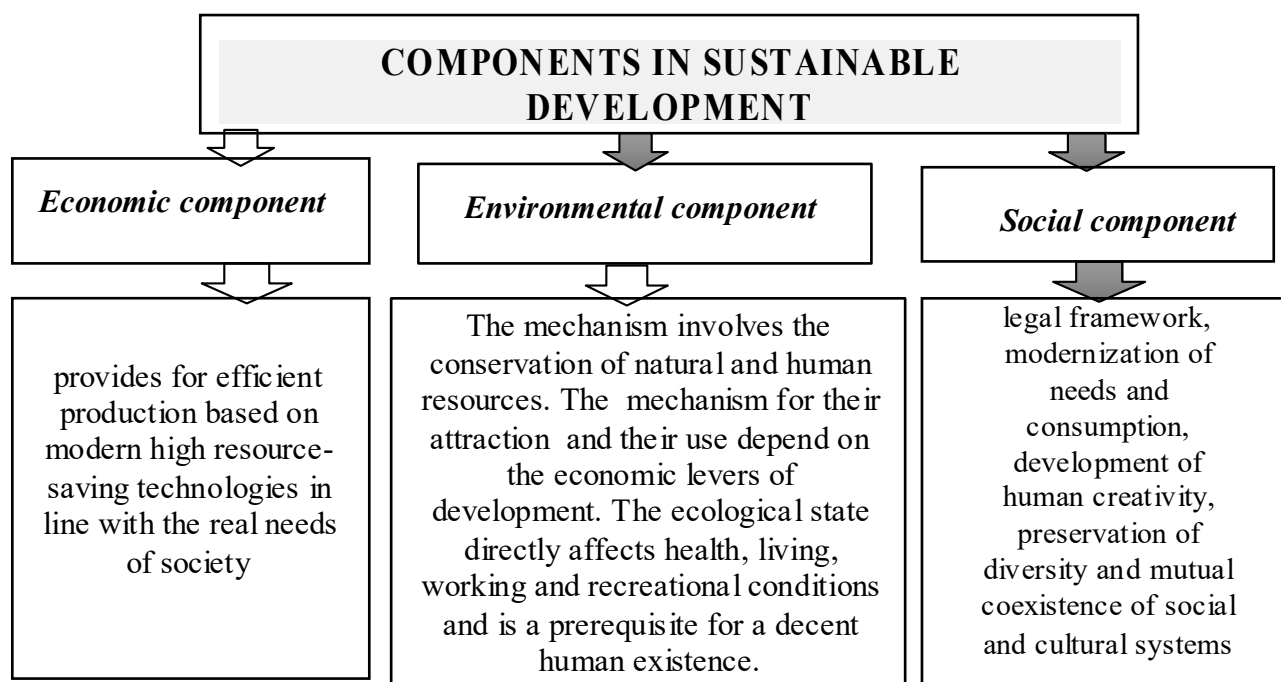


Fig. 1.20. Components of the concept of sustainable development of natural resources management

The imbalance between these components results in threat of damage that is being caused or may be caused in the future to people, society and the natural environment. Neglecting the components of sustainable development is very dangerous and can lead the country and the planet to irreparable consequences. Ignoring the processes of sustainable development has a detrimental impact on the viability of a person, society, the efficiency of the enterprise, as well as on the state of the natural environment, the economic situation in the region, city, and country. [30]

The transition to sustainable development is a global process in which each country must coordinate with the entire global community to implement the goals and principles of a new civilisation model. In the long term, successful achievement of sustainable development will depend on new approaches that will lead to a change in the way we do things at all levels of both official and private life.

The National Strategy for Sustainable Development of Ukraine should be permanent, coordinated, cyclical and based on broad support of the public,

Scientific basis for sustainable development of urban land use

business community and academic science. It should include an analysis of policy making, action plans, implementation, as well as monitoring, regular review and evaluation.

Global experience shows that there is no single approach and no single formula that can be approach, a single formula that should be used to build a national sustainable development strategy. Each country independently determines how best to approach the preparation and implementation of its own **national sustainable development strategy**, taking into account its political, historical, cultural and environmental circumstances. However, it is important to consistently implement certain fundamental principles, including:

- the need for equality and justice, ensuring the rights of the poor and future generations;

- a forward-looking view combined with the precautionary principle;
- systems thinking, understanding the relationship between the environment, economy and society environment, economy and society;

- national strategies for sustainable development must be adopted at the highest level and be the business of the whole nation;

- ensuring communication with the budget and investment processes;

- establishing ongoing and effective monitoring and evaluation.

Increased attention should be paid to such important issues as improving decision-making, mobilising and efficiently allocating resources, resolving conflict situations in society, building reliable institutional capacities, and harmonising policies and strategies. Obviously, the implementation of the concept of sustainable development will require significant additional allocations, but the benefits will outweigh the costs.

A number of mechanisms need to be used to adapt the sustainable development strategy to the current realities. These include an information

system with key sustainability indicators, communication and technology, international commitments, budgeting, and reporting. The optimal ratio of indicators and standards should be ensured by relevant legislation, voluntary

actions, and market instruments.

All of the above processes and mechanisms should be managed by an authoritative governmental (or semi-governmental) body with clear powers (e.g., the National Council of Ukraine for Sustainable Development).

When implementing sustainable development strategies, different countries try to solve different problems. Developing countries seek to achieve economic growth, overcome poverty, attract foreign investment, etc. Developed countries face challenges related to high levels of industrial activity, integration, etc. Countries in transition have to solve specific problems of transition to a market economic system.

Is sustainable economic and social development possible and necessary in Ukraine? First of all, let us recall that by voting in favour of Agenda 21 in Rio, Ukraine agreed that sustainable development is an objective, strategic vision, a real and necessary prerequisite for all countries of the world. [36]

Ukraine has virtually committed itself not only to developing but also to implementing its own national sustainable development strategy, which aims to "ensure socially responsible economic development while protecting the resource base and the environment for the benefit of future generations".

Well-managed sustainable development can give Ukraine a solid future. But this requires fundamental changes in all spheres of economic, social and political life, and their democratization. As already mentioned, sustainable development requires a partnership between the government, civil society and the private sector.

1.4. Planning organization of the city in the context of sustainable development

According to the Charter for Sustainable Development of European Cities, adopted by the participants of the first European Conference on Sustainable Development of Cities and Towns (Aalborg, Denmark, 27 May

1994), the goal of sustainable development is to achieve a stable economy, social justice and environmental sustainability.

Each city can and should initiate and accelerator of progressive socio-economic transformations in the region and the country as a whole. In these circumstances, the urgent task is to develop conceptual approaches to making urban development processes sustainable. The development of a conceptual strategy for sustainable urban development should primarily be based on the opinions of residents and heads of structural units of the city administration, experts, and scientists. Sustainable development of a modern city should include the main areas contributing to the comfortable life of citizens (fig. 1.21)

Today, the development of Ukrainian cities is characterized by significant differences in the levels of their socio-economic development, inconsistency in a number of legislative and regulatory acts on urban planning issues, and a lack of a clearly defined national strategy. There is a rather large concentration of population and production in large cities, against the background of inefficient, slow development of most medium and small cities. As a result, the demographic situation in the country has deteriorated, employment rates have fallen, and the quality of life has deteriorated. Depopulation processes are intensifying in almost all Ukrainian cities. [38]

The state of housing and communal services is not improving, sanitary, hygienic and epidemiological situation, especially in large cities. Capital investment in housing development and the commissioning of new and renovated housing is declining.

Scientific basis for sustainable development of urban land use

- ➔ Coherence of social, economic, urban planning and environmental aspects of the development of cities and surrounding areas
- ➔ Rational use of land, water, recreational and other natural resources, creating conditions for their restoration
- ➔ Formation of a modern transport infrastructure
- ➔ Development of engineering infrastructure and energy saving systems
- ➔ implementation of state regulation of the planning and development of settlements through the development of master plans, other urban planning documentation and local rules development, and control over their implementation
- ➔ promoting the development of national peculiarities of urban planning and architecture
- ➔ Creating a full-fledged living environment, balancing social and economic development of cities
- ➔ Improving the environmental condition of cities, creating safe conditions for conditions for human life and health, implementation of modern systems for waste collection, removal, processing and disposal
- ➔ Improvement of existing legislation and development of new ones regulations on planning and development of cities, reforming social, housing, investment policy, land use, environmental protection, activities of executive authorities and local self-government bodies, citizens and legal entities in the field of ensuring sustainable urban development

Fig. 1.21. The main directions of the city's policy on sustainable development

At the same time, there is a tendency to increase the total area of urban areas. At the same time, land is used irrationally. Significant areas are used for storage of industrial waste, landfills, etc. The land allocated for industrial, transport and energy facilities, as well as recreational purposes, is mostly used inefficiently. Due to the lack of budgetary funds, the development and adjustment of master plans and other urban planning documents that form the basis for addressing issues of rational use of territories has almost ceased. [38]

An urgent problem for Ukrainian cities is their environmental degradation. The ecological state of a city is inextricably linked to the overall social and economic situation in it, the implementation of municipal environmental, urban planning and housing policies. Pollution of the atmosphere, sources of drinking water supply, unsatisfactory situation with the disposal of solid household and industrial waste, etc. have a negative impact on public health.

The most acute environmental problem in cities is air pollution caused mainly by the operation of transport, energy and other industrial enterprises. An audit conducted in a number of Ukrainian cities showed that the ineffectiveness of municipal control over transport emissions is largely due to a lack of funding. The several times lower number of observation posts significantly increases the error of the results and does not allow for a reliable assessment of the state of the urban atmosphere in general. [38]

As a result of disruption of the main socio-economic functions of cities, deterioration of all components of natural landscapes, intensification of adverse natural and anthropogenic processes and exhaustion of the ecological capacity of natural landscapes, the environmental safety of many cities is under threat. For example, irrational economic development of territories and forestry, artificial watering of soils have led to increased flooding, soil movement and subsidence, flooding and salinization of large areas.

Almost a quarter of engineering networks and communications are in poor condition. The situation is further complicated by the fact that all types

of preventive maintenance are carried out untimely and insufficiently due to lack of funds.

Imperfect industrial technologies, land use systems, inadequate environmental infrastructure to meet production needs, outdated waste extraction, processing and disposal systems, lack of recycled water supply at industrial enterprises, and deteriorating engineering infrastructure lead to significant air pollution, deterioration of water and land resources, and the overall sanitary and hygienic state and environmental situation. [38]

The main reasons that impede the sustainable development of Ukrainian cities are the lack of a scientifically sound, clearly defined sustainable development strategy, legal, information and communication space, imperfect legal, organizational and economic foundations of the executive authorities, and the formation of a full-fledged living environment.

The current system of territorial development planning in Ukraine is insufficiently formed and balanced and does not provide a positive result in achieving high economic efficiency and environmental safety in land use. [27]

By spatial planning we mean "the process of regulating of the use of territories", which consists in the creation and maintenance of urban planning and land management documentation, adoption and implementation of relevant decisions.

The following units are the objects of territory development planning:

- the territory of Ukraine, its separate parts;
- territories of administrative and territorial units;
- parts of the territories of administrative units;
- individual land plots.

Planning subjects are persons who, in accordance with the legislation of Ukraine, have the right (authority) and/or are obliged to carry out develop planning documents (plans, schemes) and ensure the implementation of these documents.

The legislation defines the subjects of planning as state authorities and local self-government bodies, as well as individuals and legal entities. [27]

Land use development planning is a process of inventorying and assessing the condition, opportunities and constraints of the territory in order to determine a sustainable socially and environmentally oriented, socially desirable and economically feasible form of land use. Land use development planning is aimed at a specific area or space, and the subject of consideration is the form of land use in its social context.

In the Land Code of Ukraine, land use planning is allocated to a separate chapter 30 and includes:

- national programs of land use and protection;
- regional land use and protection programs;
- natural and agricultural land zoning;
- land zoning.

Along with the above, Article 184 of the Land Code of Ukraine stipulates that the development of national and regional programs for the use and protection of land is included in the content of land management, and, accordingly, is the subject of land management forecasting. However, the Law "On Land Management" excluded articles on this subject (43 and 44) from the Law in 2015. Some authors explain that land use planning is a part of the national planning system, but this is not confirmed by the Land Code. Land use planning in the concept of foreign practice and land use forecasting (design) are also closely interrelated.

Due to the exclusion from the Law "On Land Management" of Articles 43 and 44 on the development of national and regional programs for the use and protection of land, the title of Section IV of this Law is "Conducting Land Management at the National and Regional Levels" and the composition of the section need to be substantially adjusted.

Land use development planning is closely related to specific territorial problems. Its place in the overall system of state planning can be represented by the following logical scheme (fig. 1.22).

Scientific basis for sustainable development of urban land use

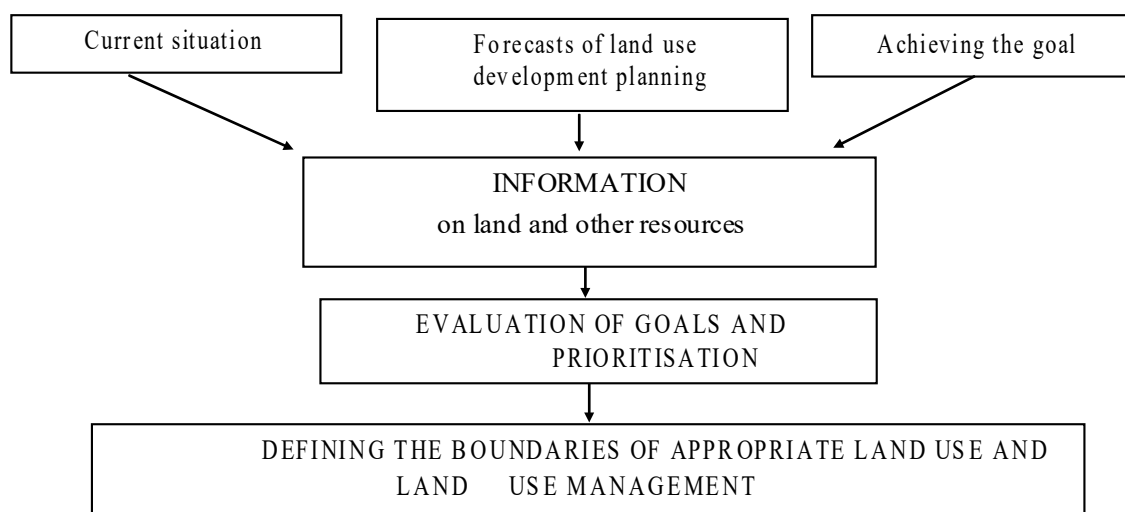


Fig. 1.22. Stages of the land use planning process. [27]

There is a close connection between spatial development planning and other types of planning, which are provided through land management and urban planning documentation.

Land use development planning is the process of assessing the state of land use and alternative land use patterns and other natural, social and economic conditions in order to select and develop the types of land use, directions and activities that are best suited to meet the objectives set. [27]

The main goal of the functional planning organization of the city is to meet the needs of residents in their living environment, places of work, service and recreation, in other words, to satisfy the functional processes of human life: work, life, recreation, first proclaimed by the Charter of Athens. This is reflected in the widespread methodology of "classical" functional zoning, which was later enshrined in the state building codes for urban planning, according to which the urban area is divided into rural, industrial, external transport, recreational, and other functional areas according to the dominant functional feature.

The system of functional use of territories that developed during the period of a planned economy and state ownership of land was based on the dominance of economic priorities over social ones, i.e. on the directive principles of the scope of development of the industrial base - the main city-forming factor. [12]

All settlements in Ukraine are divided into two types: urban, which

Scientific basis for sustainable development of urban land use

include cities and urban-type settlements, and rural, which include villages, hamlets, summer cottages, and hamlets. Thus, according to "Planning and Development of Territories 2019", the largest and largest multifunctional cities, which partially duplicate the functions of existing public facilities for unique and occasional services to the population of the country's capital, centers of macro-regions - interregional settlement systems for the provision of services of unique demand for service facilities, administrative and social services;

mainly large multifunctional cities of regional significance, centers of regions - regional settlement systems with episodic demand services;

mainly medium-sized cities of regional significance, significant industrial, industrial and transport centers of micro-regions - inter-district settlement systems with the provision of services of episodic demand;

small cities of regional or district significance, local centers of economic activity: industrial, industrial-agricultural, industrial and transport, mainly centers of district and intra-district settlement systems (amalgamated territorial communities) with the provision of inter-village services of periodic and everyday demand;

small towns of rayon significance, townships, villages, mainly agrarian, centers of amalgamated territorial communities with inter-village services of periodic and everyday demand.

An important criterion for granting a settlement the status of a city or urban-type settlement is the population. According to DBN B 2.2-12:2019 cities are divided into:

the largest (most significant) - more than 800 thousand people.

large (significant) - more than 500 to 800 thousand people

large - over 250 to 500 thousand people.

medium - over 50 to 250 thousand people

small - up to 50 thousand people. [12]

The population is the main feature by which a city is classified a city is classified by. It affects the size of the territory, planning structure, number and quality of public facilities, transport, engineering equipment, etc. ***The***

Scientific basis for sustainable development of urban land use

dynamics of the population of Ukraine in 1990 -2022 is characterized by the following data (Table. 1.3).

Table 1.3. Dynamics of the population of Ukraine in
1990 -2022 [29]

Date			
	Population (thousand people)	(+/-)until last year	% %
as of 1.01.1992	52 056,6	112,2	0,22%
as of 1.01.1993	52 244,1	187,5	0,36%
as of 1.01.1994	52 114,4	- 129,7	- 0,25%
as of 1.01.1995	51 728,4	- 386,0	- 0,74%
as of 1.01.1996	51 297,1	- 431,3	- 0,83%
as of 1.01.1997	50 818,4	- 478,7	- 0,93%
as of 1.01.1998	50 370,8	- 447,6	- 0,88%
as of 1.01.1999	49 918,1	- 452,7	- 0,90%
as of 1.01.2000	49 429,8	- 488,3	- 0,98%
as of 1.01.2001	48 923,2	- 506,6	- 1,02%
as of 1.01.2002	48 457,1	- 466,1	- 0,95%
as of 1.01.2003	48 003,5	- 453,6	- 0,94%
as of 1.01.2004	47 622,4	- 381,1	- 0,79%
as of 1.01.2005	47 280,8	- 341,6	- 0,72%
as of 1.01.2006	46 929,5	- 351,3	- 0,74%
as of 1.01.2007	46 646,0	- 283,5	- 0,60%
as of 1.01.2008	46 372,7	- 273,3	- 0,59%
as of 1.01.2009	46 143,7	- 229,0	- 0,49%
as of 1.01.2010	45 962,9	-180,8	- 0,39%
as of 1.01.2011	45 778,5	- 184,4	- 0,40%
as of 1.01.2012	45 633,6	- 144,9	- 0,32%
as of 1.01.2013	45 553,0	- 80,6	- 0,18%
as of 1.01.2014	45 426,2	- 126,8	- 0,28%
as of 1.01.2015	42 928,9	- 2497,3	- 5,50%
as of 1.01.2016	42 760,5	- 168,4	- 0,39%
as of 1.01.2017	42 584,5	- 176,0	- 0,41%
as of 1.01.2018	42 386,4	- 198,1	- 0,47%
as of 1.01.2019	42 153,2	- 233,2	- 0,55%
as of 1.01.2020	41 902,4	- 250,8	- 0,59%

Scientific basis for sustainable development of urban land use

as of 1.01.2021	41 588,4	- 314,1	- 0,75%
as of 1.01.2022	41 167,3	- 421,0	- 1,01%

The total population in 1990-2021 decreased from 51838.5 to 41167.3 thousand people, or by 10769.2 thousand people, with natural increase, except for 1990-1992, being negative in the country as a whole.

The sad dynamics of population change in Ukraine is illustrated in the graph below (fig. 1.23):

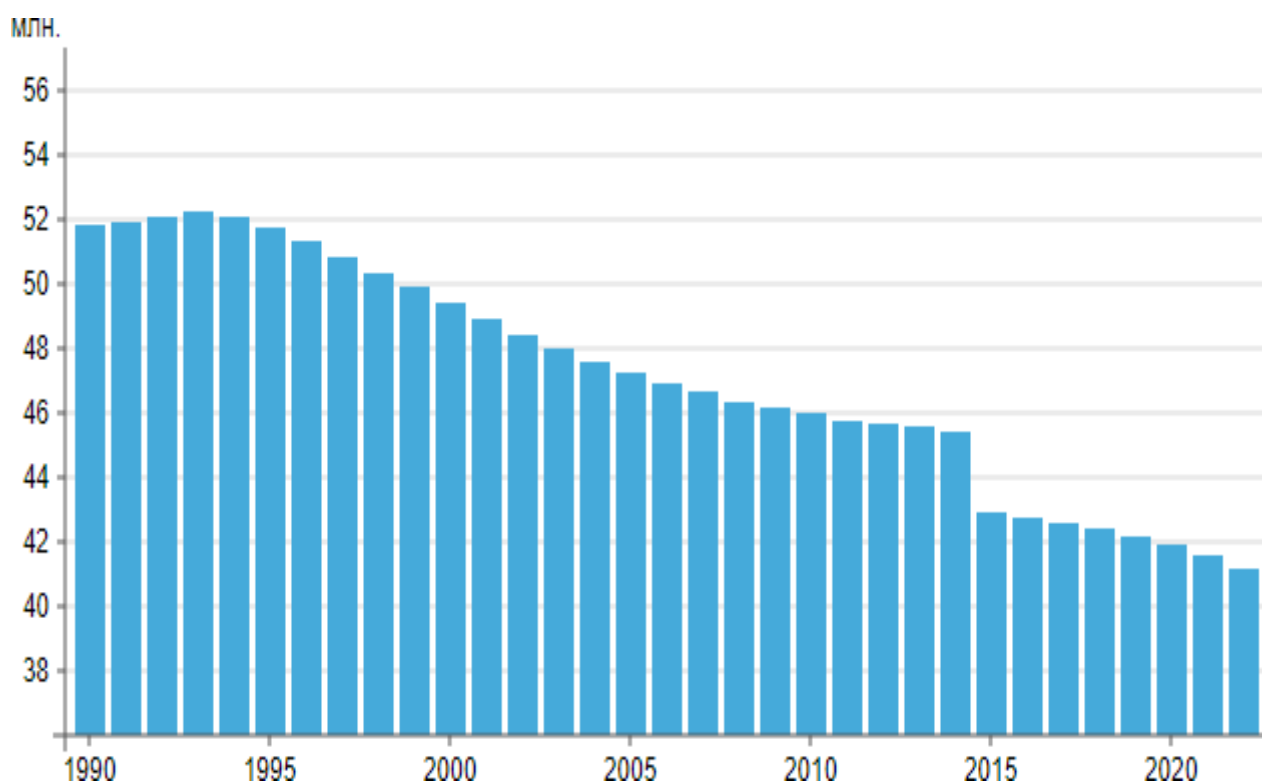


Fig.1.23. Dynamics of population change in Ukraine [29]

The dynamics of the urban population was also stable in 2001-2020. 2020 (except for 2014, when Crimea was annexed). Over these 20 years, the urban population in Ukraine decreased by 1.512 million people in total (table.1.4.)

Table 1.4. Urban population dynamics in 2001-2020.

	2001	2014*	2020*
Total population in cities	28 592 111	27 512 937	27 079 817

* population of the cities of the annexed Crimea according to City Populatio

Scientific basis for sustainable development of urban land use

In fact, about 34 per cent of the urban population is concentrated in eight cities (Kyiv, Kharkiv, Odesa, Dnipro, Donetsk, Zaporizhzhia, Lviv and Kryvyi Rih).

According to the All-Ukrainian Population Census of 5 December 2001 and the statistical collections "The number of the existing population of Ukraine" of the State Statistics Committee of Ukraine as of 1 January 2014 and 2020, the cities were divided into categories and the dynamics of their population for the indicated years is presented (Table. 1.5.).

Table 1.5. Dynamics of the number of cities by category [29]

Category	№	City	Region	2001 p.	2014 p.	2020 p.
				Population size		
1	2	3	4	5	6	7
More than 1 million	1	Kyiv	Kyiv	2 611 327	2 868 702	2 967 360
	2	Kharkiv	Kharkiv region	1 470 902	1 451 132	1 443 207
	3	Odesa	Odesa region	1 029 049	1 017 022	1 017 699
500 thousand and 1 million	4	Dnipro	Dnipropetrovska region	1 080 846	993 094	990 724
	5	Donetsk	Donetsk region	1 016 194	949 825	908 456
	6	Zaporizhzhya	Zaporizhzhya region	817 882	766 268	731 922
	7	Lviv	Lviv region	732 818	729 038	724 314
	8	Kryvyi Rih	Dnipropetrovska region	709 014	652 137	619 278
250 - 500 thousand	9	Mykolaiv	Mykolaivska region	514 136	494 922	480 080
	10	Mariupol	Donetsk region	492 176	458 533	436 569
	12	Luhansk	Luhansk region	463 097	424 113	401 297
	13	Vinnytsia	Vinnytsia region	384 840	372 116	370 707
	16	Kherson	Kherson region	328 360	297 593	286 958
	17	Chernihiv	Chernihiv region	304 994	295 670	286 899
	18	Poltava	Poltava region	317 998	295 950	286 649
	19	Cherkasy	Cherkasy region	295 414	285 170	274 762
	20	Khmelnysky	Khmelnyskyi region	253 994	266 095	273 713
	21	Chernivtsi	Chernivtsi region	240 621	262 129	267 060
	22	Zhytomyr	Zhytomyr region	284 236	270 922	264 318
	23	Sumy	Sumy region	293 141	268 874	262 119
100-250 thousand	24	Rivne	Rivne region	248 813	249 912	246 003
	25	Horlivka	Donetsk region	292 250	254 416	242 224
	26	Ivano-Frankivsk	Ivano-Frankivsk region	218 359	227 030	237 686
	29	Ternopil	Ternopil region	227 755	217 110	223 462
	30	Kremenchuk	Poltava region	234 073	225 828	219 022

Scientific basis for sustainable development of urban land use

	31	Lutsk	Volyn region	208 816	216 076	217 315
	32	Bila Tserkva	Kyiv region	210 128	211 205	209 238
	36	Uzhhorod	Zakarpattia region	117 317	115 947	115 512
50 - 100 thousand	45	Kamianets-Podilskyi	Khmelnyska region	99 610	102 254	98 970
	47	Mukachevo	Zakarpattia region	82 346	85 487	85 796
	74	Irpin	Kyiv region	40 593	44 023	60 084
	75	Stryi	Lviv region	62 479	59 835	59 730
	87	Horishni Plavni	Poltava region	51 740	51 958	50 816
20- 50 thousand	88	Bilhorod-Dnistrovskyi	Odesa region	51 890	50 105	48 674
	97	Fastiv	Kyiv region	51 976	48 098	45 393
	99	Lubny	Poltava region	52 572	47 397	45 032
	104	Vyshneve	Kyiv region	34 465	38 011	41 820
5 - 10 thousand	352	Derazhnya	Khmelnyskyi region	10 446	10 302	9 969
	353	Sniatyn	Ivano-Frankivsk region	10 479	10 102	9 905
	354	Dubliani	Lviv region	8 469	10 132	9 811
	374	Tysmenytsia	Ivano-Frankivsk region	9 790	9 443	9 175
	375	Khotyn	Chernivtsi region	11 216	9 591	9 132
	376	Zalishchyky	Ternopil region	10 125	9 379	9 089
	379	Tyachiv	Zakarpattia region	9 786	9 127	8 972
	382	Tlumach	Ivano-Frankivsk region	8 831	8 885	8 805
2,5 -	441	Druzhba	Sumy region	5 726	4 997	4 654
	442	Miusinsk	Luhansk region	6 029	4 732	4 613
5 thousand	451	Komarno	Lviv region	3 994	3 841	3 727
	452	Glyniany	Lviv region	3 378	3 165	3 050
	453	Pidhaitsi	Ternopil region	3 280	2 830	2 654
Up to 2.5 thousand.	454	Baturin	Chernihiv region	3 078	2 652	2 492
	455	Belz	Lviv region	2 478	2 352	2 257
	458	Berestechko	Volyn region	1 904	1 757	1 694
	459	Ugnov	Lviv region	1 021	1 002	972

The population of cities in 2001 is given as of 1 January 2003, and the population of cities in 2014 is given as of 1 January 2014. The boundaries of some cities may have changed during this period. In particular, the village of

Scientific basis for sustainable development of urban land use

Stepne was included in Kryvyi Rih, in 2012 a number of settlements in Dergachiv and Kharkiv districts were included in the city of Kharkiv, etc.

As of 1 January 2020, there were 44 cities in Ukraine with a population of over 100,000 people, 15 cities with a population of 250,000 to 500,000 people, 5 cities with a population of 500,000 to 1,000,000 people, and three cities with a population of over one million people. The majority of Ukrainian cities belonged to the category of small cities (374 cities or 81%).



Fig. 1.24. Kyiv*



Fig. 1.25. Chernivtsi*



Fig. 1.26. Novyi Kyseliv village*



Fig. 1.27. Stepne village*

* Photo from open Internet sources

A modern city is a complex set of territories and buildings occupied by industrial enterprises, residential complexes, community centres, outdoor recreation areas, transport and engineering facilities (fig.1.28).

Scientific basis for sustainable development of urban land use

The main functions of the city are implemented on its territory and it is difficult to change them later [33]. *City functions are:*

residential buildings of various types, which are classified by number of stories, population density, family size, period of construction, income level of residents and a number of other features; industry of various types, which is differentiated by industry, employment density, hazard class, etc.;

Utility and warehousing facilities of various types, which are differentiated by specialization - industrial goods warehouses, vegetable depots, cold storage facilities, elevators, car parks, railway rights-of-way, etc.;



Fig.1.28. An example of a modern city*

* *Photo from open Internet sources*

public and shopping centers of city and local importance;
trade of different hierarchical levels and different specializations - large shopping centers, large specialized shops of municipal and local importance, ordinary shop trade, kiosk trade;

healthcare institutions of various types, which are divided by capacity and specialization - general hospitals, specialized hospitals and clinics, polyclinics, preventive care centers, etc..

Such a differentiation of functions is necessary for the calculation justification of solving the problems of integrated urban planning assessment and functional zoning of the territory, since different functions interact differently with a certain territory, with elements of engineering and transport infrastructure; with each other - in terms of increased construction costs, risks, environmental damage, communication links, social relations, etc..

These functions of the city dictate the functions of land in the city as a complex socio-economic phenomenon. At the first level, urban functions are divided into macro-functions, or groups of activities, and at the second level - into basic functions [33]. The basic functions of urban land include (fig.1.29).

Within the framework of the systemic approach, urban land is a dynamic subsystem of the complex natural and technogenic geosystem "city", which interacts with many interconnected elements (soil, rocks, water bodies, etc.), the change of properties of which causes a change in the state of the technogenic and natural subsystems interacting with the land.

In turn, these subsystems have a reverse effect on urban land, which entails a change in the quantitative and qualitative characteristics of land.

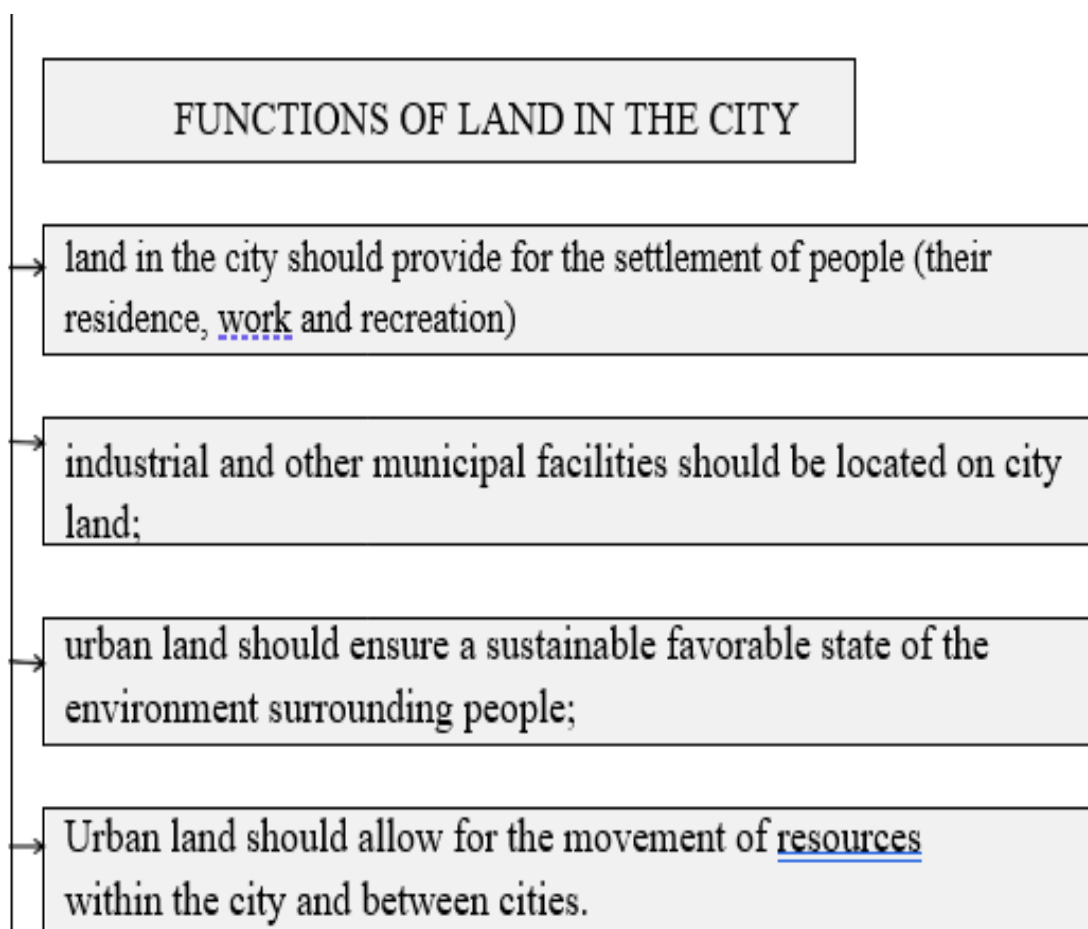


Fig. 1.29. Functions of land in the city

Table 1.6. Urban basic functions [33]

Groups of activities (urban macro functions)	Urban basic functions	City functions
1	2	3
primary species (housing)	accommodation	summer cottages, garden plots, low-cost individual housing; low-rise housing; medium-rise housing; multi-story housing multi-story housing; multi-apartment housing elite housing; cottage housing
Secondary species (production)	industry	Mechanical engineering; electricity; ferrous and non-ferrous metallurgy; chemicals and other hazardous industries; construction materials, woodworking; light industry, food processing

Scientific basis for sustainable development of urban land use

Tertiary uses (maintenance and recreation)	utilities and warehousing, transport and communications and communications companies	warehouse enterprises; motor transport enterprises, urban passenger transport; railway, air and bus stations and stations; petrol stations; car service stations; multi-story and underground garages and car parks; ground level garages and car parks; agricultural enterprises agricultural enterprises; municipal services, sewage treatment plants, landfills
	offices	financial and legal institutions; commercial firms; design organizations; public organizations; embassies, consulates, representative offices; communication, TV and radio broadcasting institutions, publishing houses
	trade, catering, services	shopping malls and centers; shops, public catering; kiosks, pavilions; markets, fairs; hotels; consumer services; car dealerships, exhibitions and sales; amusement parks
	education, healthcare, sports, culture leisure	educational institutions; healthcare institutions; healthcare institutions healthcare institutions; physical education and sports institutions; large sports complexes; entertainment facilities; clubs, leisure centres; large libraries, museums; religious institutions institutions

Urban land should be used in the interests of the city. However, in practice, this is not always the case: in the United States, for example, 30-40% of urban land is not used in the interests of cities (17 million acres is the area of cities, of which only 11 million acres are actually used for urban needs). The land outside the city can serve as a reserve for expanding its territory, as well as play a protective and sanitary role; it can also be used as a place for recreation. These territories were previously designated as suburban and green zones of the city, subject to special protection. [33]

The main features of the classification are the designated purpose and nature of use. For various types of analysis of the state of land and for the convenience of urban land use management, they are classified according to various criteria. A number of classifications of urban land have been proposed, including multi-criteria schemes in accordance with the tasks of public services that carry out state regulation of land use.

Scientific basis for sustainable development of urban land use

Architectural and urban planning classifications of urban land are based on the division of the city territory in accordance with its functional organization; land management classifications establish categories corresponding to the main types of intended use; environmental classifications are tied to the environment protection and environment-forming properties of land (table. 1.7).

Table 1.7. Environmental (environment protection and environment formation) functions of urban land use [33]

Urban land	Economic functions performed
Built up	Practically absent
Contaminated: <i>impenetrable</i>	Preservation of bioproductive potential; Protective barrier against pollution for groundwater and bedrock
<i>permeable</i>	Preservation of bioproductive potential; Sorption of pollutants; Regulation of the gas composition of the atmosphere (the function is weakened)
Waterproofing	Formation of a microclimate
Ground covered <i>with vegetation cover</i>	Ensuring plant growth and the basis of of bioproductivity; Sorption of pollutants; Protective barrier against pollution for water bodies and bedrock
<i>without vegetation cover</i>	Preservation of bioproductive potential; sorption of of pollutants; Protective barrier against pollution for water bodies and bedrock; regulation of the gas atmosphere
Violated	Preservation of bio productive potential; Sorption of pollutants; Protective barrier against pollution for water bodies and bedrock; regulation of gas atmosphere (functions weakened)

According to the research report on urban and spatial planning and architectural and construction design [57], the following positions of urban

development are identified:

- 1) the urban planning process should be inclusive and equitable, and serve the common good;
- 2) different segments of the population should be involved in urban and territorial planning, especially the poor, women, youth and marginalized groups;
- 3) Policies and regulations should be developed and implemented to encourage social inclusion and multifunctional land use;
- 4) to promote the protection of property rights, access to land and the acquisition of property rights, and facilitate access to finance for low-income households;
- 5) reconstruct informal residential areas and integrate them into cities through communication systems, the location of institutions and utilities, and the provision of development opportunities.

Effective urban planning involves taking into account many aspects, including spatial, institutional and financial, including:

- Ensuring geographical coherence and consistency in the implementation of land use plans, basic services and infrastructure;
- identification, preservation and development of objects of cultural and natural value in the process of urban and territorial planning;
- combining planning and design with financial mechanisms based on appropriate rules and regulations; ensuring that existing cities are prepared for disasters and climate change, including such preparedness in new urban areas and in modernization plans, in line with the Sendai Framework for Disaster Risk Reduction. [57]

Particular attention should be paid to the legal and regulatory support of environmental requirements when justifying urban development projects, especially in areas with unfavorable weather conditions, high levels of air pollution, and especially in protected areas. The environmentally hazardous situation at many enterprises, compounded by the progressive ageing of fixed assets, puts large residential areas of cities at risk of flooding. [9]

An important tool in the context of sustainable development is the formation of a system of recreational land use in cities. (fig.1.30)



Fig. 1.30. Formation of a recreational land use system (Kyiv)*

** Photo from open Internet sources*

Recreational activities involve active interaction between humans and nature, not related to production activities, and occupy an important place in meeting the needs of society.

The concept of recreational potential of urbanised areas includes the totality of all means and possibilities of the territory to meet the needs of the urban population and adjacent territories in restoring the body's strength and recreation, which is the basis for sustainable development.

The unfavourable situation with water supply to the population continues to pose a threat to the national security of the country (by the way, about 40% of water supply systems need to be replaced). It should be noted that 62% of water sources are surface waters, which are more susceptible to anthropogenic pollution than groundwater. Almost all major cities in Ukraine have sewage systems and domestic wastewater treatment facilities. However,

Scientific basis for sustainable development of urban land use

only 84% of wastewater passes through treatment plants, of which only about 30% is treated in accordance with the established standards. Of the currently operating facilities 38% of wastewater treatment plants require urgent reconstruction, as they have been in operation for 20-30 years and are therefore morally and physically outdated. Therefore, it is necessary to increase funding for the construction and reconstruction of water supply and sewage systems.

The poor state of environmental protection facilities in cities, combined with economic difficulties, requires new approaches to address environmental problems. One of them is the widespread replacement of centralised water treatment and purification systems with local systems. This approach, subject to compliance with water regulations, will help to ensure investment in the works and avoid the cost of creating large water supply and sewerage networks.

The volume of solid waste is increasing in cities. However, the landfills where waste is disposed of are gradually moving away from cities, leading to the creation of many unauthorised dumpsites. They become a source of infectious and other types of pollution. However, the construction of waste processing plants is delayed due to lack of funding.

Thus, the target parameters of sustainable development should include characteristics of the environment, ecosystems and protected areas. These include indicators of the quality of the atmosphere, water, natural and modified areas, forests, taking into account their productivity and degree of conservation, and the number of endangered species. [38]

Therefore, in the process of land use planning, compromise solutions should be found to specifically address land management tasks, requirements for the development of sustainable land use and reconciliation of the interests of the state, community and land owners.

The land use planning system covers subsystems: urban land use, rural land use, transport routes, public benefits, natural environment, landscape, urban planning, etc.. [27]

In the future, the planning model of Kyiv is being formed as a single open urban planning system for the city of Kyiv and suburban areas, taking into account the established local association "Kyiv Agglomeration". The Kyiv agglomeration continues to develop on a voluntary basis and will be able to cover the territorial communities of 10 administrative districts, Irpin City Council and 8 cities of regional significance, covering an area of approximately 1176 thousand hectares. The total population of the agglomeration is projected to reach 5.2 million people. [6]

1.5. Global experience in shaping integrated urban development

In today's rapidly changing world, cities are faced with simultaneously addressing a range of challenges: economic, environmental, demographic, social and spatial. The flexibility with which a city can respond to new challenges and plan long-term solutions that will ensure its sustainability determines the success of its development and prosperity in the future. [27]

According to the United Nations Department of Economic and Social Affairs [35], in the 1950s, about 30% of the world's population lived in cities, in 2014 this percentage increased to 55% (3.5 billion people) and is expected to continue to grow, reaching 68% in 2050. (fig. 1.31).

Although these documents are informal planning documents (not defined by law as mandatory urban planning documents), they are the legal and informational basis for further development of urban master plans, investment in construction, rational use of territories, implementation of large-scale projects, and organization of planning work at the regional and local levels [16].

Many foreign authors emphasize the idea of land use planning as a means of resolving land conflicts. After all, unlike other factors of production, such as labor and capital, land is in constant supply. [27]

Scientific basis for sustainable development of urban land use

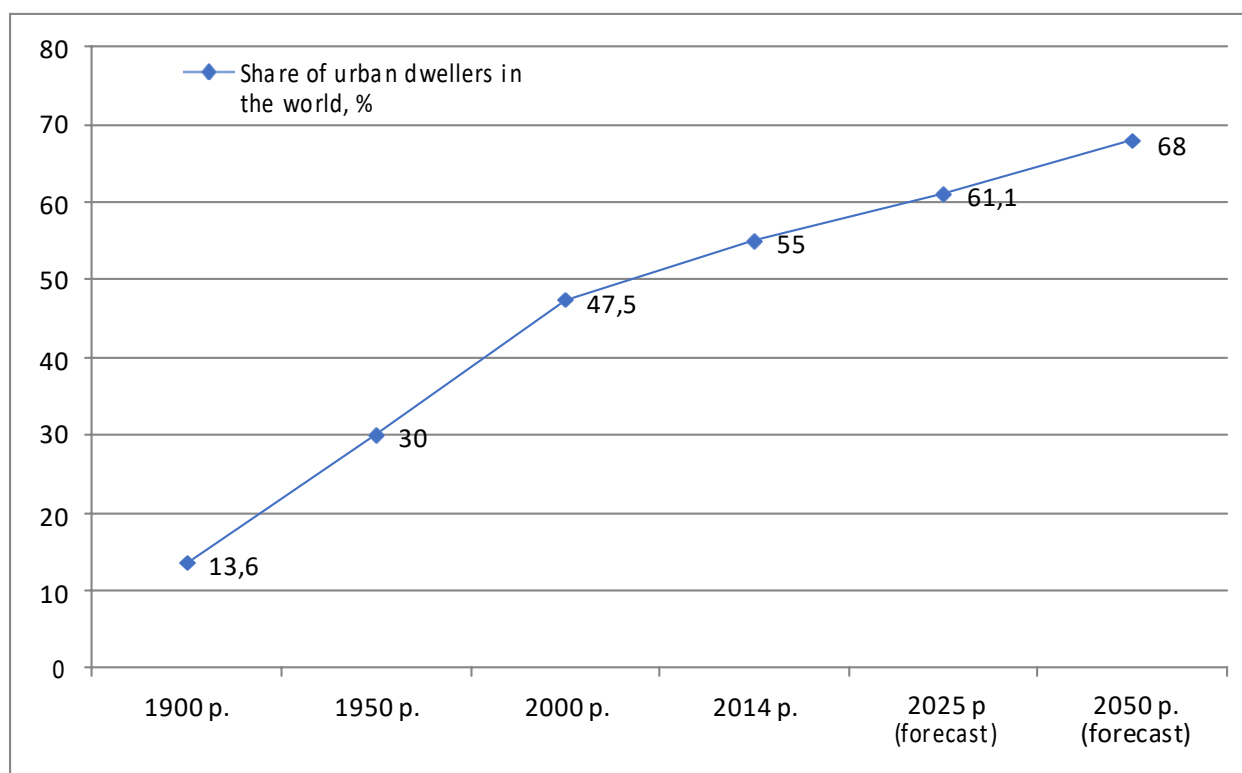


Fig.1.31 Share of urban dwellers in the world, % [35]

Foreign scientists Burnell and Dirk proposed four functions of land use planning, which in each case involve the need to overcome market inefficiency or injustice:

- stop those uses that are incompatible with existing ones;
- to achieve greater efficiency in the use of land resources in a particular territory;
- reduce or eliminate certain risks;
- preserve or protect valuable elements of the environment (environmental component). [27]

Scientist Deuson proposes three meso-scales and macro-scales of land use planning tasks:

- a) to control the integrity of the land distribution among possible uses;
- б) achieve certain levels of production (especially in agriculture);
- в) control mixed use to ensure a safe and pleasant environment [27]

The European experience of developing competitive communities proves that in order to formulate approaches to integrated urban development, it is important to rely on strategic documents that define the vision, goals, objectives and projects of urban development. Based on the main provisions

Scientific basis for sustainable development of urban land use

of the Leipzig Charter and actively using participatory practices (citizen engagement), cities develop and implement the concept of integrated development.

Today, cities are the leading form of territorial, political and socio-economic organisation of modern society. About 78% of Europeans live in cities, and 85% of EU GDP is also generated in cities. Ukraine has a long tradition of centralised management and regulation of local development by the government. Thanks to the Association Agreement with the European Union, which was ratified in September 2014, Ukraine is also subject to the Leipzig Charter with its commitment to empowering cities and their self-governance. [9]

The Leipzig Charter (2008) "European Cities towards Sustainable Development" is a document developed with the participation of representatives of various social groups of common European interests. Aware of all the threats, challenges and opportunities, and taking into account the different cultural, historical, economic, social, political and environmental aspects in the development of European cities, the ministers responsible for urban development agreed on common positions, principles and strategies in the field of urban development policy. [25]

The Leipzig Charter defines that sustainable urban development should guarantee economic prosperity, social balance and a healthy environment. [25] It recommends focusing development on cities, and benefiting from the use of integrated urban development policy approaches. Many interdependent factors influence urban development, hence the need for clear and holistic planning and an integrated approach to urban development. This one the approach has been successfully used in the development of large European cities and small towns. [9]

There are a large number of international and national integrated indicators and indices for quantitative and qualitative assessment of the social and economic development of cities. Such indicators and indices are developed within the framework of national and international partnerships to monitor sustainable integrated urban development. In addition, such indices help to identify the areas that require the most attention from city managers and leaders. The most well-known are:

Scientific basis for sustainable development of urban land use

- Sustainable Cities Index (is compiled by the consulting company ARCADIS);
- European Smart Cities (Vienna University of Technology); Cities in Motion Index (IESE Spanish Business School);
- Global Power City Index (Institute of Urban Strategies, Japan Memorial Foundation);
- Smart City Index (Centre for Global Competitiveness of the International Institute for Management Development together with the Singapore University of Technology and Design) etc.

Among the leading cities according to various ratings are Singapore, Stockholm, Vienna, London, Chicago, New York [26]

The use of project-based technologies for integrated urban development is one of the ways to improve strategic management of local development. The project "Integrated Urban Development in Ukraine" is supported by the German government company Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH. With the support of the project, two initiatives have been developed in Ukraine: in 2011, an initiative for the historic centre of Lviv was created, and in 2015, an initiative for the historic centre of Chernivtsi.

A smart city is the effective integration of physical, digital and human systems in an artificial environment for a sustainable, prosperous and inclusive future for citizens. This is the definition provided by the British Standards Institution (BSI) [2] Urban expert Bill Hutchinson has proposed his own classification of smart cities: versions 1.0, 2.0 and 3.0:

- there is no overall strategy in smart city 1.0, automation has affected individual unrelated components;
- Version 2.0 combines and interconnects previously independent initiatives and as many different sources of information as possible;
- Version 3.0 implies that the integration of all components is complete, and the entire city infrastructure is literally imbued with intelligent systems and technologies [2] Smart City is a concept of integrated urban development that involves an extensive infrastructure, open data services, and the use of IT technologies for everyday life and improving the level of service for residents.

Scientific basis for sustainable development of urban land use

Possible models of smart cities are presented in Table 1.8.

Table 1.8. Models of smart cities [2]

№	Model type	Characteristics
1	«Intelligent city»	involves innovative development and reconstruction of urban areas, the availability of competences that allow creating and monetising unique intellectual capital
2	«Digital city»	operates on the basis of collecting open data (big data) on the basis of which decisions are made. The model should be considered from the perspective of data processing and information distribution.
3	«Sustainable city»	focused on the implementation of energy efficient measures and environmental technologies
4	«Techno city»	ensures the quality of logistics and transport infrastructure
5	«Well-being city»	a high-tech, efficient city that works to stay ahead of critical situations, is focused on the introduction of technologies that serve as a means of increasing the attractiveness of the area for local residents and businesses through climatic, cultural and technological advantages

The so-called eco-cities (Basel, Munich, Freiburg) are examples of the implementation of approaches to land use design. The work of a creative team of land surveyors and urban planners who design the spatial organisation of the territory and land use in accordance with the requirements of today consists of the following stages:

1. Analysis and necessary surveys.
2. Developments.
3. Critics.
4. Fantasies.
5. Implementation of ideas.
6. Project approval. [27]

Spending on smart city initiatives globally in 2020 was highest in the US, a significant regional market accounting for about 26% of global spending (fig.1.32).

Scientific basis for sustainable development of urban land use

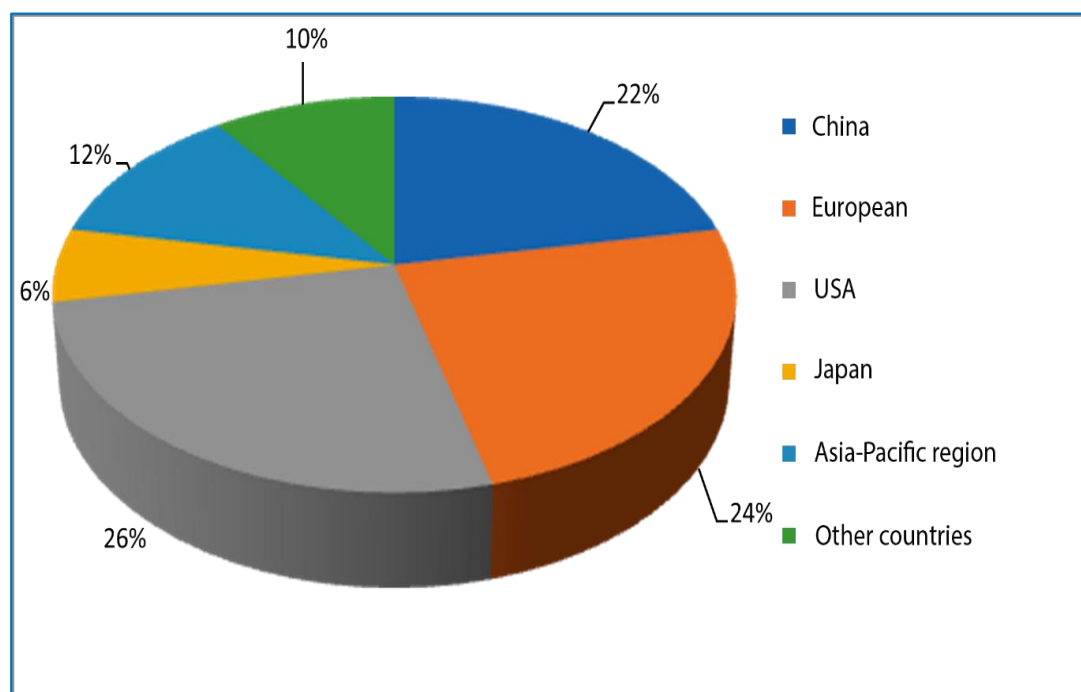


Fig. 1.32 . Geographical distribution of expenditures on initiatives to build "smart cities in the world in 2020, %

The total global spending (local budgets, funding from companies and individuals) on smart city projects could exceed USD 1 trillion in 2025. [26]

The Smart Cities Index, a ranking of the world's cities where Smart City technologies are being implemented, is compiled by various independent companies: Juniper Research in cooperation with Intel, Forbes, PwC, Juniper Research and EasyPark. The ranking analyses the level of development of 165 cities from 80 countries in nine dimensions that are considered key to creating a smart and sustainable city: human capital (development, attraction and nurturing of talent), social cohesion (consensus between different social groups, groups in the city), economy, environment, governance, urban planning, international activities, technology, mobility (transport, convenient access to public services). New York, London, Paris, Tokyo, and Reykjavik are among the top cities in the Smart Cities Index ranking (table. 1.9).

Scientific basis for sustainable development of urban land use

Table.1.9. Top 5 cities in the Smart Cities Index ranking in the world year [9]

Number in the ranking	City (country)	Characteristics
1	New York (USA)	<p>The streets of the metropolis are filled with cameras video surveillance cameras and sound sensors that instantly send a signal to the police when shots are fired. There is a modern fire prevention system. Smart technologies are used for street lighting. The system collects data on the congestion of streets and highways and selects the optimal mode of operation of the lights. At the initiative of Vonage, interactive booths are being installed in New York City where you can contact city services, use a tablet, connect to Wi-Fi or charge your phone. In the city centre, BigBelly smart bins have been installed, which are equipped with sensors and notify you when it's time to send a garbage truck to collect them. The Watson Health medical platform collects and organises data, received from patients' devices (For example, smart scales or fitness bracelets). This data helps your doctor make a more accurate diagnosis.</p>
2	London (UK)	<p>London was among the first cities in Europe to face collapses due to congestion and lack of parking spaces. In 2002, a transport reform took place that introduced a charge for entering the city, created a network of interceptor car parks and replaced the bus service. Smart car parks have been in operation since 2014. The city has created a navigator app: you can build your own route, and it will select the best means of transport. Since 2002, a system of payments for congestion has been in place, which has now become fully digital (the driver pays for the right to use a car in a congested area on weekdays). The UK is a leader in the area of citizen participation in city-wide decision-making. Everyone can discuss problems or get the information they need on internet portals. The education system is aimed at increasing the digital literacy of the population. Everyone can use the Internet in London, as classic payphone boxes on the streets have been transformed into Wi-Fi access points. London is positioned as a centre for developing talent in digital technologies and innovative services and is considered one of the best places to do business.</p>

Scientific basis for sustainable development of urban land use

3	Paris (France)	<p>Since 2015, Paris authorities have introduced the latest information and communication technologies into the city's social and public life. According to the city's innovative development plan, free Wi-Fi is available in all public places in Paris. Paris now has the opportunity to move around the city in any of the active and environmentally friendly ways: on foot, by electric car, by bicycle. The number of cars on the city's streets has significantly decreased due to the development of the practice of shared driving, as well as the emergence of additional coworking spaces. It is now possible to pay for parking services using a mobile phone.</p>
4	Tokyo (Japan)	<p>The city's system of smart car parks and a large network of Wi-Fi points allowed it to outperform other smart cities in the ranking. Not long ago, the city was suffocating from smog and traffic jams; in the 1970s, traffic policemen worked exclusively in oxygen masks. Today, it is a metropolis of skyscrapers, with clean air, developed transport and a predictable traffic schedule. "Smart transport is becoming synonymous with a smart city. One of the main factors behind Tokyo's accelerated development has been the rapid development of high-speed rail links between the center and surrounding cities. Tokyo's railway network is a system of high-speed and conventional lines connected by intermodal stations. Each station is a micro-city with residential buildings, offices, shopping centers, hotels and service businesses. In addition, an eco-town built by Panasonic is located a few miles from the city. The town has zero carbon emissions and is powered by renewable energy sources.</p>

Scientific basis for sustainable development of urban land use

5	Reykjavik (Iceland)	The capital of Iceland deservedly bears the title of a smart city. Reykjavik's 123,000 residents have access to a wide range of high technologies and the world's fastest internet connection. Residents can use the Better Reykjavik website to offer their ideas for improving the city, discuss them and choose the best ones. The fiber-optic cable network provides a huge data transfer speed of 500 megabits per second (the average in industrialized countries is only 3.5 Mbps).
---	---------------------	--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------

The Kyiv Smart City Urban Atlas component is worthy of note. Cities in 28 European countries already have similar atlases. Kyiv is the first city in Eastern Europe to join this list. The atlas allows you to predict the level of growth in urban development and greening, as well as create a temperature map. It also makes it possible to identify the so-called urban heat islands - areas that are heating up the most due to high levels of air pollution.

In most foreign countries with a fairly active construction industry, special structures of municipal authorities are relied on. control is carried out in accordance with generally accepted standards and stereotypes, rules, and technical norms.

Circumstances and restrictions are established at the level of legislative acts or a citywide system of generally accepted measures (territorial development rules), which are not required to contradict the law. The status and scope of these regulations and technical documents (throughout the country or within its administrative units) depend on the shape of the country. In Ukraine, such a system is still being developed.

There is a problem with high-density development around the world. Density indicators exceed regulatory standards, or (in the absence of such standards) are high enough to reduce the level of environmental comfort. Density of housing stock is the sum of the total area per 1 ha of the entire territory of a neighborhood (quarter, settlement) in m².

Urban development on the territory of a certain land plot should be carried out according to a plan, taking into account all the characteristics of the plot itself, the capabilities of utilities, communication routes and the requirements of the law.

Scientific basis for sustainable development of urban land use

The numerical ratio between the total land area and the area covered by a future or existing building is called the building density ratio. [1] The types of urban densities are shown in Fig. 1.33

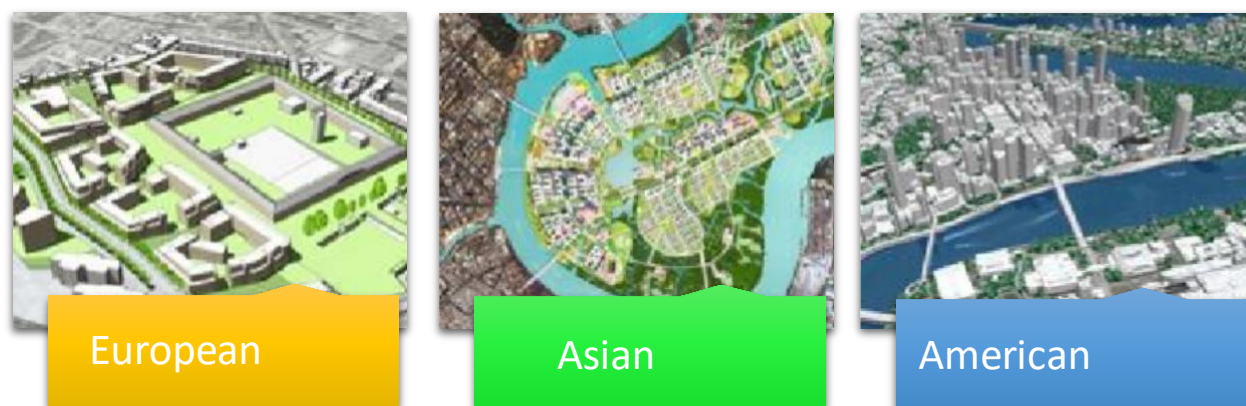


Figure 1.33. Patterns of urban densification by geography

We can observe three types of urban densification:

- European;
- Asian;
- American

The European model is characterized by the historically established principle of urban development with a predominantly low and medium number of stories, with minimal distances between buildings, and narrow streets.

The American model is characterized by the principle of maximum densification of public and business centers through the growth of buildings and the densification of residential areas through the introduction of block housing.

The Asian model is characterized by the principle of building cities with increased number of stories, narrow streets and multi-level transport and pedestrian interchanges due to the need to maximize the use of a limited area where a large number of people live.

In China, they are trying to solve the issue of high building density, and this is already yielding some results [4, 28, 53].

According to the World Bank, national averages do not tell the whole story - 44% of individual urban areas across the region have actually decreased in density. But this is mostly due to urban areas in China. Almost all of the urban

Scientific basis for sustainable development of urban land use

areas with declining densities were in China, possibly due to a mismatch between space supply and demand for urban construction in China, which has led to "ghost towns" in extreme cases. In China, while the national average urban density has increased slightly, more than 60% of its urban areas, including Chongqing, Shanghai, Tianjin and other major urban areas, have decreased. [53]

If China is excluded, 92% of the rest of East Asia's urban areas have seen their densities increase.

New York is one of the most densely developed metropolises in the world. The maximum permitted building density for central business districts is 100 sq m/ha.

The calculation of the building density through the building density coefficient is calculated by formula 1.1:

$$\text{FAR} = \text{Gross Floor Area/Lot Area} \quad (1.1)$$

where: GFA - the total floor area of the building, measured from the outside of the external walls

Lot Area - the area of the land plot along its boundaries. [55]

Examples of building density in New York City districts [53,55] (Fig. 1.34. – 1.39):

Flatiron is designed for 80,000 sq m/ha

The financial district is designed for 180,000 sq m/ha

Upper East Side is designed for 71,000 sq m/ha

Battery Park City is designed for 157,000 sq m/ha

Tribeca is designed for 70,000 sq m/ha

Greenwich Village is designed for 35,000 sq m/ha

Global processes of social development have led to increased urbanization, and the growth rate of the urban population has significantly exceeded the total global population growth. In the second half of the twentieth century, the annual growth of the urban population was 4%, while the total world population growth was 1.7%. [19]

It should be noted that urbanization processes have a serious impact on the distribution of the population, its demographic structure, living standards,

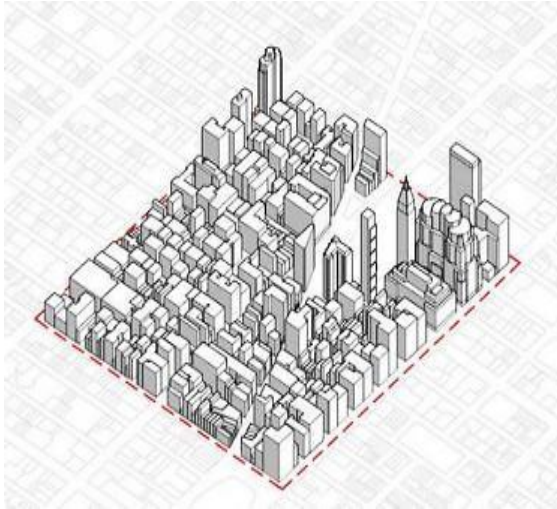


Fig. 1. 34. - Building density in Flatiron



Fig. 1.35 - Building density in the Financial District



Fig. 1.36 - Building density in the Upper East Side



Fig. 1.37 - Building density in Battery Park City



Figure 1.38 - Building density in Tribeca

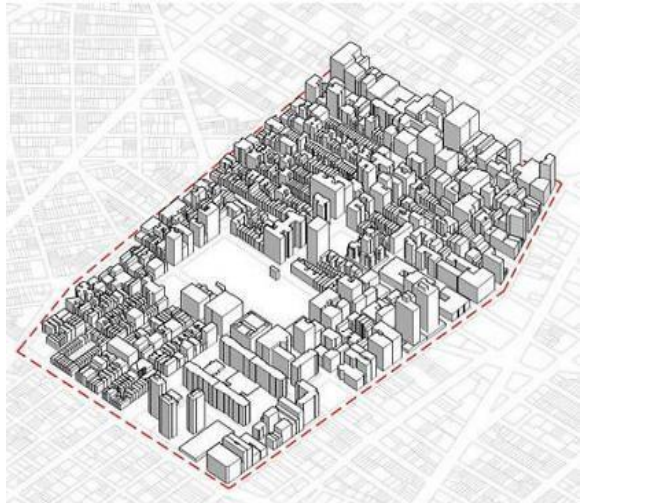


Fig. 1.39 - Building density in Greenwich Villa

Scientific basis for sustainable development of urban land use

health and social conditions. In addition, the growing urbanisation of territories contributes to environmental impacts and increases the pressure on limited land resources.

The world and national experience of spatial and economic development shows that as a result of the impressive pace of urbanization, suburban areas of large and largest cities are experiencing significant economic, environmental and social transformations, characterized by an increase in their economic potential, on the one hand, and excessive anthropogenic pressure and deterioration of the environmental situation in the country, clashes of economic and territorial interests, and aggravation of social conflicts, on the other.

Despite the negative effects of urbanization, urban land use remains promising for the development of society and the protection of natural resources, as with a high concentration of population in relatively small areas, their impact on the environment can be limited under conditions of an environmentally sustainable production model and land use system.

The research of the Centre for Economics and Business Research (CEBR) is worthy of attention [54]. After analyzing about 50 cities in the world, taking into account the "green city index" (Siemens Green City Index), i.e. the presence of green urban areas (parks, squares, etc.) and indicators of economic development, the city of Frankfurt (Germany) was recognized as the leader of this rating).

In particular, the cities were assessed by the state of transport infrastructure, the level of education and income of residents, the financial stability of the city (cost of living, real estate, the level of electricity consumption by the city to its GDP), as well as environmental indicators of urban land use. According to these parameters, more than half of the urban space in Frankfurt is allocated for the organization of 15 cities. According to the CEBR, Frankfurt is followed by European cities, namely London, Copenhagen, Amsterdam, Rotterdam, Berlin [54].

Hong Kong, Tokyo, New York and Paris fell in the ranking due to high

property prices. Such economic prerequisites may arise primarily due to the limited territorial base of large cities for the creation of new residential developments and the high density of urban population. [52]

The experience of Japan is a rather interesting example of the effective use of urban land in large settlements. The area of this country is 372.1 thousand square kilometers (the bulk of the territory is distributed among the four main islands: Honshu - 230.8 thousand sq. km, Hokkaido – 78.5 thousand square kilometers, Kyushu - 42.0 thousand square kilometers, Shikoku - 18.8 thousand square kilometers), the share of urban residents in Japan is 75.9% of the total population. The average population density is 309 people per 1 sq. km. Japan officially distinguishes between densely populated areas and mountainous areas. The former occupy 1.7% of the territory and concentrate 53.5% of the total population (the average population density is 6,000 people per square kilometer), while the latter account for 48% of the territory and 5.8% of the population (the average population density is 36 people per square kilometer). [10]

At the same time, Japan demonstrates the possibility of building large engineering facilities (airports) outside of a settlement, namely in the sea. Given the complexity of the terrain (mountainous landscape) and the high density of neighborhoods, the idea of creating a rather complex infrastructure facility such as an airport on artificially created territories in the sea is unsurpassed in terms of effective urban land use planning. With such a spatial arrangement, this property has a convenient location for passengers and does not cause a "noise burden" on the urban population [22] (Fig. 1.40, Fig. 1.41).

The foreign experience of state regulation in the field of natural resources management and environmental protection demonstrates the need to combine economic methods with administrative and legal ones.

In the market economy of foreign countries, effective and efficient regulatory instruments include:

- environmental payments that give businesses the freedom to choose alternative solutions to pollution charges;
- benefits and economic assistance to enterprises that combat pollution;

Scientific basis for sustainable development of urban land use

- a pledge system that provides for the establishment of surcharges to retail prices for goods whose disposal is advisable after the period of operation;



Fig. 1.40 T Inubu Santora International Airport (Tokonoma, Japan)*

* *Photo from open Internet sources*



Fig. 1.41. Kansai International Airport (Osaka, Japan)*

* *Photo from open Internet sources*

- voluntary agreements between environmental inspectors and nature users;
- issuance of licenses, which involves a comprehensive examination

of the enterprise and an individual approach to regulatory restrictions on environmental impact;

- fines for administrative violations of environmental legislation. [49]

The rapid development of urbanization requires increased attention to the formation of recreational land as an integral part of recreational nature

The issue of using urbanized areas for recreational purposes is of the highest priority.

Hus, urbanized landscapes are characterized by an almost completely changed natural environment, but at the same time, people need to rest and recuperate on a daily basis, and travelling out of town for recreation is often quite problematic. Therefore, it is necessary to use the available territories within cities under the conditions of carefully developed programs for the use of their recreational potential. One of these programs can be a landscape planning methodology. [18]

These instruments are somewhat similar to those used in Ukraine, but in developed countries, priorities are given to economic stimulation and support of entrepreneurship that ensures environmental protection and conservation.

The signing of the Association Agreement between Ukraine and the EU imposes new requirements for state regulation of environmental protection in Ukraine in accordance with European standards. Therefore, the main condition for the use of these state regulatory instruments is to improve the current environmental legislation of Ukraine, develop legislative acts relating to subsidies, loans, quotas, pledge systems, etc., which should lead to increased investment in environmental protection.

At the same time, the role of the state in regulating the processes of environmental management should remain decisive, and funding for scientific research in the field of environmental protection, conservation and restoration should be provided from the state budget of Ukraine. Prospects for further research include improving Ukraine's environmental legislation in accordance with the requirements of the EU-Ukraine Association Agreement. [50]

CHAPTER 2.

СТРАТЕГІЯ РОЗВИТКУ РЕСУРСИ ТА ЗЕМЛЕУСТРІЙ DEVELOPMENT STRATEGY, RESOURCES AND LAND MANAGEMENT OF URBAN LAND USE

2.1. Sustainable development strategy for the capital's metropolis

Kyiv, the capital and largest city of Ukraine, is one of the oldest cities in Europe, located in the middle reaches of the Dnipro River in the northern Naddniprianshchyna. Political, socio-economic, transport, educational, scientific, historical, cultural and spiritual center of Ukraine.

With a population of over 2.780 million people, modern Kyiv is one of the ten largest cities in Europe, with a population and land area of 835.6 ^{km²}, similar to London, Rome, and Berlin (Fig. 2.1)



Fig. 2.1. Kyiv*

* Photo from open Internet sources

Kyiv is located in the center of Eastern Europe on both banks of the Dnipro River, in its middle reaches, below the confluence of its left tributary, the Desna River.

The peculiarity and diversity of Kyiv's natural conditions are related to its location on the border of physical and geographical zones: forest-steppe and mixed forests. The northern part of the city is located on the Polissya lowland, the southwestern (right bank) part is on the Prydniprovskia upland, and the southeastern (left bank) part is on the Prydniprovskia lowland. The surface of the right-bank part of the city is an elevated plateau plain, dissected by ravines and gullies, valleys of small rivers, and the left-bank part is a lowland plain.

The right bank is characterised by the remnant mountains, in particular, Pecherska (its highest is 196 m above sea level), Starokyivska (188 m), Batyieva (176 m), (Fig. 2.2) Khorevytsia (174 m), Bagrynova (170 m), Shchekavytsia, Zamkova, Zvirynetska, Chorna, Cherepanova, and Lysa (Fig. 2.3).



Fig. 2.2. Batyeva Gora (Kyiv)*

* *Photo from open Internet sources*

The most famous ravines: Babyn, Khreshchatyi, Smorodynskyi, Kmitiv, Protasiv, Tsymbaliv and others. The lowest parts of the city correspond to the water level in the Dnipro River - about 92 m above sea level.



Fig. 2.3. Bald Mountain (Kyiv)*

* *Photo from open Internet sources*

The capital of Ukraine is unique in that it is surrounded by forests. To the southeast is the large Pushcha-Vodytsia forest, and to the south is the Holiivskyi forest. Forests, parks and gardens cover more than half of Kyiv's area. Per capita as of 01.01.2020 there were 23.13m² of public green spaces per capita. [13] It should be noted that this figure varies in the capital's districts.

Fomin Botanical Garden, Shevchenko Park, Khreshchatyi Park, Mariinsky Park, City Garden, Volodymyrska Hill, Askold's Grave Park, Park of Eternal Glory, Landscape Alley, Chornovil Square, Hydropark, Holiivskyi Park, Holiivskyi Forest, Partisan Glory Park, Peremoha Park, Pushkin Park, Zoo, and another 610 squares, arboretums, and street trees (Fig. 2.4, 2.5)



Fig. 2.4. Fomin Botanical Garden*

* *Photo from open Internet sources*

The city of Kyiv is rich in water: there are significant groundwater reserves; in addition, there is a large number of surface water bodies: rivers, lakes, and ponds. In total, water bodies in the city cover 6.7 thousand hectares, or 8.0% of the territory. The territory of Kyiv is drained by numerous permanent and temporary watercourses, which form a hydrographic network of about 70 small rivers that eventually flow into the Dnipro River. The structure of the hydrographic network of small rivers in Kyiv is determined by the basin groupings of water bodies.

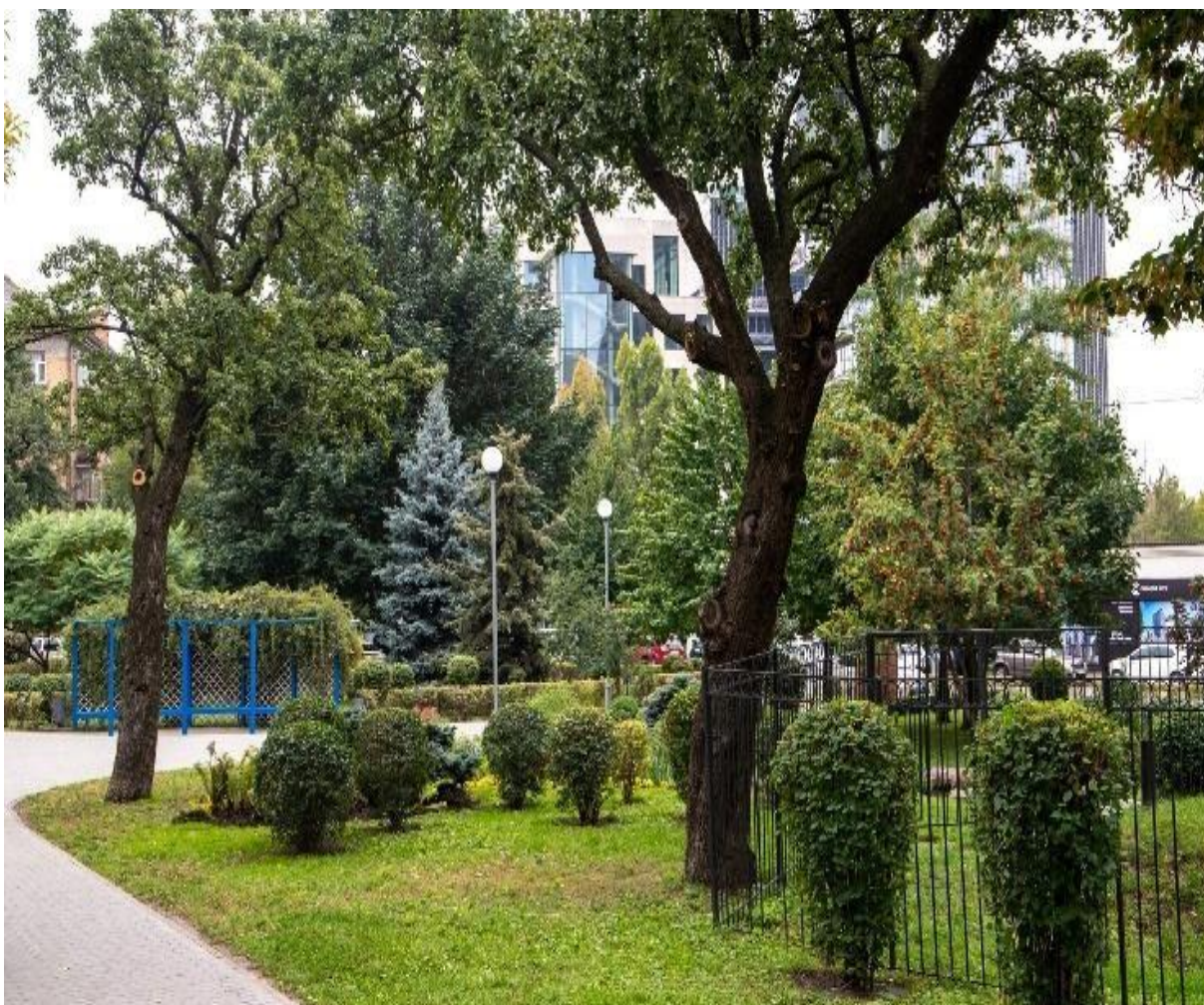


Fig. 2.5. Munich square*

** Photo from open Internet sources*

The main feature of Kyiv is the presence of a large hydrographic "axis" - the Dnipro River, which divides the city into two parts - the right bank and the left bank. The Dnipro is the largest river in Kyiv and the third largest river in Europe in terms of length and basin area (Fig. 2.6, 2.7).

The city of Kyiv is characterized by a fairly comfortable, temperate continental climate with warm summers and mild winters, and optimal humidity. The climate of Kyiv is moderately continental, with rather mild winters and warm summers.



Fig. 2.6. Dnipro is the largest river in Kyiv*

** Photo from open Internet sources*

Kyiv's climate is significantly influenced by the Dnipro River, which is stretched in a submeridional direction within the city. The large movable water area contributes to the formation of breezy air transport: during the day, the temperature difference between water and land creates flows of fresh, humid air into the city. Throughout the year, anticyclonic activity prevails, which is characterized by fairly stable, low-cloud weather.



Fig. 2.7. Kyiv Reservoir embankment*

** Photo from open Internet sources*

The driving force of economic growth in the city of Kyiv in recent years has been the following sectors: wholesale and retail trade; repair of motor vehicles and motorcycles (physical volume index 103.5%), information and communication (105%), professional, scientific and technical activities (104.7%), transport, warehousing, postal and courier activities (103, 4%) and financial and insurance activities (110.5%).

Due to the advantages of Kyiv as a metropolitan city and the city authorities' constant efforts to eliminate and reduce the impact of factors unfavourable to employment, the overall situation on the labour market in the capital remains one of the best among Ukrainian regions (Table 2.1.)

In 2021, the average monthly nominal salary of a full-time employee of enterprises, institutions, and organisations was UAH 20,558 (UAH 14,014 in Ukraine), up 20.3% compared to 2020. In the reporting year, the real wage index in

Scientific basis for sustainable development of urban land use

Kyiv was 110.1% compared to 2020 (110.5% in Ukraine). [17]

According to the State Statistics Service, wages in Kyiv have increased. As of December 2021, the average nominal salary in the capital was UAH 26,759 per month, and the average hourly wage in Kyiv was UAH 172.62.

Table 2.1. Employment dynamics in Kyiv in 2017-2019 [17]

	2017	2018	2019
Labour force aged 15-70, thousand people	1457,9	1459,3	1464,6
Employed population aged 15-70, thousand people	1356,8	1368,6	1379,9
Employment rate, as a percentage of the population aged 15-70	61,8	62,6	63,1
Unemployed population aged 15-70 (ILO methodology), thousand people	101,1	90,7	84,7
Unemployment rate of the population aged 15-70 (ILO methodology), %	6,9	6,2	5,8

In 2021, the average nominal wage in Ukraine increased by 22.7%, and as of the beginning of 2022, it stands at UAH 17,453. [51]

According to the results of employment activities in 2021:

- the number of citizens registered at employment centres and looking for work was almost 50.6 thousand (3% less than in 2020), of which almost 28.4 thousand were registered this year;

- Almost 8 thousand people were employed at the direction of the Employment Service, including 7.4 thousand unemployed people (in 2020 - 7.6 thousand and 6.6 thousand people, respectively).

As of 01.01.2022, 10.2 thousand unemployed remained registered, which is 54.2% less than last year. According to official statistics, in January-September 2021, the unemployment rate (ILO methodology) for people aged 15-70 decreased by 0.2 percentage points to 6.9% (6.6% in January-September 2020) compared to January-June 2021, due to a 15.6% increase in the number of employees hired by enterprises, institutions and organisations in Kyiv, to 283.8 thousand people. [17]

The development of the General Plan of Kyiv until 2020 was based on the principles of sustainable development (Fig. 2.8.)

Sustainable development of Kyiv in accordance with the master plan (2020) includes the following indicators:

a compact city. The city's territorial sprawl was curbed in order to reduce the burden and costs of engineering and transport infrastructure. This was achieved through the introduction of energy saving, internal development and urban amenities, and taking into account global climate change. The programme envisages the rational use of vacant urban land resources, degraded industrial and warehouse areas, and the modernisation of outdated housing stock;

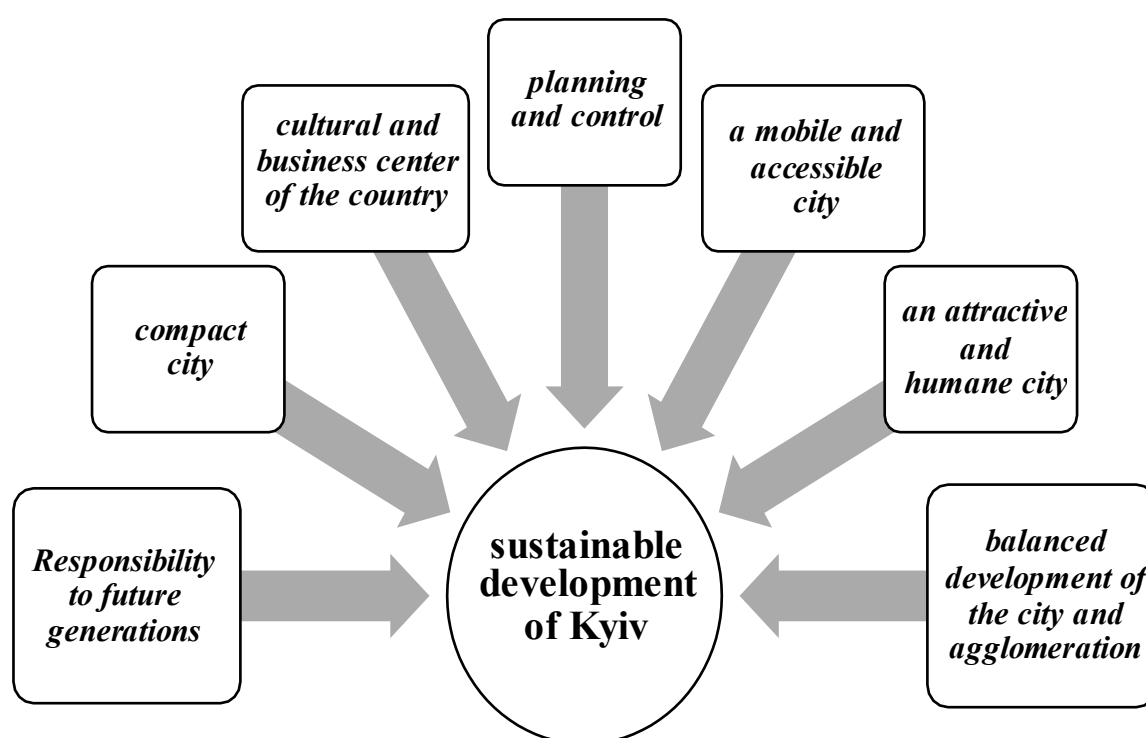


Fig. 2.8. Principles of sustainable development of Kyiv according to the General Plan until 2020 [6]

cultural and business center of the country. To perform the functions of the capital of Ukraine as the economic and cultural center of the south-eastern region of Europe, the national center of science, culture, education, sports and international tourism. Major business initiatives. Activating the development potential of the capital. Expansion of international relations and projects. Increasing the competitiveness of the economy. Development of the

knowledge economy. Increasing the number of pre-school and out-of-school education institutions, places of cultural communication for young people. Organization of public public spaces;

balanced development of the city and agglomeration. Coordinated regulation of the use and development of suburban areas (Kyiv agglomeration). Formation of a unified transport and planning framework for the city and suburban areas. Development of high-speed electric transport to provide connections between the places of settlement and employment in the city and the suburban area. Ensuring the construction of facilities of common interest;

responsibility to future generations. It provides for the preservation of the historical environment, monuments of global, national and local significance, and their rational use for historical and educational tourism. Preservation and improvement of the unique natural landscape, the level of greenery, enrichment of ecosystems, creation of new green spaces, parks, squares, and increase in the area of public green areas. Improvement of air and water quality and sanitation of the city. Cleanliness of the territories;

attractive and humane city. Improving the quality of living conditions. Modernization of the outdated housing stock. Taking into account the housing needs of the next generation. Providing housing for middle-income families. Provision of social housing for citizens in need of social support. Ensuring public safety and the provision of quality household, medical and communal services. Development of sports and physical education infrastructure. Taking into account the needs of people with disabilities;

mobile and accessible city. A balanced settlement and employment on the left and right banks is planned. Spatial coordination of places of work, housing and services. Priority development of public high-speed electric transport. Improving transport links between individual districts. Increase the length and density of motorways. Construction of tunnels, bridges, interchanges and car parks. Providing convenient transport links to suburban areas. Reducing the time required to travel from home to work to 30-40 minutes. Development of cycling infrastructure;

planning and control. overseeing the implementation of the planned construction of facilities, monitoring the implementation of the Kyiv City

Scientific basis for sustainable development of urban land use

Master Plan and urban development activities, and identifying conflict points and ways to overcome them in advance. Creating and maintaining an urban planning cadastre. Implementation of sectoral development programmes. [6]

Taking into account the results of the public discussion and in order to implement the strategic priorities of economic and social development of Kyiv, the Kyiv City Council approved the Kyiv City Development Strategy until 2025, the main strategic goal of which is to improve the quality of life of residents, which is determined by economic well-being and comfort of living in a city with a rich historical tradition. [44]

The main principles of the Development Strategy include: measurability, ambition, pragmatism/practicality, fairness, openness, transparency, and the principle of sustainability. "The Development Strategy is not a one-time sprint programme, but a marathon of long-term city development based on the principles of sustainable development, which will allow the city to be passed on to future generations with a resource base that will ensure further improvement of living standards." [44] (Fig. 2.9)

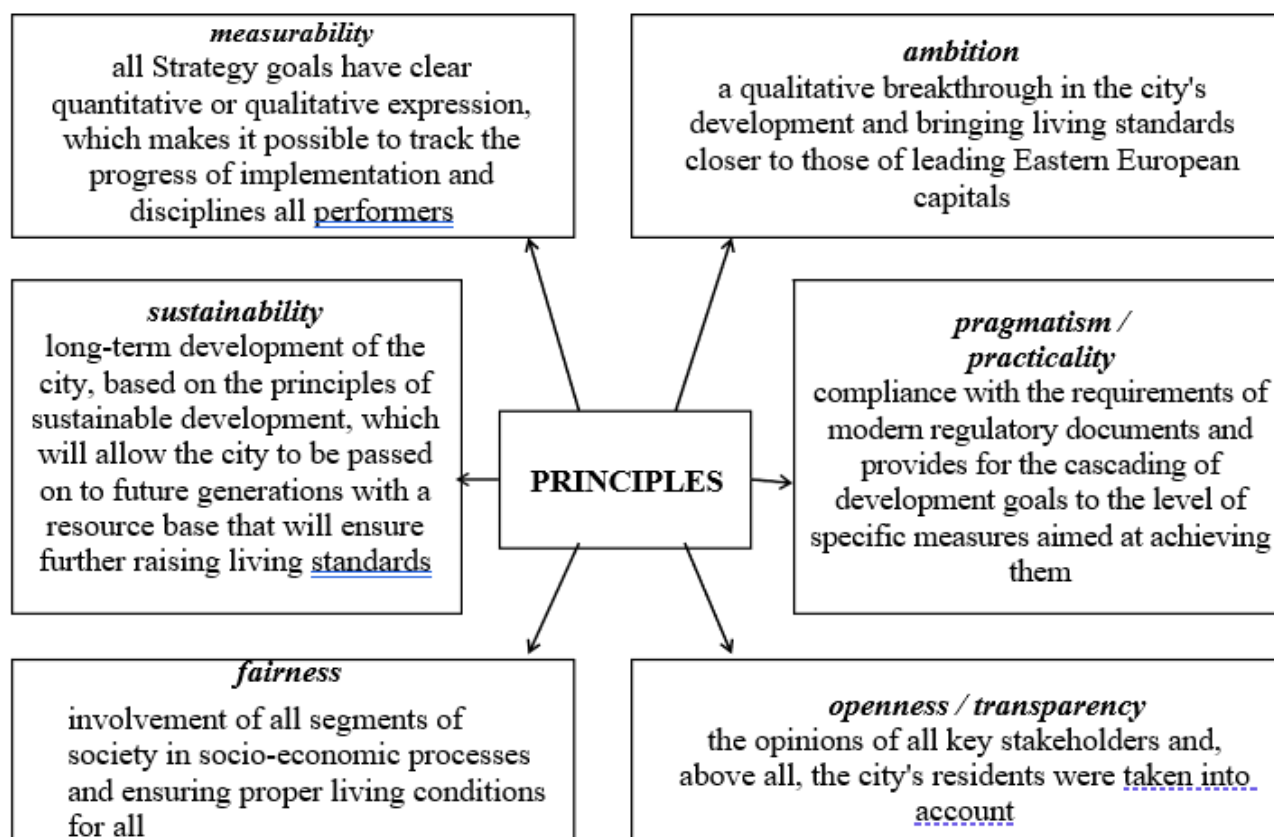


Fig. 2.9. Principles of the Kyiv City Development Strategy until 2025 [44]

It should be emphasized that the Kyiv City Development Strategy is in line with the basic principles of the state regional policy of Ukraine, in particular:

- constitutionality and legality - compliance with the Constitution, laws of Ukraine and binding international treaties;
- cooperation - coordination of goals, priorities, tasks, measures and actions of the authorities. Ensuring interaction between them;
- parity - equal opportunities for access to resources of state financial support for regional development;
- openness - transparency, predictability, consistency of public authorities' activities;
- subsidiarity - decentralization of powers to ensure their most effective implementation;
- coordination-interconnection and coherence of long-term development strategies, plans and programs at all levels;
- unity - reducing socio-economic disparities, ensuring the integrity of Ukraine;
- historical continuity - taking into account and preserving the positive experience of regional development;
- sustainable development - efficient use of resources with due regard for the interests of future generations

For the purpose of an objective assessment, the updated Living Standards Index included about 50 indicators that characterize key areas of the city's life and have a decisive impact on the comfort of life of Kyiv residents. Among these indicators, the weighting coefficient of eco-policy and environmental protection is 7%. (Table 2.2.)

Scientific basis for sustainable development of urban land use

Table 2.2. Description of the calculated index of living comfort in Kyiv by the indicator «Environmental policy and protection»

	Status indicators by sector urban development	weighting factors	2015	2025
2.5.1.	Air pollutant emissions per year, tonnes / km ² /year	7 %	205	164
2.5.2.	Share of recycled waste (of total waste generated), %.		0	25
2.5.3.	Land area of the nature reserve fund, thousand ha		13	20
2.5.4.	Provision of green areas for public use, m ² / resident		21,7	25,0

The operational objectives for improving this indicator to ensure environmental safety in the capital and reduce the negative impact on the environment are, in particular:

- **reducing the negative impact of industry:**



Fig. 2.10. The plant "Energhia"*

* Photo from open Internet sources

Scientific basis for sustainable development of urban land use

The city of Kyiv is characterized by a fairly comfortable, temperate continental climate with warm summers and mild winters, and optimal humidity. The climate of Kyiv is moderately continental, with rather mild winters and warm summers.

- remediation of the territories of environmentally hazardous enterprises and removal of harmful substances outside the city for further disposal (PJSC Radical, Kyiv Special Plant of the Ukrainian State Enterprise Radon, etc.) ;
- introduction of modern environmental technologies at Kyiv enterprises (including flue gas cleaning systems at the waste incineration plant Energia of PJSC Kyivenergo, CHP-4 (Darnytska CHP) (Figures 2.10, 2.11);
- implementation of a local incentive system for companies switching to renewable energy sources;
- creation of organisational, administrative and economic conditions for ensuring global environmental and economic standards in the activities of business entities in Kyiv;
- Ensuring the fulfilment of energy efficiency and climate change commitments under the «Covenant of Mayors»;



Fig. 2.11. CHP-4 (Darnytska CHP)*

* *Photo from open Internet sources*

- reclamation of the drainage dump of CHP-4 (Darnytska CHP);
- a ban on the use of coal as a fuel for CHP plants in Kyiv from 2023, except for plants converted to circulating fluidised bed technology (CFB) equipped with a chemical flue gas treatment system;
- **implementation of a modern environmental monitoring system:**
 - establishment of a regional environmental monitoring centre;
 - improvement of the environmental monitoring system in Kyiv using modern information and communication technologies and monitoring devices;
 - updating the environmental passport of the city of Kyiv;
- **implementation of modern methods of solid waste recycling and limitation of landfill disposal (objective – Zero waste):**
 - prevention of spontaneous waste accumulation;
 - reclamation of certain maps of landfill №5 with the construction of a waste processing complex;
 - creation of facilities for processing and utilisation of solid waste and plant waste;
 - establishment of a separate waste collection and recycling system;
 - conducting awareness-raising activities among the population on the separate collection of resource-rich components of household waste;
- **raising environmental awareness among city residents:**
 - integration of the environmental and climate component into the educational space of the city;
 - conducting information campaigns (including social advertising, television programmes, etc.);
- **protection and rational use of the natural environment:**
 - increasing the area of public green spaces and green areas (including through the cultivation of green spaces in the adjacent territories of new buildings);
 - simplifying the procedure for determining the territories of green zones, fixing the boundaries of urban forests, forest parks, buffer parks of

hydroparks and parks, and preventing their development;

- development of the network of territories and objects of the nature reserve fund (including the establishment of boundaries of territories with special regimes of use);

- establishment of an effective system of management of nature reserve fund objects (including patronage by scientific institutions and non-governmental organisations);

- creation of a geoinformation system of nature reserve areas and objects in Kyiv;

- developing and implementing immediate measures to ensure the preservation of the most significant landscape sites;

- development of environmental museums and landscape architecture objects;

- developing and ensuring further implementation of the Dnipro River Valley Development Concept;

- improving the condition of the main water bodies of Kyiv (rivers, lakes, canals, etc.), including ensuring strict control over the discharge of pollutants into water bodies;

➤ **improving the legal and regulatory framework:**

- developing, together with industrial enterprises in Kyiv, proposals for updating and bringing existing emission standards closer to European ones;

- creating the preconditions for implementing the requirements of the EU Water Framework Directive on the protection and use of water bodies (Fig. 2.12) [44]

The Kyiv City Development Strategy until 2025 in the section "City Development and Land Relations" in the context of sustainable development provides for:

1. Ensuring transparency in land relations:

1.1 Dynamics of real local budget revenues from land payments (in prices of the previous year);



Fig. 2.12. Kyiv development strategies until 2025*

* *Photo from open Internet sources*

1.2 Development of the plan of land and economic structure of the city territory (in accordance with the General Plan of Kyiv):

- ✓ optimisation of the territorial location of industrial enterprises (including the relocation of environmentally hazardous enterprises outside the city);

- ✓ establishing the boundaries of territories with special regimes of use (nature reserves, protected areas, coastal protection zones, etc.);

improving procedures for the provision of land plots for construction (including registration of land use rights, lease relations and improvement of the functioning of the land market);

- ✓ land plots of condominiums, introduction of a simplified mechanism for registration of land ownership by co-owners of an apartment building in which condominiums/household cooperatives are established, on the principle of the "Single Window" with financing of the costs of preparing technical documentation from the city budget;

Scientific basis for sustainable development of urban land use

- ✓ stimulating the efficient use of land and receiving land payments in an objective amount, in particular by switching from leasing land under real estate objects to purchase/superficies;

- ✓ amendments to local legislation in the field of land relations to automate processes and provide online access, including reforming and automating the sale of land/land lease rights through electronic bidding (auctions).

2. Harmonious development of the city, taking into account the interests of the community, business and government:

2.1. Improving the quality of urban planning, taking into account the needs of the community and modern European practices:

- ✓ development and approval of a new Master Plan, as well as relevant urban planning documentation (including zoning plans, detailed territory plans), taking into account existing sectoral development concepts and European norms/standards in the field of sustainable urban planning and construction;

- ✓ conducting an independent professional examination of the draft Kyiv City Master Plan with the involvement of international experts;

- ✓ development and implementation of mechanisms for public participation in urban planning decision-making in accordance with modern European practices;

implementation of the procedure for strategic environmental assessment and other types of expertise and assessments provided for by European legislation in the development of the Kyiv General Plan;

- ✓ developing a landscape plan for the city, conducting an inventory of landscapes;

- ✓ development of the Concept of preservation and development of Kyiv landscapes;

- ✓ implementation of a modern regulatory and legislative framework for urban planning;

- ✓ development of the Kyiv Spatial Development Concept (including modern principles of city development, organisation of improving the connectivity of the environment and the quality of recreation), including: -

Scientific basis for sustainable development of urban land use

Identification of tools for the completion of problematic residential buildings/long-term construction (including with the participation of utility companies) and their completion - Development and phased implementation of a programme for the comprehensive reconstruction of outdated residential neighbourhoods ("Khrushchev", panel buildings of the first period of industrial house building, etc.);

- ✓ introduction of competitive design in the development of urban planning documentation, architectural planning and landscape architecture objects.

2.2. Implementation of a transparent system for the development of urban space:

- ✓ implementation of information and analytical tools for urban planning decision-making (including building monitoring, tools for analysing the efficiency of urban areas, the current state and dynamics of infrastructure development, modelling of the urban planning situation, etc.);

- ✓ inventory of urban space objects and development of the urban planning cadastre system, including publicly available up-to-date information on the sale/lease of municipal property (including publication of the full text of contracts, information on arrears of local taxes and fees, etc.);

- ✓ ensuring the development of existing and creation of new social, engineering and transport infrastructure (rather than excessive use of existing resources)

- ✓ reforming the institution of equity participation in the creation of engineering, transport and social infrastructure;

- ✓ improvement of the procedures for obtaining documents by customers that entitle them to perform preparatory and construction works, and commissioning of completed facilities (including related documents and procedures);

- ✓ publication of information on all documents of developers required for the creation of construction projects (including construction permits, urban planning conditions and restrictions, design and estimate documentation, etc.);

- ✓ initiating changes to state building codes to ensure their compliance with modern requirements.

2.3. Improving control in the field of land relations and construction:

Scientific basis for sustainable development of urban land use

- ✓ introduction of an effective system of architectural and construction control / construction police;
- ✓ initiating legislative changes to strengthen liability (including financial liability) for unregistered land use, unauthorised occupation of land plots and unauthorised construction, as well as granting local authorities additional control powers;
- ✓ preventing the adoption of questionable / illegal decisions by the KCSA / structural units of the KCSA (the mayor's influence on these processes, in particular through the veto mechanism);
- ✓ identification and return of illegally occupied plots, bringing them into a condition suitable for further use;
- ✓ implementation of urban planning monitoring and development of the Kyiv Development Monitoring Centre;
- ✓ developing the capacity of the city community to control violations using modern technologies (mobile applications, electronic portal, etc.);
- ✓ improving lease relations by ensuring the rights of the city.

3. *Inventory of the city's land, organisation of land management and maintenance of the city land cadastre* (including updating the State Land Cadastre), including making the following information publicly available:

- ✓ register of communal land and land lease/sale agreements (including publication of the full text of agreements, information on arrears of local taxes and fees;
 - ✓ register of land owners and land users (including tenants);
 - ✓ data on vacant land plots that may be investment objects;
 - ✓ data on the quantity and quality of land plots by category - a list of land subject to taxation (including at preferential rates);
 - ✓ графічного зображення ділянки на основі топографічних зйомок та просторової прив'язки;
 - ✓ up-to-date photographic documentation of land plots;
 - ✓ data for determining linear and planar characteristics on the ground;
 - ✓ data on the designated purpose of land plots (including the

Scientific basis for sustainable development of urban land use

functional purpose for the future in accordance with the city's General Plan);

- ✓ information on the designated area for construction - information on the form of ownership (owner, user) of both land and real estate according to the approved system of indicators;

- ✓ data on the availability of utilities;

- ✓ the estimated value of the land plot, etc..

4. Synchronisation of registers/databases (land and urban planning cadastres).

5. Development of a land management project to establish the boundaries of the city of Kyiv.

6. Drafting of new and regularisation of existing land ownership and land use. [44]

General indicators of the effectiveness of the above tasks are presented in Table 2.3.

Table 2.3. General performance indicators

Indicators	Eq. measurement	2015	2025
The share of the city's land area covered by the inventory and entered into the municipal land cadastre (in the total area of the city's land	%	86	100
Area of land plots in Kyiv occupied in violation of the law	ha	4.5	0
Number of land lease agreements for which the lease payment is less than 3% of the normative monetary value (as of the end of the year)	units	1 632	0
Ratio of the amount of land rent payable (as at the end of the reporting period) to the amount of land rent actually paid (during the reporting period)	%	13.5	<10.0
Ratio of the amount of land tax payable (as at the end of the reporting period) to the amount of land tax actually paid (during the reporting period)	%	24.4	<10.0

Scientific basis for sustainable development of urban land use

Ratio of the amount of arrears of share participation (contributions) for the development of social and engineering transport infrastructure of the city of Kyiv and under compensation agreements for engineering preparation of the territory in accordance with the concluded agreements (at the end of the reporting period) to the amount of actually paid share participation (contributions) for the development of social and engineering transport infrastructure of the city of Kyiv and under compensation agreements for engineering preparation of the territory in accordance with the concluded agreements (during the reporting period), excluding inflation and penalties	%	223	<10
Fulfilment of UNESCO's requirements for compliance with the development regime in the buffer zone of St Sophia of Kyiv and Kyiv Cave Monastery	yes / no	yes	yes

2.2. Territorial resources of urban space and their use

Built-up land and public areas

A general feature of urban space is that the amount of free territorial resources that can be used for urban planning purposes is extremely limited, and a significant part of almost all functional zones is used inefficiently. The experience of Kyiv in finding territorial resources for sustainable development of the metropolis can be applied to other cities of the country, especially large, large and even medium-sized ones.

The structure of the land fund of the capital of Ukraine, according to the StateGeoCadastre, in 2019 is described in Table 2.4.

According to the functional purpose, the territory of the city, subject to clarifications, is divided into lands residential and public buildings (16640.6 ha or 19.9% of which 2670.3 ha or 3.2% are allocated for construction but are not built), industrial, scientific and production, municipal and warehouse (6912.3 ha or 8.3%), transport infrastructure and external transport facilities (1848, 8 hectares or 2.2%), green spaces and recreational areas (45449.2 hectares or 54.4%), agricultural enterprises (289.8 hectares or 0.3%), streets and roads (4341.8 hectares or 5.2%), water surfaces (6309 hectares or 7.6%),

Scientific basis for sustainable development of urban land use

other (1727.4 hectares or 2.1%) (Fig. 2.13.)

Table 2.4: Structure of the land fund

Main types of land and land use	in total, thousand ha	% to total area territory
Total area	83,6	100
including:		
1. Agricultural land, including:	4,4	5,3
arable land	0,5	0,6
fallow land	-	-
perennial plantations	3,3	4,0
hayfields	0,6	0,7
pastures	0	0
2. Forests and other wooded areas	35,1	41,7
of them are covered with forest vegetation	34,9	41,7
3. Built-up land	37,0	44,3
4. Open wetlands	0,2	0,2
5. Other land	6,9	8,3
Total land (land)	76,9	92
Areas covered by surface water waters	6,7	8

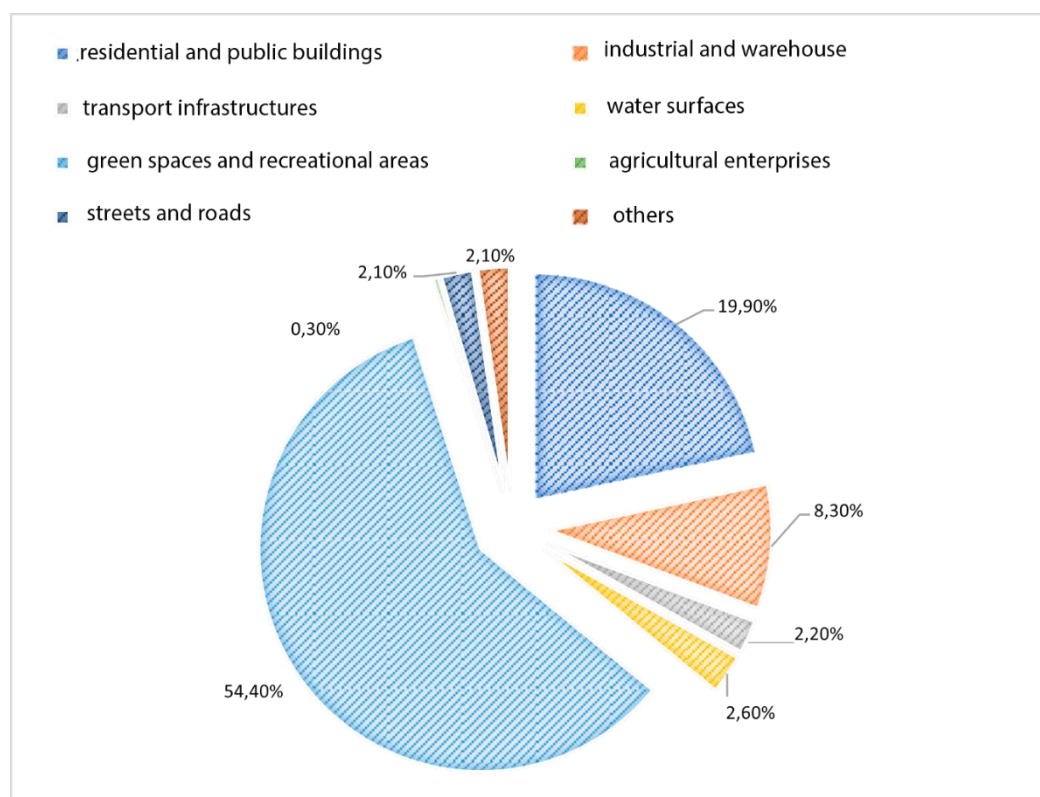


Fig. 2.13. City territory by functional purpose

Scientific basis for sustainable development of urban land use

According to the above data, almost 86% of the city's territory is occupied by built-up land (37.0 thousand hectares - 44.3%), forests and other forested areas (35.1 thousand hectares - 44.7%). Taking into account the specially conducted environmental and urban planning assessment of land cadastral, land management and architectural and planning documentation, territorial resources can be used for urban planning purposes (Fig. 2.14)

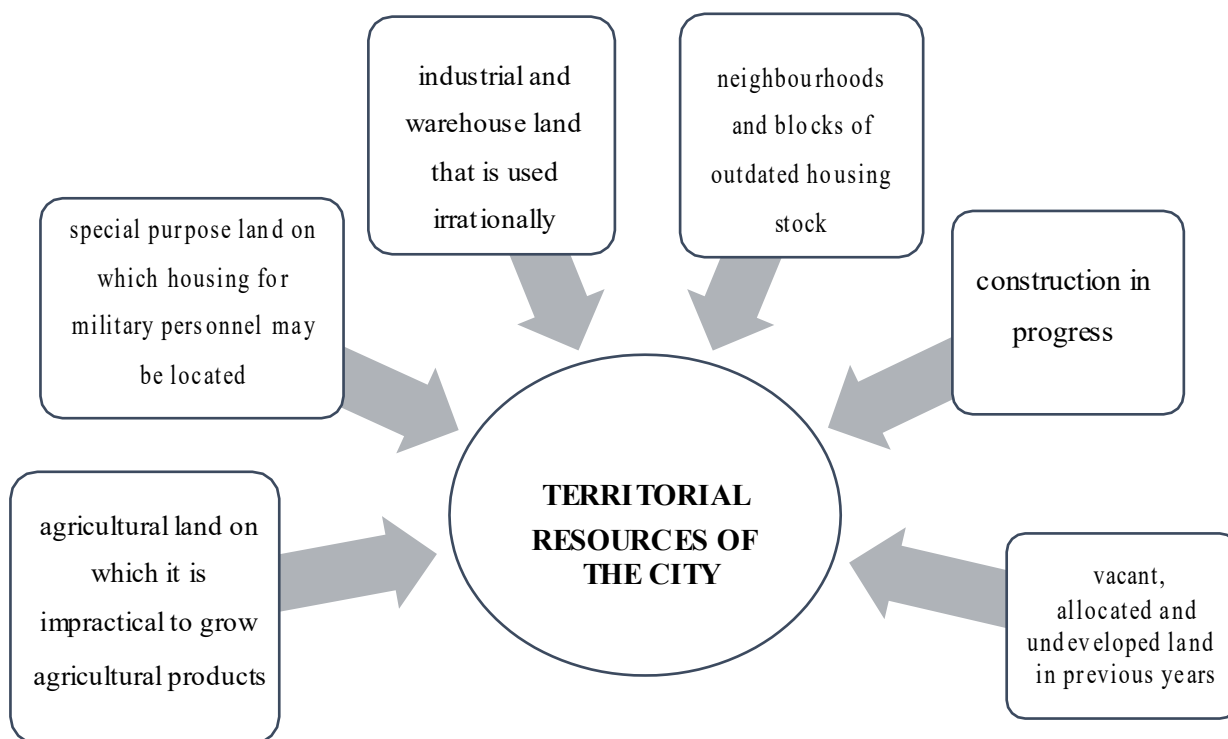


Fig. 2.14. Composition of the city's territorial resources that can be used

It has been established that in the rural areas there are free from development land plots allocated for complex residential and public development with a total area of 880.4 hectares, which will be developed within 20 years (Tremky-3 in Holiivskyi district, Osokorky Pivnichni, Osokorky Tsentralni, microdistrict 11 of the Pozniaky residential area in Darnytskyi district), as well as free territories reserved for promising complex residential and public development (residential area on Ozerna str. Ozerna Street, Pivnichna Street, Osokorky-Pivdennyi Street and others) with a total area of 273.5 ha.

For the development of industry and public utilities, the territory along Pukhivska Street (Troyeshchyna industrial area) - 184 hectares, and south of

Tyahle Lake (Osokorky industrial area) - 158 hectares (subject to the territory being included in the city of Kyiv) are planned (Fig. 2.15., 2.16)

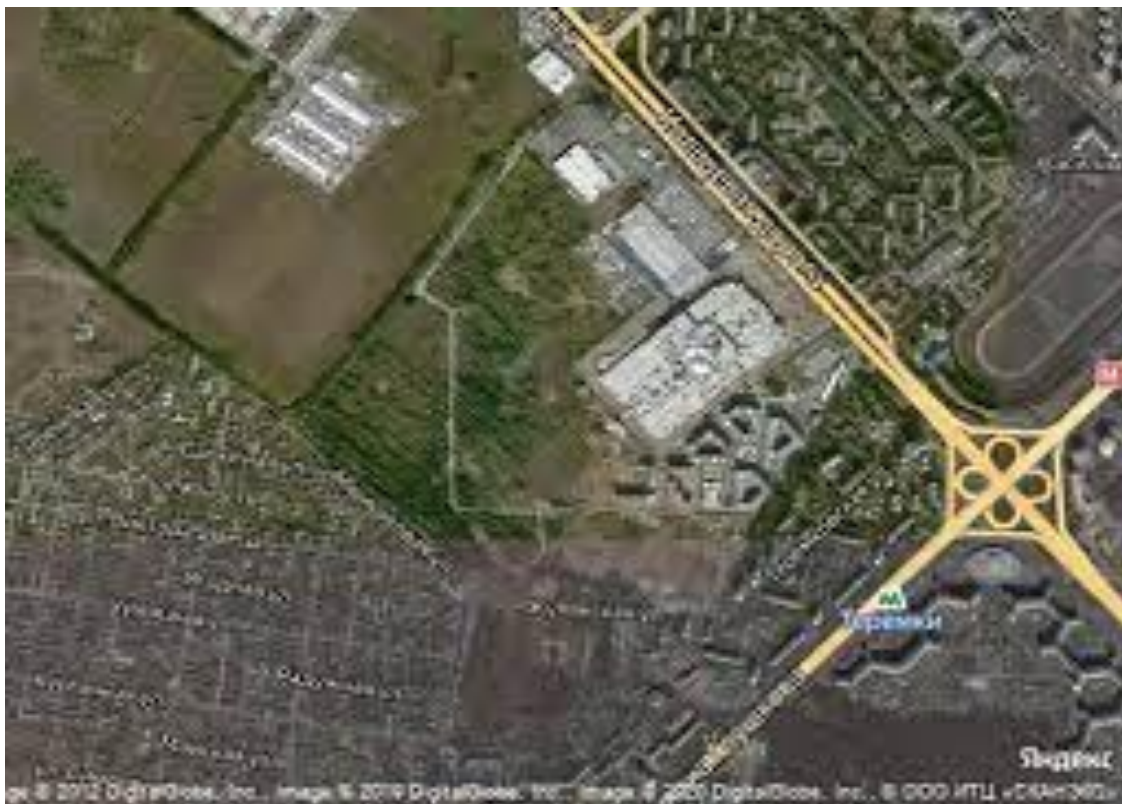


Fig. 2.15. Teremky-3



Fig. 2.16. Osokorky Central

In the long term, there will be a financial opportunity for the comprehensive reconstruction of post-war neighbourhoods (districts), which contain about 12.3 millionm² of obsolete housing stock, including about 42.9 thousandm² of dilapidated and emergency stock that is already subject to demolition. The total area of territories requiring a phased comprehensive reconstruction of the outdated housing stock is 388.5 hectares in the future.

The efficiency of use of a number of industrial, production, utility and warehouse areas and special purpose areas is extremely low. The area of industrial, utility and warehouse territories currently amounts to 6.6 thousand hectares. In the future, the city model can be expected to release up to 60% of their total area or 3,900 hectares of industrial and communal and warehouse areas. Industrial and utility and warehouse areas with a total area of up to 706.5 hectares may be re-profiled for residential construction, multifunctional public buildings, as well as engineering and transport infrastructure, and public green spaces in the 20-year period. The total area of special territories that will change their functional purpose to accommodate residential and public buildings is 173.0 hectares. [51]

The resource assessment of the territory, which was carried out on the basis of the state land cadastre database, urban planning documentation for planning of individual territories and project documentation for the construction of facilities, taking into account environmental and urban planning assessment, objectively existing spatial growth boundaries, is shown in Table 2.5.

The calculation of the needs for territories for various purposes for a 20-year period, which was performed for the prospective permanent population (3.26 million people) with an average housing provision of at least 29 km² per 1 person, taking into account the relevant standard indicators of the population density of the quarter (microdistrict) from 300 to 450 people/ha, and for the areas of estate development - 35 people/ha, confirmed that for the capital metropolis to ensure sustainable development, taking into account the prospective population, there are enough territories for all types of functional purposes.

Scientific basis for sustainable development of urban land use

Table 2.5. Volumes of territorial resources of the city

№ p/p	Areas for internal development of the city	Area, ha
1	The territorial resource of existing rural areas (free from development, including those already allocated for residential and public construction and classified in the state land cadastre as residential and public land)	1185,6
2	Areas for comprehensive reconstruction of outdated housing stock	388,5
3	Inefficiently used production and storage facilities	1662,0
4	Special purpose	173, 0
5	Land of agricultural enterprises, including land already allocated for residential and public construction and classified in the state land cadastre as residential and public construction land	335,2
6	Territorial reserve for the creation of buffer forest parks of public green spaces at the expense of part of the territories of forestry enterprises	1598,0
7	Other territorial resources	564,1
8	Total	5906,4

However, there is a lack of free-for-use municipal land to implement affordable housing and social housing construction programmes without hindrance. In this regard, the rational use of urban land resources, modernisation of the outdated housing stock, restructuring and change of functions of degraded industrial, warehouse and other areas with the preservation and development of budget-forming enterprises remain the priority areas of internal development and improvement of Kyiv.

The main principles of public development include:

- ✓ clear differentiation of levels of public centres, namely city-wide, planning zones, residential areas;
- ✓ allocation of territories for the formation of community centres;
- ✓ performing national and metropolitan functions in Kyiv;
- ✓ equitable location of community centres at all levels to bring them closer to the city's population and reduce the time spent using them.

Residential and public development land tends to be constantly

Scientific basis for sustainable development of urban land use

expanded due to the increase in the city's population and the level of housing provision. The analysis of the planning structure of the existing rural area shows a high proportion of estate development, with relatively small areas of community centres and medical facilities.

Proposals for the reconstruction and development of rural areas should be based on the principle of achieving maximum efficiency in the use of urban territory, placing as much housing as possible on existing territorial reserves of the city, forming zones of citywide and regional community centres, and restoring and restoring the historic environment in the central area of the city.

To solve these problems, all possible types of housing construction are used, starting with the use of previously reserved territories of multi-storey residential areas and ending with proposals for the densification of low-rise estate development areas, reconstruction of the territories of collective gardening societies for housing and civil construction.

In addition to the main issues related to the development of residential and public buildings and the allocation of housing construction volumes, constant attention should be paid to the reconstruction and improvement of existing residential areas, both multi-storey, 5-storey buildings and low-rise residential areas of the estate type.

The use and protection of public land should be based on the principles envisaged in the General Plan of Kyiv, the formation of a differentiated system of public centres and separate facilities of city-wide cultural, educational, sports and service institutions. Particular attention should be paid to the objects of historical and cultural reserves and individual monuments of history and cultural heritage, the basis for the development of measures to protect land in these categories is the citywide architectural historical and cultural plan of Kyiv. Kyiv, as a component of the General Plan of Kyiv.

The efficiency of use of a number of industrial and production, municipal and warehouse areas and special purpose areas is extremely low. The area of industrial, municipal and warehouse territories currently totals 6.6 thousand hectares. Current employment at industrial enterprises is 129.2 thousand people.

In the future, given the prevailing trends in robotisation of production cycles,

the number of jobs at industrial and utility and warehouse enterprises in certain production areas is expected to stabilise at 145-150 thousand (approximately 11% of the total number of jobs in the city), and up to 370 thousand jobs at research and production associations, industrial and technology parks. In the future, the city model can be expected to release up to 60% of their total area, or about 3900 hectares of industrial and communal warehouse areas. Industrial and utility and warehouse areas with a total area of up to 706.5 hectares may be re-profiled for housing, multifunctional public buildings, as well as engineering and transport infrastructure, and public green spaces over a 20-year period. [51]

Green spaces and recreational areas

In the context of the implementation of the national programme for the formation of the national ecological network of Ukraine, a set of measures is being taken to expand the ecological network, protected areas, and develop tourist and recreational, medical and healthcare facilities using forest resources and nature reserves. Conservation of biological resources, including forests, is one of the most important prerequisites for the integrity of natural ecosystems. [14]

The area of land within the city of Kyiv covered by green spaces of all kinds (including garden and summer cottage development) is 45449 hectares or 54.4% of the city's area. In total, there are 127 parks in Kyiv, including 6 specialised parks, 367 squares, and 77 boulevards, which perform two major functions - environmental and recreational. At present, 172 territories and objects of the nature reserve fund with a total area of 12452.34 hectares have been identified. Green areas of restricted use cover an area of 11638.6 hectares. Such areas include: green areas of general education institutions - 1093 hectares, pre-schools - 865.4 hectares, higher education institutions - 1242.5 hectares, medical institutions - 284.6 hectares, residential areas - 5411.4 hectares, etc. There are 28 cemeteries in Kyiv with a total area of 533.2 hectares (most of them are closed and semi-closed). The level of cemetery landscaping is about 80%.

As of 1 October 2020, the territory of green spaces of general use and special purpose within the city limits, according to the reported data, is 41126.46 hectares or 48.21% of the total area of the city, of which 7147.6

Scientific basis for sustainable development of urban land use

thousand hectares are located within the urban development. The actual provision of green space for the population of Kyiv with urban and suburban forests is 138.71m²/person, and green space within the urban area is 24.11m²/person. The results of the analysis and assessment of the network and condition of public green areas allow us to determine the actual indicators of provision in the city and administrative districts (Table 2.6). [48]

Green spaces are an important component of the urban environment, which has a significant impact on its urban planning and aesthetic landscape characteristics, and are also recognised as stabilisers of both the quality of living space and the environmental well-being of the city.

On the right bank of Kyiv, the connections of the central districts with Sviatoshynske forestry are traced through Peremohy Avenue, Nyvky, Pushkin, Zoo, KPI Park, Fomin Botanical Garden, Shevchenko Park in the western direction, and through Kyn Hust, near the Shevchenko Cinema, Kurenivskyi Park, Berezovyi Hai, Babyn Yar parks with Pushcha-Vodytsia forestry in the northwestern direction.

Table. 2.6 Actual provision of available green areas for public use, excluding slopes, tracts and other publicly accessible landscaped areas

Administrative district	Area of green public areas, ha	Current population	Provision of green areas for general use, m ² /person.
1	2		3
Holosiivskyi	1069,43	254331	42,04
Darnytskyi	473,2948	347611	13,61
Desnianskyi	532,04	369155	14,41
Dniprovskyi	1132,59	358352	31,60
Obolonskyi	620,1565	318968	19,44
Pecherskyi	366,47	163264	22,44
Podilskyi	222,77	208449	10,69
Sviatoshynskyi	231,0216	342544	6,74
Solomianskyi	282,35	383387	8,73
Shevchenkivskyi	491,94	218952	22,47
Total:	5422,06	2965013	18,29

Holosiivskyi Park of Culture and Recreation named after Rylskyi, the

territory of the Expocenter of Ukraine, the Museum of Folk Architecture and Life, Pokal Park form a green wedge in unity with the Koncha Zaspa Forestry and Holiivskyi National Park.

On the left bank of Kyiv, the green wedge is formed in the north-eastern direction on the basis of Peremoha Park and parks adjacent to Brovarskyi Avenue, and in the southeast - on the basis of Partizanska Slavy Park. The public green spaces managed by Kyivzelenbud are in the best condition, despite a number of problems common to all green spaces.

Green areas of restricted use and special purpose belong to different departments and have different degrees of improvement and maintenance. Landscape reconstruction works are carried out only in the case of a change of land use without coordination with adjacent territories, so the reconstructed areas look random and only emphasise the unattractiveness and lack of professional care of other areas.

According to their ecological and socio-economic significance and functions, they are classified as protective, recreational, conservation, scientific, historical and cultural forests and are grouped into three forest parks (Fig. 2.17)

To develop green and recreational areas, the Master Plan provides for the creation of new public green spaces, namely parks, squares and boulevards. To expand the network of public green spaces, it is proposed to:

- territories of public plantations in new residential areas (Bortnychi Nyzhni, Teremky-III, south of the Vinogradar district, Rembaza, certain residential neighbourhoods Osokorky, Poznyaki, etc.);
- territories of special-purpose plantations within the former sanitary protection zones after the liquidation of enterprises, within the former protection zones of power lines (after their cabling), within the protection zone of the gas pipeline (during the implementation of the pressure reduction project and reduction of the protection zone, in particular in the north of Obolon district), etc.;

- territories of protective plantations (anti-erosion plantations on slopes - Podilskyi, Solomianskyi, Shevchenkivskyi districts, protective plantations around water bodies - Darnytskyi, Dniprovskyi, Obolonskyi districts) and others;

Scientific basis for sustainable development of urban land use

- forestry lands located on the border of residential development (in particular, in Holiivskyi, Sviatoshynskyi, Dniprovskyi and Desnianskyi districts);

- territories of industrial districts and industrial zones subject to restructuring for the development of residential and public buildings and public green spaces (public centres of city-wide significance Telichka, Rybalskyi, residential complex and park on Mykilsko-Slobidska and Mykolaivska streets). Mykilsko-Slobidska on the territory of the former plant, etc.).

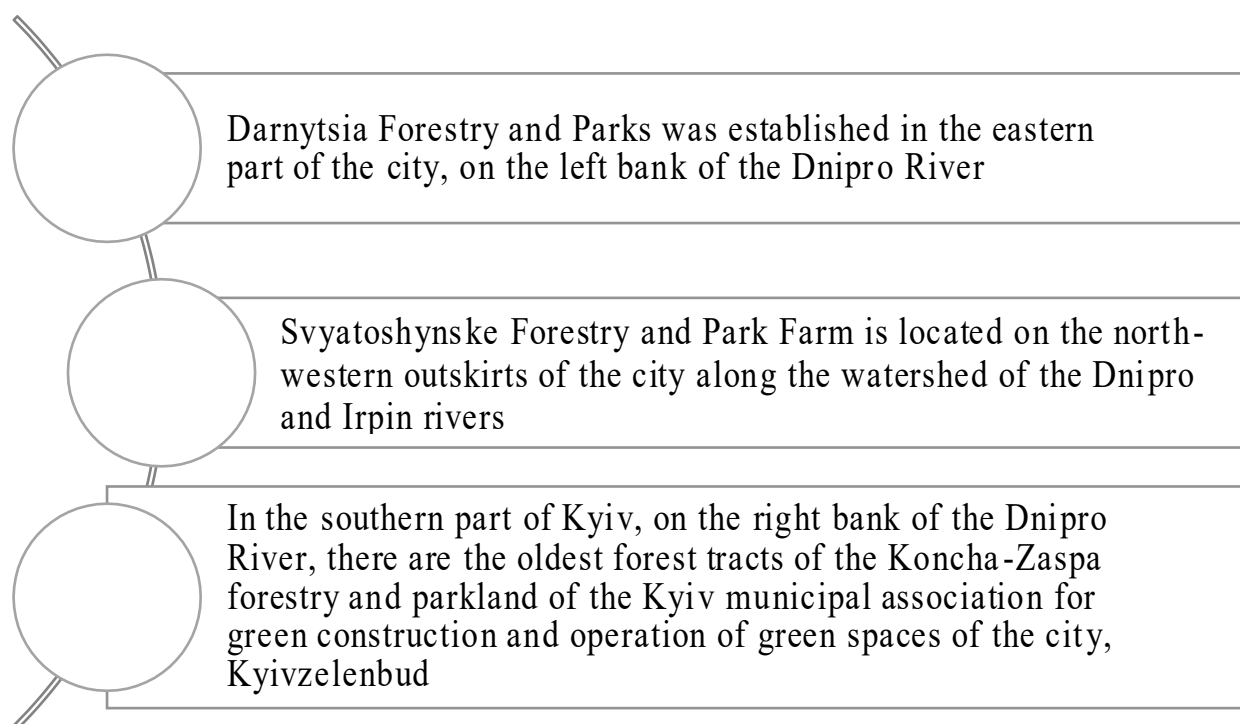


Fig. 2.17. Groups of forestry enterprises by ecological and socio-economic significance

The increase in public green areas over the next 20 years will amount to 662.0 hectares, of which 557.0 hectares will be parks (36 new facilities and expansion of 6 existing ones), 68.2 hectares will be squares (50 facilities), 36.7 hectares will be boulevards and avenues (11 facilities).

New nature reserve areas are to be established. These include

Scientific basis for sustainable development of urban land use

Troyeschynskyi and Osokorkivskyi meadows, Horbachyha, Dolobetskyi Island, the most valuable areas of Trukhaniv Island: the Babyn Lake area and the Lisovyi Peninsula, the Pokal tract - the Ostryi Peninsula, Observatory Hill, the remains of the Darnychanka River valley, Protasiv Yar, Mount Lipynka, the Nadpodil Mountains, etc. (Fig. 2.18)



Figure 2.18. Protasiv Yar (Kyiv)*

* *Photo from open Internet sources*

The General Plan proposes to expand the network of territories and objects of the nature reserve fund by:

- creation of 11 territories and objects of the nature reserve fund on the reserved territories with a total area of 1077.7 ha (Fig. 2.19)



Figure 2.19. The landscape reserve «Babyn Yar»*

* *Photo from open Internet sources*

Scientific basis for sustainable development of urban land use

- expanding the territory of the Holosiivskyi National Nature Park at the expense of promising protected areas and bringing its approximate area to 12,664 hectares within Kyiv;
- adjustment of the project for the creation and clarification of the boundaries of the Dnipro Islands Regional Landscape Park (Fig. 2.20)



Fig. 2.20. Landscape park «Dnipro Islands»*

** Photo from open Internet sources*

Territories and objects of the nature reserve fund:

- expanding the territories of the Holosiivskyi National Nature Park at the expense of promising protected areas and bringing its approximate area to 12,685 hectares; (Fig. 2.21);



Figure 2.21. Holiivskyi National Nature Park*

** Photo from open Internet sources*

- adjusting the project for the creation and clarification of the boundaries of the Dnipro Islands Regional Landscape Park;

- creation of 12 territories and objects of the nature reserve fund in the reserved areas with a total area of 6447 hectares;

General organisational and management measures for the development and preservation of the territories and objects of the nature reserve fund as particularly valuable green areas include:

– creation of a special unit for the management of the Kyiv Nature Reserve Fund within the Kyiv City State Administration;

– ensuring control and supervision over the strict fulfilment of the requirements of the Conservation Obligations for the territories and objects of the nature reserve fund;

– Creation and constant updating of the geographic information system of the database on the territories and objects of the nature reserve fund of Kyiv;

– developing and implementing a targeted budget programme and

continuously allocating the necessary funds for the maintenance of the territories and objects of the nature reserve fund;

- completion of land management projects and delineation of territories and objects of the Kyiv nature reserve fund;

- development and approval of projects for the organisation of regional and landscape parks, protection, restoration and recreational use of their natural complexes;

- development and approval of projects for the maintenance and reconstruction of parks and monuments of landscape gardening.

It is necessary to grant the status of nature reserve objects to all existing green wedges in the city, as well as to the adjacent suburban forests of Sviatoshynskyi, Koncha Zaspivskyi and Darnytskyi forest parks. This will protect the green wedges not only from destruction, but also from isolation from large forest areas in the future.

Water resources

Water bodies in the city cover 6.7 thousand hectares, or 8.0% of the territory. There are 422 water bodies of various types, including 44 artificial ones (Figure 2.22). These include lakes, pond systems, small rivers, and the Dnipro River, which forms the Kaniv Reservoir below Kyiv. Each body of water has its own hydrological characteristics and anthropogenic load of varying intensity. The length of rivers in the city is 104.28 km. [14]

The total service area of the water fund lands is 1145,672 hectares, including: 14 beaches (98.54 hectares) and 18 recreation areas (184.25 hectares).

The largest so-called small rivers in Kyiv that flow into the Dnipro are Lybid, Syrets, Nyvka, and Vita in the right-bank part of the capital, and Darnytsia in the left-bank part (Table 2.7).

Kyiv has an extraordinary length of coastal strip of water bodies, which is a result of the exceptionally high number of straits, islands and other water bodies. The pearl of the city is Trukhaniv Island, which has the largest number of sports and recreation centres (about 30). The main waterway that creates the unique face of the city is the Dnipro River, which is used for many purposes: drinking and industrial water supply, shipping, sports and recreation.

Scientific basis for sustainable development of urban land use

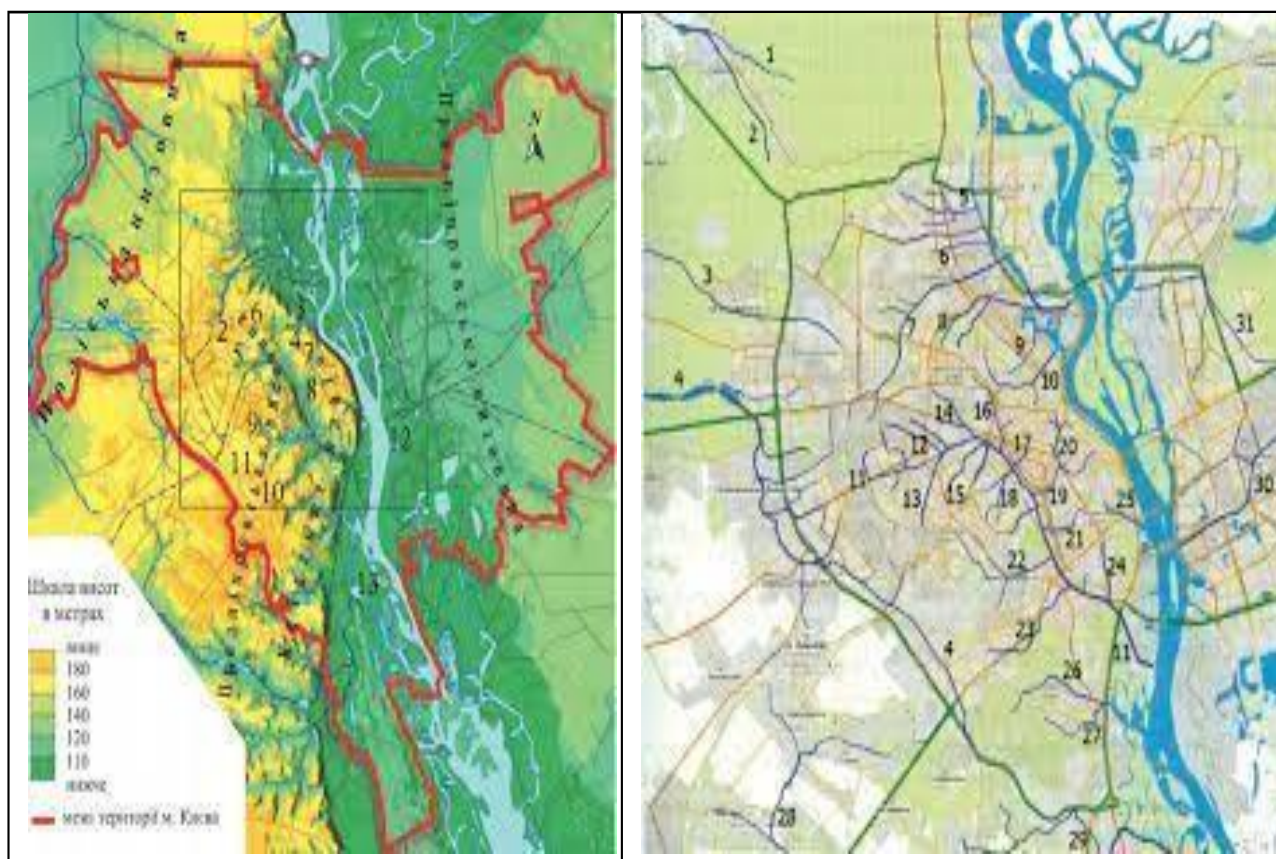


Fig. 2.22. Location of water bodies in the city*

* Photo from open Internet sources

The significant natural value of the islands on the Dnipro River near Kyiv contributed to the fact that in December 2004 they were declared a regional landscape park «Dnipro Islands» by the Kyiv City Council.

Table. 2.7 Main characteristics of small rivers in Kyiv

No p/p	Name of the river	Where it goes	Length, km	Catchment area, km ²	Water runoff, million m ³
1	Vita	Dnipro	13,9	244	18
2	Darnytsia	Lake Telbin, Dnipro	21,1	133	8,5
3	Lybid	Dnipro	16,0	66,2	3,8
4	Nyvka	Irpın	19,7	94,0	5,4
5	Syrets	Lake Opechin, Dnipro	12,3	24,4	1,4
6	Siverka	Vita	29,2	129	9,8

Kyiv's rivers are mainly water recipients of surface runoff, while being fed by it. Some of them also receive waste water from some enterprises. These factors lead to the fact that most of Kyiv's small rivers are polluted. The water of the city's small rivers is heavily polluted with oil products, nutrients and organic matter. The main indicators that characterise the level of water pollution are the oxygen regime, chemical and biochemical oxidation values, the regime of biogenic elements, and the presence and level of substances of man-made origin. [40]

The aforementioned areas require a range of works to maintain and ensure proper sanitary and epidemiological conditions, including the main set of works, such as intensive cleaning, garbage collection, sanitary sand filling, and deratization measures. The issue of establishing and maintaining water protection zones for all water bodies of the city remains problematic, which should ensure restrictions on economic activity in coastal protection zones along rivers, around water bodies, construction of any structures (except for hydraulic, hydrometric and linear), including recreation centres, summer cottages, garages and car parks, washing and maintenance of vehicles and equipment, construction of garbage dumps, etc. Certification of water bodies (establishment of technical parameters of a water body, hydrological characteristics of a river (watercourse), regulation of operational activities at reservoirs, ponds and lakes to ensure sustainable use (including quantitative and qualitative restoration) of all resources related to the existence of a water body, reliability of facilities and to increase the efficiency of their use). [40]

2.3. Land management support for the location and maintenance of green spaces

One of the most important characteristics of the territory in cities is the functional purpose of land. The criteria for functional division are as follows:

- a significant share of built-up areas compared to undeveloped areas;
- large areas of multi-storey buildings;
- the presence of industrial and service businesses;
- a well-developed public transport system, surface and underground communications;
- modern retail network;

Scientific basis for sustainable development of urban land use

- high level of environmental pollution;
- availability of special recreational areas for public use;
- high enough density of educational, medical and cultural institutions;
- religious buildings of various denominations.

The guidelines for sustainable land use planning are:

- an acceptable balance of protection, conservation and development of land use;
- land use based on sustainable development of society;
- implementation of integrated government actions in the field of land relations (conflict prevention, coordination of powers and responsibilities, cooperation, etc);
- involving the public in the process of sustainable land use planning;
- improved the level of knowledge about the importance and role of land and land resources in decision-making;
- support and implementation of initiatives of environmental organisations in land management. [49]

One of the main indicators of sustainable urban development is the land for recreational and health purposes, which is part of the land of the settlement, performs preventive and health functions and is used for mass recreation and tourism.

Recreational areas are a network of green and other open spaces for various purposes located both in settlements and in suburban areas and in the territories of landscape complexes, recreational areas, resorts and health and wellness areas, cultural heritage sites and tourist areas, territories of nature reserves and water funds, water protection, field protection, transport and distribution green belts and other green facilities.

According to the UN Sustainable Development Goal 11.7, by 2030, universal access to safe, inclusive, green spaces, including for children, older people and people with disabilities, is to be ensured.

When forming a network of recreational territories of settlements, the following territories should be allocated (Fig. 2.23).

Scientific basis for sustainable development of urban land use

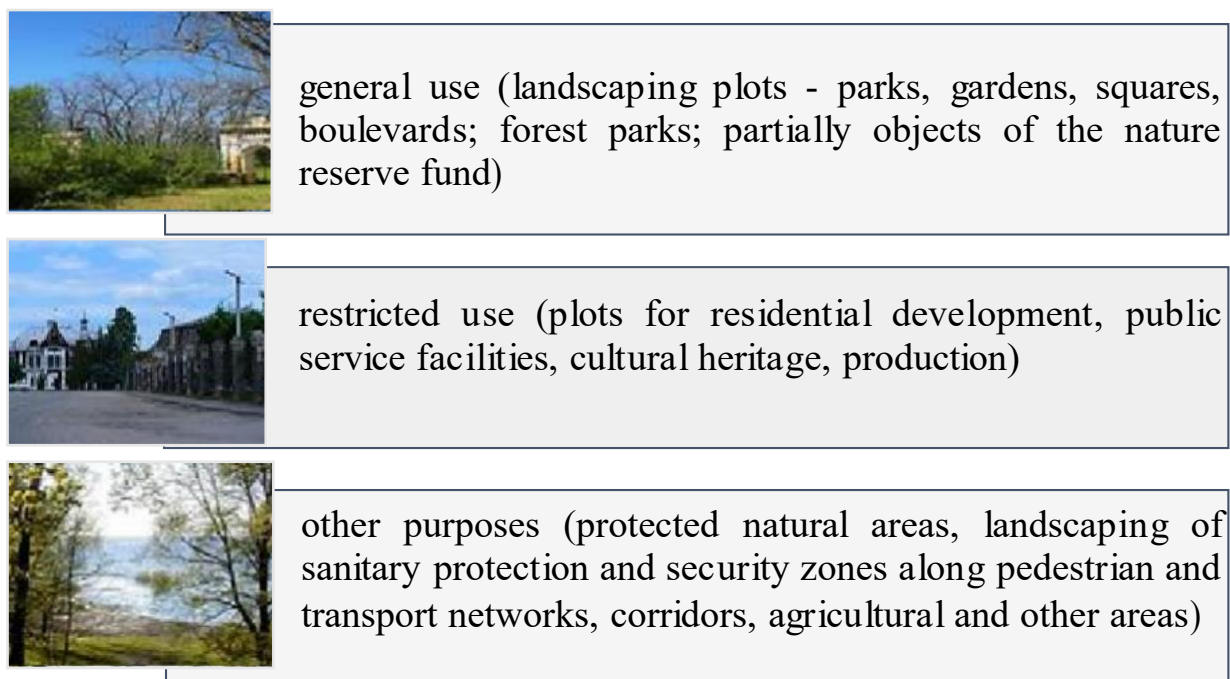


Fig. 2.23. Formation of a network of recreational areas

In cities with a population of 100,000 or more people, existing urban forests should be transformed into urban forest parks according to master plans and be included in addition to public green spaces, based on a calculation of no more than $5\text{m}^2/\text{person}$ (Table 2.8)

Table 2.8. Standard indicators of landscape and recreational areas [12]

Landscape and recreational areas	Groups of cities by population, thousand people	Area of green areas, m^2/person			
		Zones I-II - mixed and broadleaf forests	Zone III - forest-steppe	Zone IV - steppe	Zone V - Carpathian Mountains; Zone VI - Crimean Mountains
Suburban and non-urban					
Recreational and health areas and green zone forests around settlements	From 500	300	250	250	350
	25-500	250	200	200	300
	50-250	200	160	160	200
	Up to 50	100	80	80	120

Scientific basis for sustainable development of urban land use

Within the settlement					
General use	From 250	10	11	12	15
	50-250	7	8	9	11
	Up to 50	8	9	10	12
	Rural settlements	12	13	14	17
Residential areas, neighbourhoods	From 10	6	6	7	8

In settlements, green areas should be identified that belong to the lands of recreational use and are part of a single network of landscape and recreational areas. Green areas should be established in accordance with the existing boundaries of land plots, natural boundaries and transport routes.

Green areas of public use in settlements include multifunctional and specialised parks, gardens, squares, boulevards, urban forest parks, green areas of embankments and beaches, botanical gardens and zoological parks, parks-monuments of landscape art and other natural and artificially created landscape objects.

The proportion of green areas for various purposes (green spaces for general use, limited and special purposes) within the territory of a settlement is determined in accordance with DSP 173 "State Sanitary Rules for Planning and Development of Settlements". In cities where CHP plants, boiler houses and enterprises of the first class of sanitary hazard are located, the level of greenery should be increased by at least 15 %.(Table 2.9)

Land use is known to be differentiated depending on the region and the main types of activities that have historically developed in a particular area. The main instrument of the state to ensure environmentally safe and economically efficient use of land should be land management, which, as an important component of land relations, is an effective mechanism for organising land as a natural basis and means of production and for regulating social relations regarding the ownership, use and disposal of land.

The implementation of measures envisaged by urban planning and land management documentation makes it possible to increase the efficiency of land use as the main means of production and as its territorial basis in

Scientific basis for sustainable development of urban land use

combination with the country's natural and economic potential, to optimise the inter-sectoral and inter-regional distribution of land, the territorial organisation of production, especially agricultural production, and to plan land protection measures in an optimal way.

Table 2.9. Specific indicators of the level of greenery [12]

Structural elements	Landscaping level, not less than %
1. Green areas for public use	
Multifunctional parks: urban	65
regional	60
gardens, squares	75
boulevards	60
urban forest parks	80
Specialised parks: children's	40
sports	15
memorial	30
zoological	40
botanical	55
exhibition	50
museums of architecture and life	60
attractions, architectural miniature parks	45
golf courses	75
2. Green areas of restricted use	
residential development areas	25
Land plots: preschool education institutions	45
other educational institutions	50
cultural and leisure facilities	40
sports, fitness and recreational facilities, sports grounds	30
healthcare facilities	55
resort and recreational facilities	60

Scientific basis for sustainable development of urban land use

Therefore, the preservation of recreational and environmental functions of the territories of settlements should be implemented mainly through the development of land management projects for the allocation of land plots with the appropriate designated purpose to determine the ecosystem functions of a particular land plot.

As a tool for preserving the recreational and environmental functions of the territories of settlements, land management provides:

- preserving the natural diversity of landscapes, protecting the environment, and maintaining ecological balance;
- creation of places for organised treatment and rehabilitation of people, mass recreation and tourism;
- creation of green areas, preservation and use of cultural heritage sites;
- conducting research and development work;
- establishing the boundaries of water protection zones and coastal protection strips, right-of-way and coastal strips of waterways;
- determination in kind (on the ground) of the boundaries of the territories of the nature reserve fund and other environmental protection, health (districts and zones of sanitary (mining) protection), recreational and historical and cultural (protection zones) purposes and restrictions on the use of land established by laws and regulations adopted in accordance with them, as well as informing landowners, land users, other individuals and legal entities about restrictions;
- establishing a regime for the use and protection of their territories.

[48]

Currently, for various reasons, such projects are hardly ever developed. The reason for this is the lack of budgetary funding for the balance holders, users of these lands, which are usually on the balance sheet of district communal enterprises for the maintenance of green spaces and are serviced by them.

The consequence is that there is no legal opportunity to influence the processes that take place in green areas. The absence of clearly defined boundaries of green areas allows local governments and state authorities to dispose of the boundaries of green areas in a haphazard manner and to

Scientific basis for sustainable development of urban land use

"include" or exclude certain areas from the city's green zone, which contains significant corruption risks. Various urban green space development programmes are only a desirable vector for the development of green space networks in cities and are mostly declarative. They do not solve many problems of preserving and protecting green areas from development, so these tasks can be implemented by land management tools.

The city of Kyiv has developed a methodology, methodology and practice of developing land management projects for the allocation of land plots for the maintenance of green spaces to municipal enterprises. For the purpose of arrangement, operation and maintenance of green spaces, the article analyses the peculiarities of developing such projects in the Holiivskyi district of Kyiv. In this district, the highest provision of public green spaces is 54.46m² per person (the average for the city is 20.91m² per person).

In accordance with the request of the municipal enterprise for the maintenance of green areas of the district, the Department of Land Resources provided the land plots with registration codes and characteristics, according to which the land plots are green areas on the boulevard along Lyatoshynskoho Street, which were delimited by carriageways (U-turns), resulting in the division of two land plots into two each in the land management project. It was agreed that cadastral numbers would be assigned to the four plots upon registration with the State Land Cadastre. The land management project has been developed taking into account the clarification of the configuration and area of the land plots. [43]

According to the certificate from the state statistical reporting on the availability of land and its distribution by land owners, land users, and land plots, the land plots intended for use, according to this documentation, are accounted for as land not granted for ownership or permanent use within settlements.

According to the Classification of types of land designation, the designated purpose of the projected land plots is for the construction and maintenance of recreational facilities, code E.07.01.

Land category - 500 - recreational land. The code of the land according to the Classification of types of land is group 014, subgroup 00. The form of

ownership is communal. [43]

According to the General Plan of the city, approved by the decision of the Kyiv City Council of 28.03.2002 №370/1804, the territory is classified as streets and roads by its functional purpose (Fig. 2.24)

The plots are not classified as green areas according to the "Programme for the Comprehensive Development of the Green Zone of Kyiv until 2010 and the Concept for the Formation of Green Areas in the Central Part of the City" approved by the decision of the Kyiv City Council dated 19.07.2005 No. 806/3381, which was extended by the decisions of the Kyiv City Council dated 27.11.2009 No. 714/2783, dated 07.07.2016 No. 572/572 and dated 20.12.2017 No. 714/3721 until 31.12.2017. The land plots are not classified as particularly valuable land in accordance with Article 150 of the Land Code of Ukraine. [15]

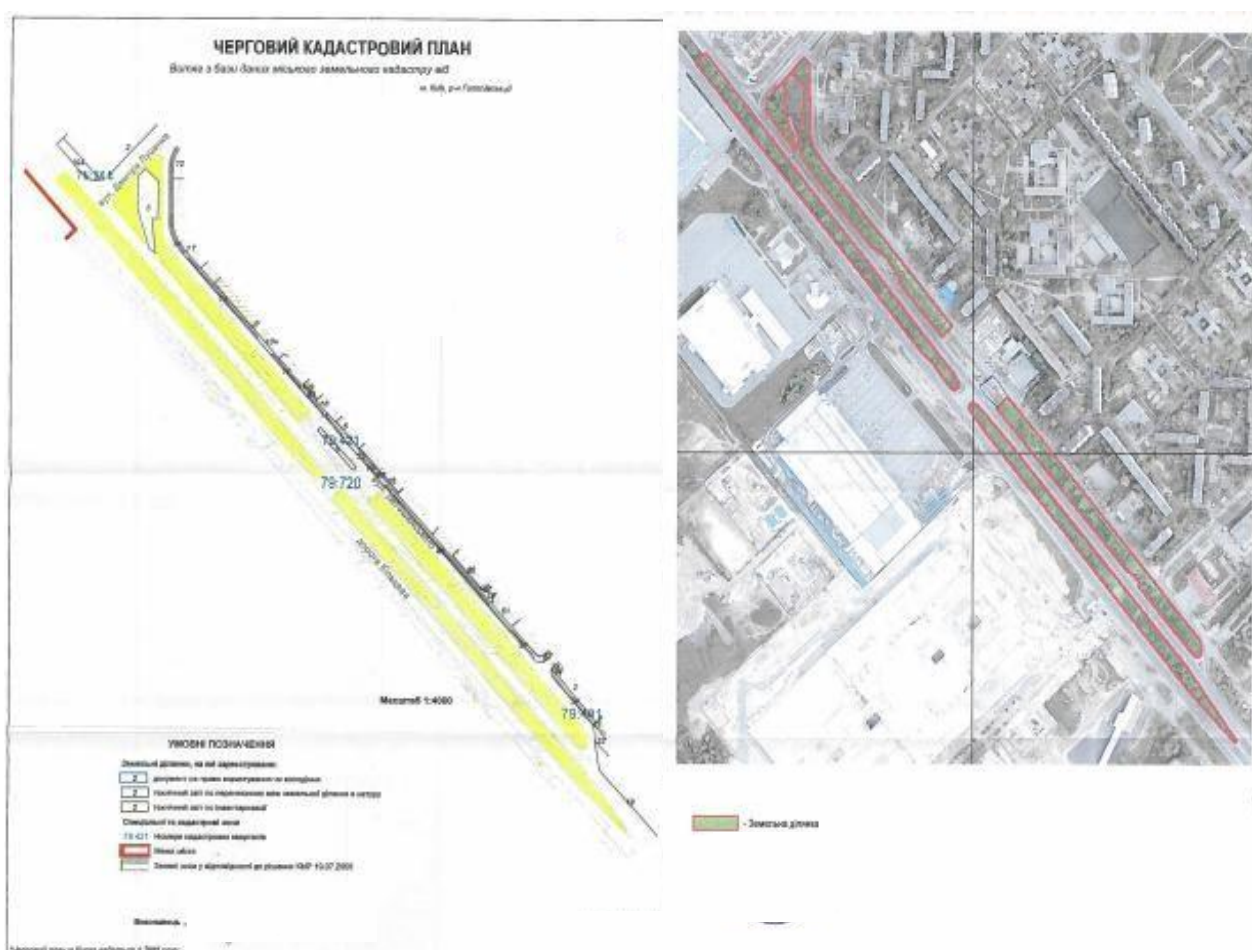


Fig. 2.24. Extract from the urban planning cadastre of Kyiv

The plots are entirely within the red lines of the streets, the coordinates

Scientific basis for sustainable development of urban land use

of which were obtained from the Department of Urban Development and Architecture.

According to the economic and planning zoning of Kyiv and the monetary valuation of the territory of Kyiv, approved by the decision of the Kyiv City Council of 03.07. 2014 №23/23 «On approval of technical documentation on normative monetary valuation of land in Kyiv and the procedure for its determination», [45] the land plots are included in 146, 163, 166, 164 and 165 economic planning zones, where the base value of 1 km² of land is respectively 645.27 UAH/m², 926.72UAH/m², 659.00UAH/m², 899.26UAH/m² and 933.59UAH/m² respectively. (Fig. 2.25)

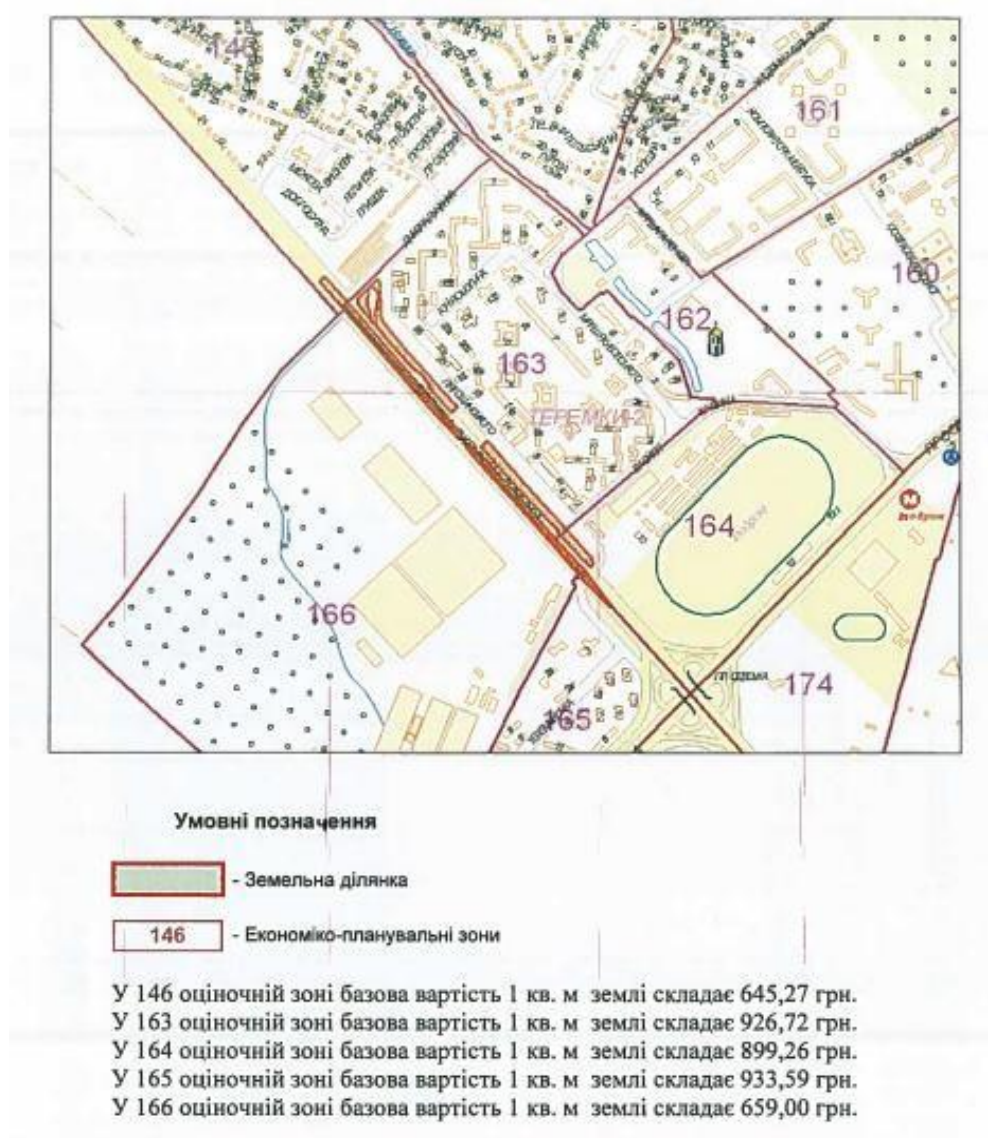


Fig. 2.25. Scheme of economic and planning zones

At the time of preparation of the land management project for the

Scientific basis for sustainable development of urban land use

allocation of land plots, a survey was carried out in kind (on the ground) and it was established:

- plots are free of buildings and structures, located along the ring road;
 - the land plots are landscaped areas on the boulevard along Lyatoshynskoho Street, which are delimited by carriageways (turning);
 - the relief of the site is «flat»;
 - the site is accessed from Lyatoshynskoho Street and Kiltseva Road.
- [39] (Fig. 2.26)

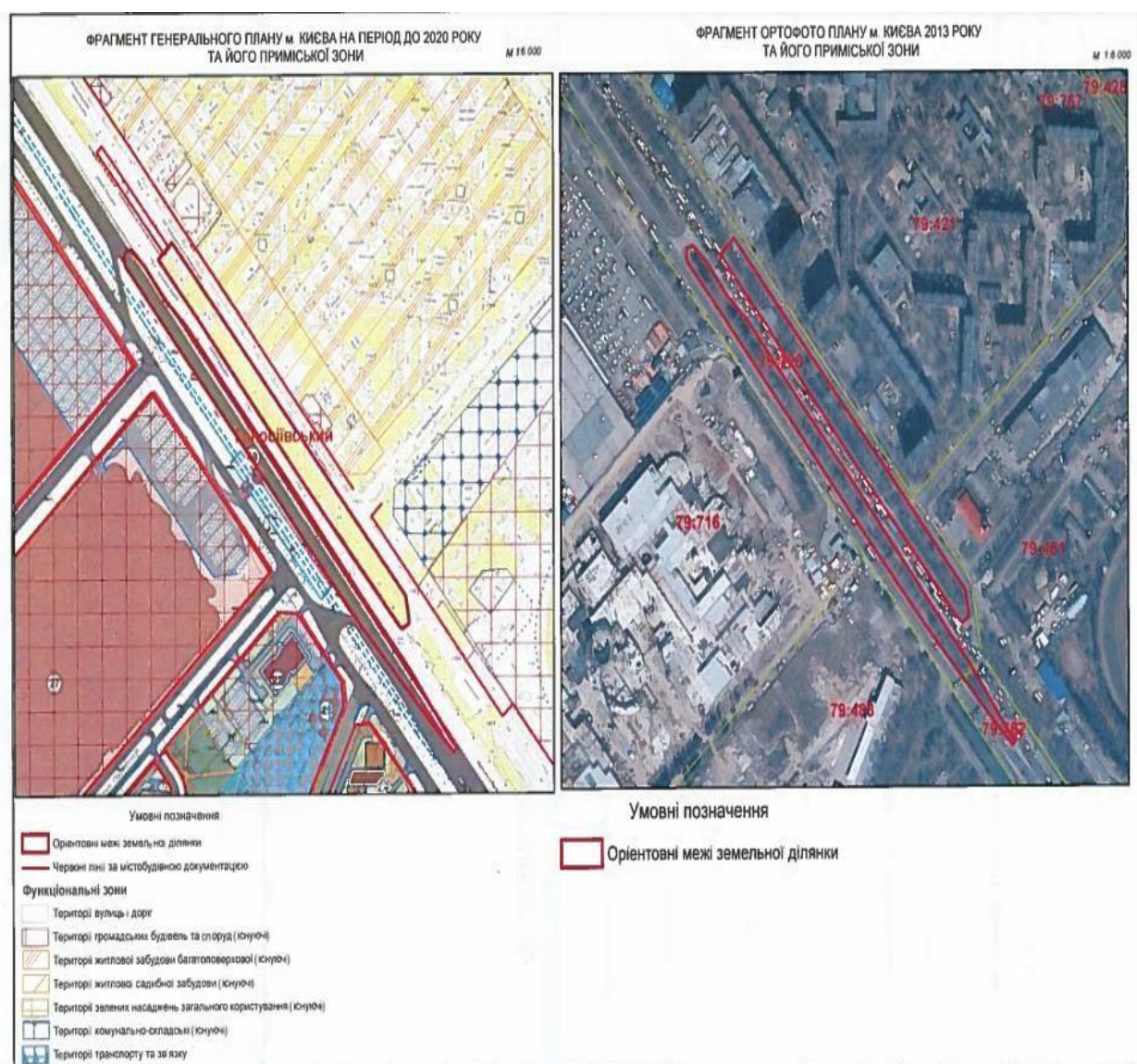


Fig. 2.26. Fragments of the General plan and orthophoto plan of Kyiv

To establish the boundaries and conduct cadastral survey of the land plots, the starting points of the planned geodetic base were created using GNSS observations using a Leica GS08 plus GPS receiver with a Leica CS 10 3.5G controller and a GSM modem. Before the works were carried out

directly at the site, a control measurement was made at the point of the geodetic network of densification in the local coordinate system of Kyiv. Kyiv, the coordinates and height of which were obtained from the State Enterprise "Research Institute of Geodesy and Cartography" (Fig. 2.27). [39]

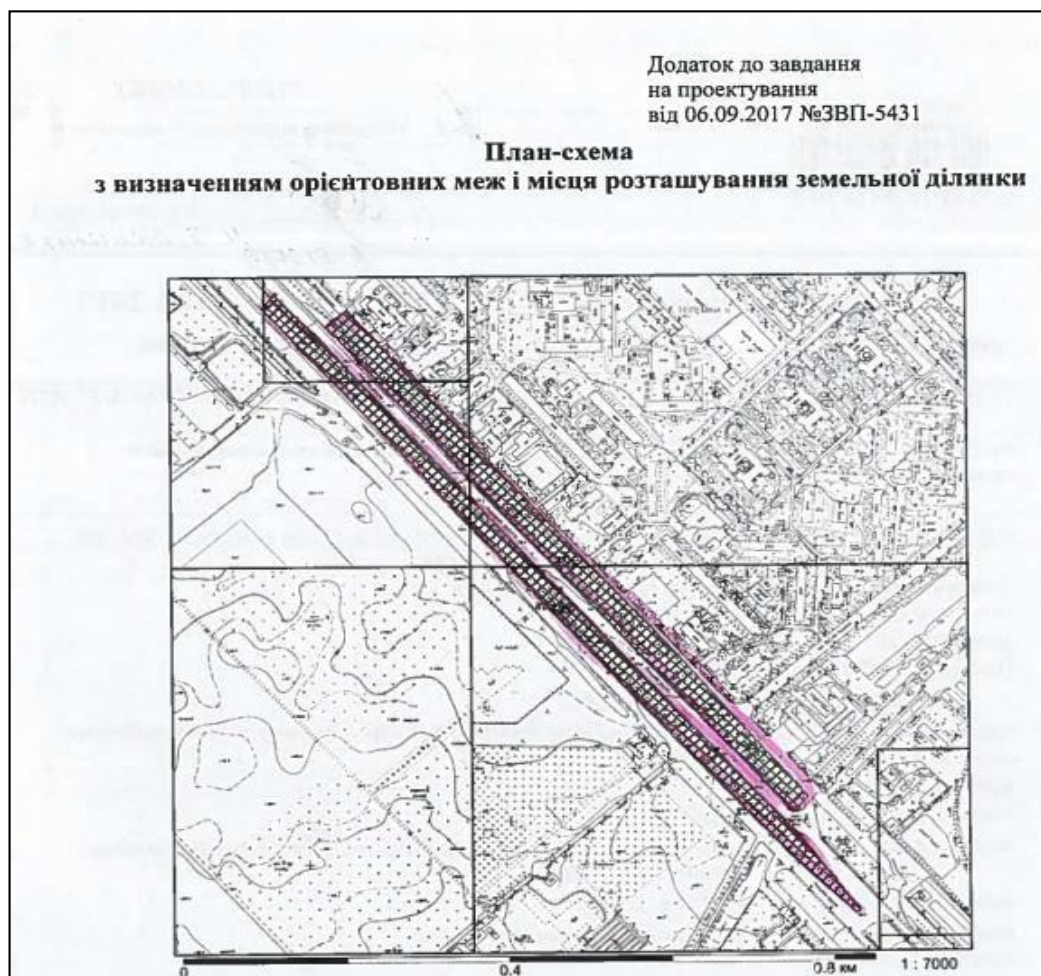


Fig. 2.27 Plan diagram of the land plot location.

Characteristics of land plots

The boundaries of the land plots were determined taking into account the situation on the ground, inventory materials and data from the State Land Cadastre.

Land plot №. 1 has 13 corners of rotation. The turning points of the land plot boundaries are fixed in kind (on the ground) with boundary markers of the established sample. The results of the boundary fixation were documented in the act of acceptance and transfer of boundary marks for storage, and a list of boundary marks was compiled for storage by a representative of the municipal enterprise for the maintenance of green spaces in the Holsiivskyi district of Kyiv. The area of the land plot is 1.4062 ha.

[39]

Description of the boundaries:

A to B - land not granted for ownership or permanent use within settlements;

From B to C - public land (Lyatoshynskoho Street);

From B to A - public land (Kiltseva road) [39] Fig. 2.28, 2.29)

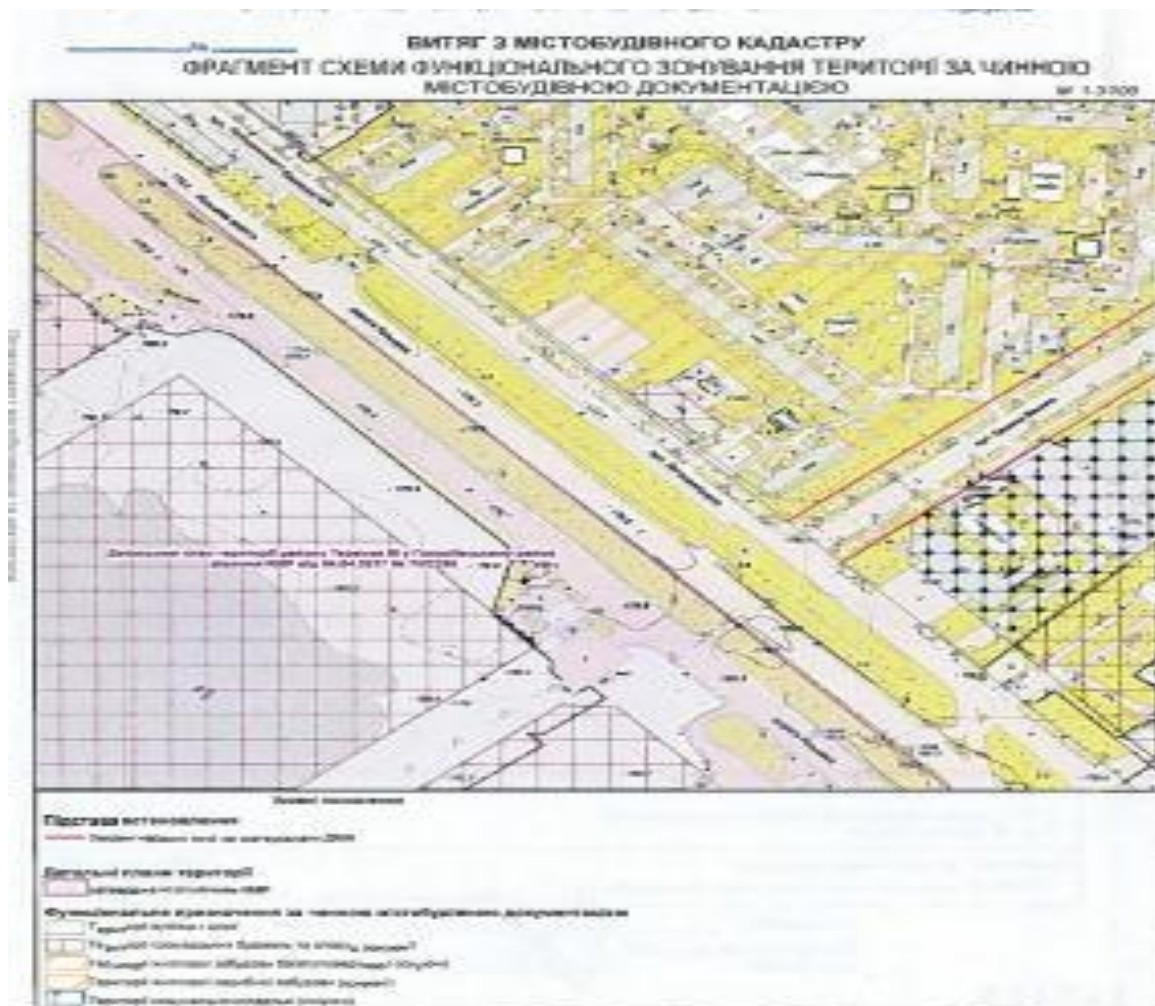


Fig. 2.28. Excerpt from the urban cadastre planning

In accordance with the Procedure for Maintaining the State Land Cadastre, approved by the Resolution of the Cabinet of Ministers of Ukraine of 17.10.2012 No. 1051, and taking into account the extract from the Urban Planning Cadastre of Kyiv and the topographic plan M 1:500, (Figs. 2.28, 2.29) restrictions on the use of the land plot are established: [39]

code 01.03 - security zone around (along) the transport facility:

medium pressure gas pipeline - 0.3942 hectares;

code 01.04 - security zone around (along) the communication facility:

Scientific basis for sustainable development of urban land use

telephone cable - an area of 0.0103 ha;
code 01.05 - security zone around (along) the power system facility:
electric underground cable - an area of 0.1286 ha;
code 01.08 - security zones around utility lines:
water supply - 0.0277 ha; pressure sewerage - 0.8028 ha and 0.2166
ha;
rainwater drainage - 0.0395 ha and 0.0015 ha; Sewerage
- 0.0156 ha and 0.0156 ha;
code 02.01 - sanitary protection zone for sources and facilities of
centralised drinking water supply:
water supply - an area of 0.0470 ha;
code 06.01 - zones of special development regime:
restricted use area from the airports - an area of 1.4062 ha;
within the red lines - an area of 1.4062 ha. [39]

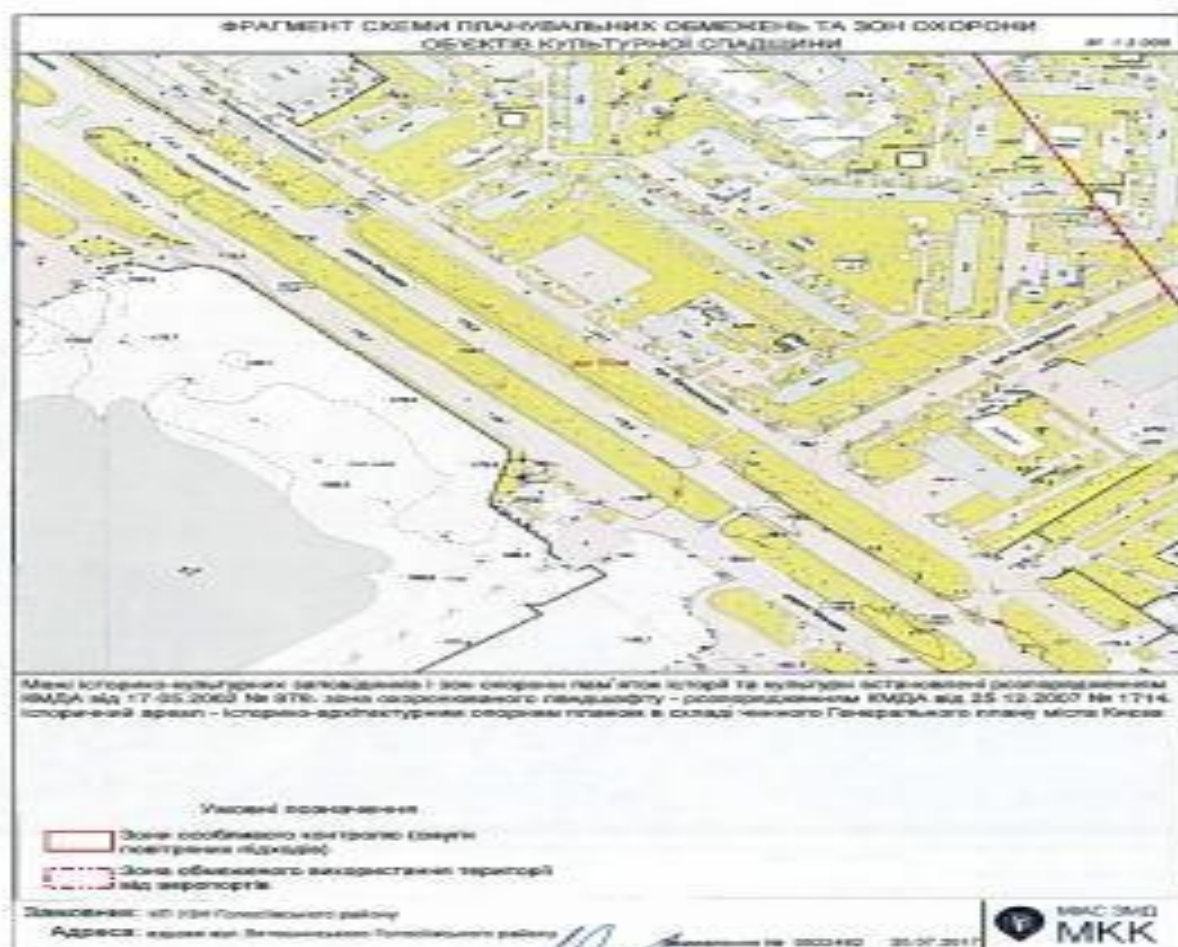


Fig. 2.29. Fragment of the scheme

Scientific basis for sustainable development of urban land use

Land plot № 2 has 15 corners of rotation. The turning points of the land plot boundaries are fixed in kind (on the ground) with boundary markers of the established sample. The results of the boundary fixation were documented in the act of acceptance and transfer of boundary marks for storage, and a list of boundary marks was compiled for storage by a representative of the municipal enterprise for the maintenance of green spaces in the Holosiivskyi district of Kyiv (Fig. 2.30). The area of the land plot is 1.4270 ha.

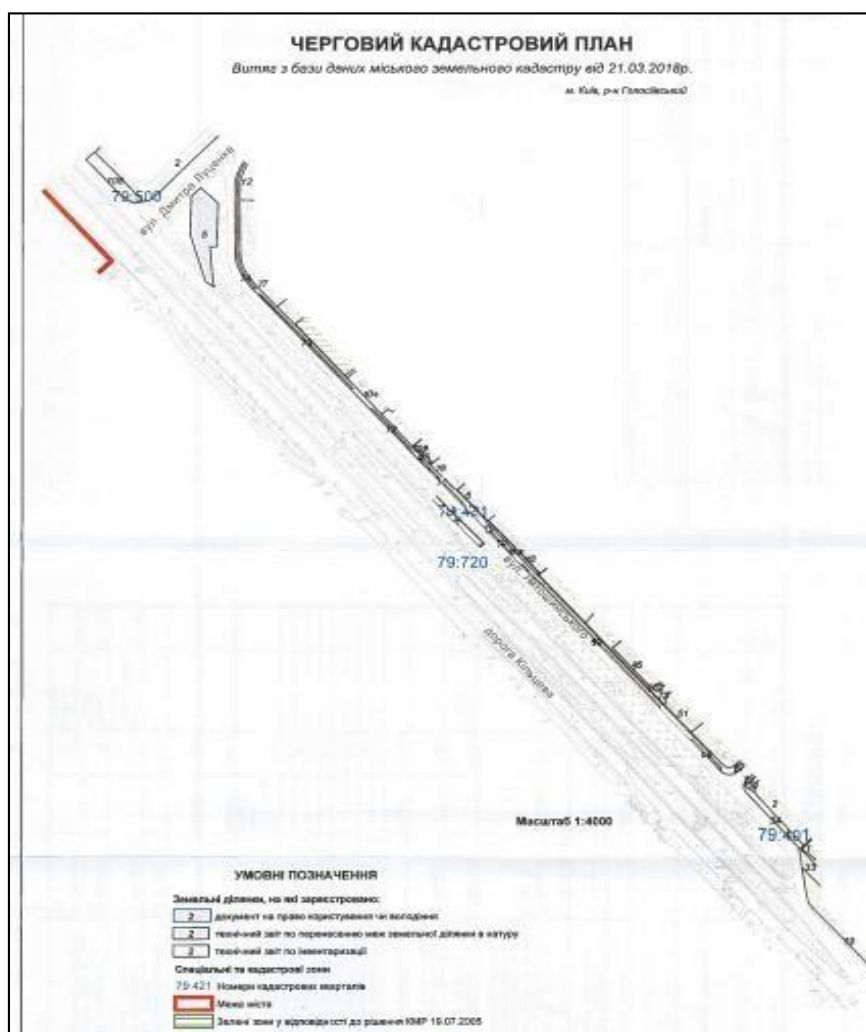


Fig. 2.30. Regular cadastral plan

Description of the boundaries:

Description of boundaries From A to B - public land (Kiltseva road)

From B to A - land not granted for ownership or permanent use within settlements in accordance with the Procedure for Maintaining the State Land Cadastre, approved by the Resolution of the Cabinet of Ministers of Ukraine No. 1051 dated 17.10.2012, and taking into account the extract from the Urban Planning Cadastre of Kyiv and the topographic plan M 1:500,

Scientific basis for sustainable development of urban land use

restrictions on the use of the land plot are established:

code 01.03 - security zones around (along) the transport facility:

High-pressure gas pipeline - 0.5570 ha; medium-pressure gas pipeline - 0.0087 ha and 0.0242 ha;

code 01.04 - security zones around (along) the communication facility:

long-distance cable - 0.7759 hectares;

telephone cable - areas of 0.0086 ha, 0.0091 ha and 0.0030 ha;

code 01.05 - security zone around (along) the power system facility:

electric underground cable - an area of 0.0043 ha;

code 01.08 - security zones around utility lines:

water supply - 0.0229 ha;

rainwater drainage - 0.0130 ha;

Sewerage - 0.0130 ha and 0.0130 ha;

code 02.01 - sanitary protection zone for sources and facilities of centralised drinking water supply:

water supply - an area of 0.5730 ha;

code 06.01 - zones of special development regime:

restricted use area from the airports - an area of 1,4270 ha;

within the red lines - an area of 1,4270 ha. [39]

Land plot № 3 has 18 corners of rotation. The turning points of the land plot boundaries are fixed in kind (on the ground) with boundary markers of the established sample. The results of the boundary fixation were documented in an act of acceptance and transfer of boundary marks for storage, and a list of boundary marks was compiled for storage by a representative of the municipal enterprise for the maintenance of green spaces in the Holiivskyi district of Kyiv. [39] The area of the land plot is 1.5972 ha.

Description of the boundaries:

A to B - land not granted for ownership or permanent use within settlements
B to C - public land (Kiltseva road)

C to D - land not granted for ownership or permanent use within settlements
D to A - public land (Kiltseva road)

In accordance with the Procedure for Maintaining the State Land

Scientific basis for sustainable development of urban land use

Cadastral, approved by Resolution of the Cabinet of Ministers of Ukraine No. 1051 dated 17.10.2012, and taking into account the extract from the Urban Planning Cadastre of Kyiv and the topographic plan M 1:500, restrictions on the use of the land plot are set:

code 01.03 - security zone around (along) the transport facility:
high-pressure gas pipeline - 0.7553 ha;

code 01.04 - security zones around (along) the communication facility:



Figure 2.31. Fragment of aerial photography

long-distance cable - 0.7119 ha;

telephone cable - 0.2540 ha;

code 01.05 - security zone around (along) the power system facility:

electric underground cable - an area of 0.0554 ha;

code 01.08 - security zone around utilities: дощова каналізація -
0.0136 hectares;

Scientific basis for sustainable development of urban land use

code 02.01 - sanitary protection zone for sources and facilities of centralised drinking water supply:

water supply - an area of 0.0452 ha;

code 06.01 - zones of special development regime:

restricted use area from the airports - an area of 1.5972 ha;

within the red lines - an area of 1.5972 ha. [39]

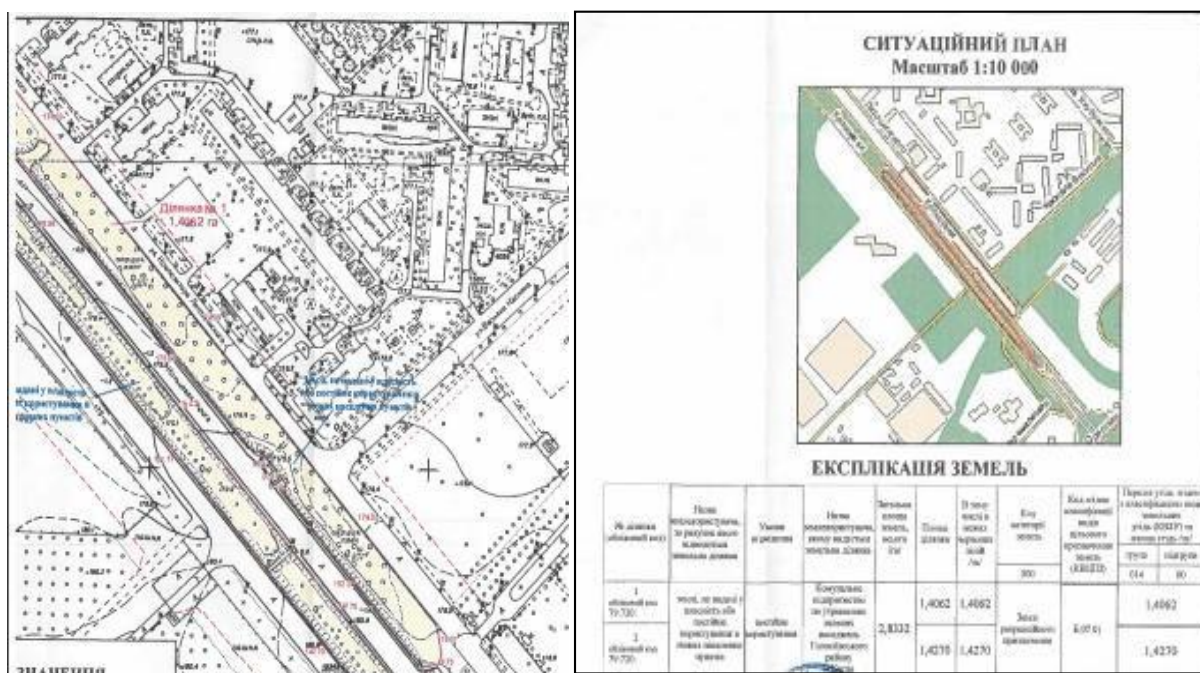


Fig. 2.32. Situation plan

Land plot № 4 has 26 corners of rotation. The turning points of the land plot boundaries are fixed in kind (on the ground) with boundary markers of the established sample. The results of the boundary fixation were documented in an act of acceptance and transfer of boundary marks for storage, and a list of boundary marks was compiled for storage by a representative of the municipal enterprise for the maintenance of green spaces in the Holsiivskyi district of Kyiv. [39]

The land plot area is 1.3914 ha.

Description of the boundaries:

From A to B - public land (Dmytro Lutsenko str.)

From B to C - public land (Lyatoshynskoho str.)

C to D - land not granted for ownership or permanent use within settlements D to E * Public land (Kiltseva road)

Scientific basis for sustainable development of urban land use

D to E - land not granted for ownership or permanent use within settlements

From E to A - public land (Kiltseva road)

In accordance with the Procedure for Maintaining the State Land Cadastre, approved by the Resolution of the Cabinet of Ministers of Ukraine № 1051 dated 17.10.2012, and taking into account the extract from the Urban Planning Cadastre of Kyiv and the topographic plan M 1:500, restrictions on the use of the land plot are established:

code 01.05 - security zone around (along) the power system facility:

electric underground cable - an area of 0.0848 ha;

code 01.08 - security zones around utility lines:

water supply - 0.0069 ha, 0.0049 ha, 0.0252 ha and 0.0246 ha;

storm water drainage - 0.0343 ha, 0.0201 ha, 0.0147 ha and 0.0155 ha;

pressure sewerage - 0.0104 ha, 0.0587 ha, 0.0999 ha, 0.0848 ha and 3810 ha;

code 02.01 - sanitary protection zone for sources and facilities of centralised drinking water supply:

water supply - 0.1562 ha, 0.1123 ha, 0.0518 ha;

code 06.01 - zones of special regime of land and development:

restricted use area from the airports - an area of 1,3914 ha;

within the red lines - an area of 1.3914 ha. [39] (Fig. 2.33)

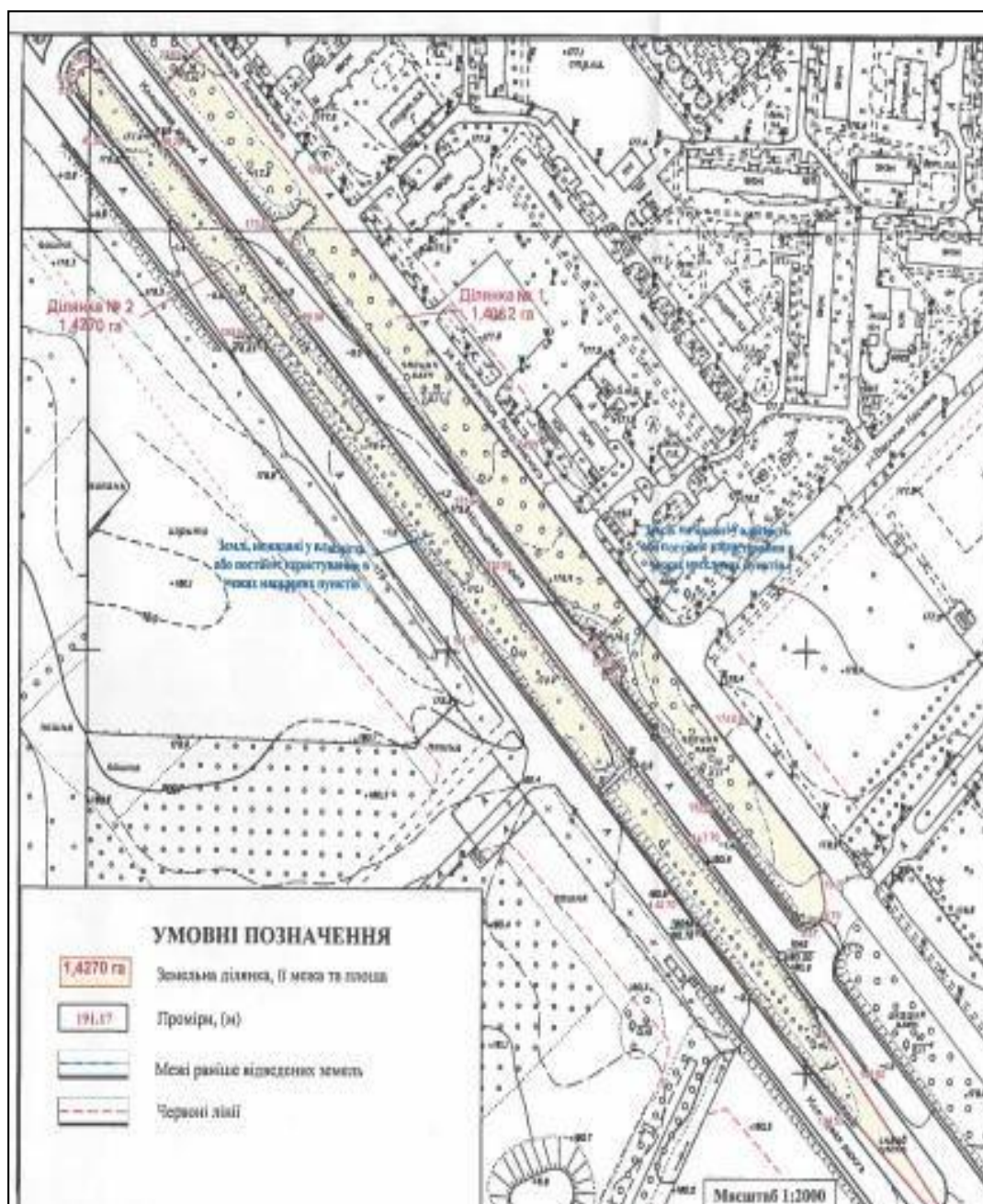


Fig. 2.33. Copying restrictions on the use of a land plot

In accordance with Articles 92 and 123 of the Land Code of Ukraine, it is envisaged to provide the municipal enterprise for the maintenance of green spaces of Holiivskyi district of Kyiv with land plots within the red lines for the arrangement, operation and maintenance of green spaces (public garden) on the boulevard along Lyatoshynskoho Street in Holiivskyi district of Kyiv for permanent use at the expense of land not provided for ownership or permanent use within settlements with a total area of 5.8218 ha, including (Table 3.6) :

Table 3.6. Explication of land

№ of the plot (accounting code)	Name of the land use for which the land plot is allocated	Conditions of allotment	Name of the land user to whom the land plot will be allocated	Total land area, in total /ha/	Area of the plot	Including within the red lines /ha/	Land category code	Code according to the classification of types of land use	List of land according to the classification of land types and land area /ha/	
									group	subgroup
							500		014	00
1	land not granted for ownership or permanent use within settlements	permanent use	Municipal enterprise for the maintenance of green spaces in Holiivskyi district of Kyiv	5,8218	1,4062	1,4062	Recreational land	E07.01	1,4062	
2					1,4270	1,4270			1,4270	
3					1,5972	1,5972			1,5972	
4					1,3914	1,3914			1,3914	

plot №1 - with an area of 1.4062 ha;

plot №2 - with an area of 1,4270 ha;

plot №3 - with an area of 1,5972 ha;

plot №4 - with an area of 1,3914 ha.

A breakdown of the land and land holdings is shown in Table 3.6

The municipal enterprise for the maintenance of green spaces in Holiivskyi district of Kyiv is obliged to:

to implement a range of measures to protect land as stipulated by the Land Code of Ukraine;

ensure the use of land in accordance with its intended purpose and the terms of its transfer (Article 96 of the Land Code of Ukraine);

resolve property and legal issues in accordance with the procedure established by law;

use land plots within the red lines in accordance with the terms of urban planning legislation.

The legislative, regulatory, legal and technical framework for the work is as follows:

1. Land Code of Ukraine.
2. The Law of Ukraine «On Land Management ».
3. Law of Ukraine «On the State Land Cadastre»;
4. The Resolution of the Cabinet of Ministers of Ukraine «On Approval of the Procedure for Maintaining the State Land Cadastre» of 17.10.2012 №1051.
5. Instructions for topographic surveying to scale 1:5000, 1:2000, 1:1000, 1:500. KNTA-2.04-02-98 Kyiv 1999.
6. Instruction on establishing (restoring) the boundaries of land plots in kind (on the ground) and their fixing with boundary marks (as amended), approved by Order of the State Committee of Ukraine for Land Resources of 18.05.2010 №376 and registered by the Ministry of Justice of Ukraine on 16.06.2010 under №391/17686.
7. Symbols for topographic plans at scales 1:5000, 1:2000, 1:1000, 1:500, Kyiv 2001.
8. Instruction on the procedure for control and acceptance of topographic, geodetic and cartographic works. State Committee for Geodesy, Cartography and Cadastre of Ukraine, Kyiv, 2000p.
9. «Rules on safety at topo-geodetic works. Nedra, 1991»

The land management project for the allocation of a land plot developed in accordance with the requirements set forth in the legislation and in accordance with Article 186-1 of the Land Code of Ukraine is subject to approval by the territorial body of the central executive body responsible for implementing the state policy in the field of land relations, the structural unit of the Kyiv City State Administration in the field of urban planning and architecture and the structural unit of the Kyiv City State Administration in the field of environmental protection. [39]

Restrictions on the use of land plots

Restrictions on the use of land plots are governed by the provisions of the Land Code of Ukraine. The right to restricted use of a land plot encumbers (restricts) the ownership of land plots and allows the use of the land plot or a part thereof to the extent provided for by law or agreement.

Rights to a land plot may be restricted by law or contract:

- prohibiting the sale or other disposal to certain persons or permitting

disposal to certain persons for a specified period of time;

- the right of pre-emption in the event of its sale;

• a condition to start and complete the construction or development of a land plot within the established timeframe and in the manner prescribed by the project;

• a ban on changing the designated purpose of a land plot, the appearance of real estate, reconstruction or demolition of buildings, structures, and buildings without approval in accordance with the established procedure;

• a condition for the construction, repair or maintenance of a road or road section;

- a ban on certain types of activity;

• a condition of compliance with environmental requirements or performance of certain works, including the protection of soil cover, fauna, rare plants, natural, historical and cultural monuments, archaeological sites located on the land plot;

• a condition to grant the right to hunt, fish, and collect wild plants on their land plot at the established time and in the established manner. [39]

Restrictions on the use of a land plot are subject to state registration. The boundaries of land plot restrictions are determined by land management projects.

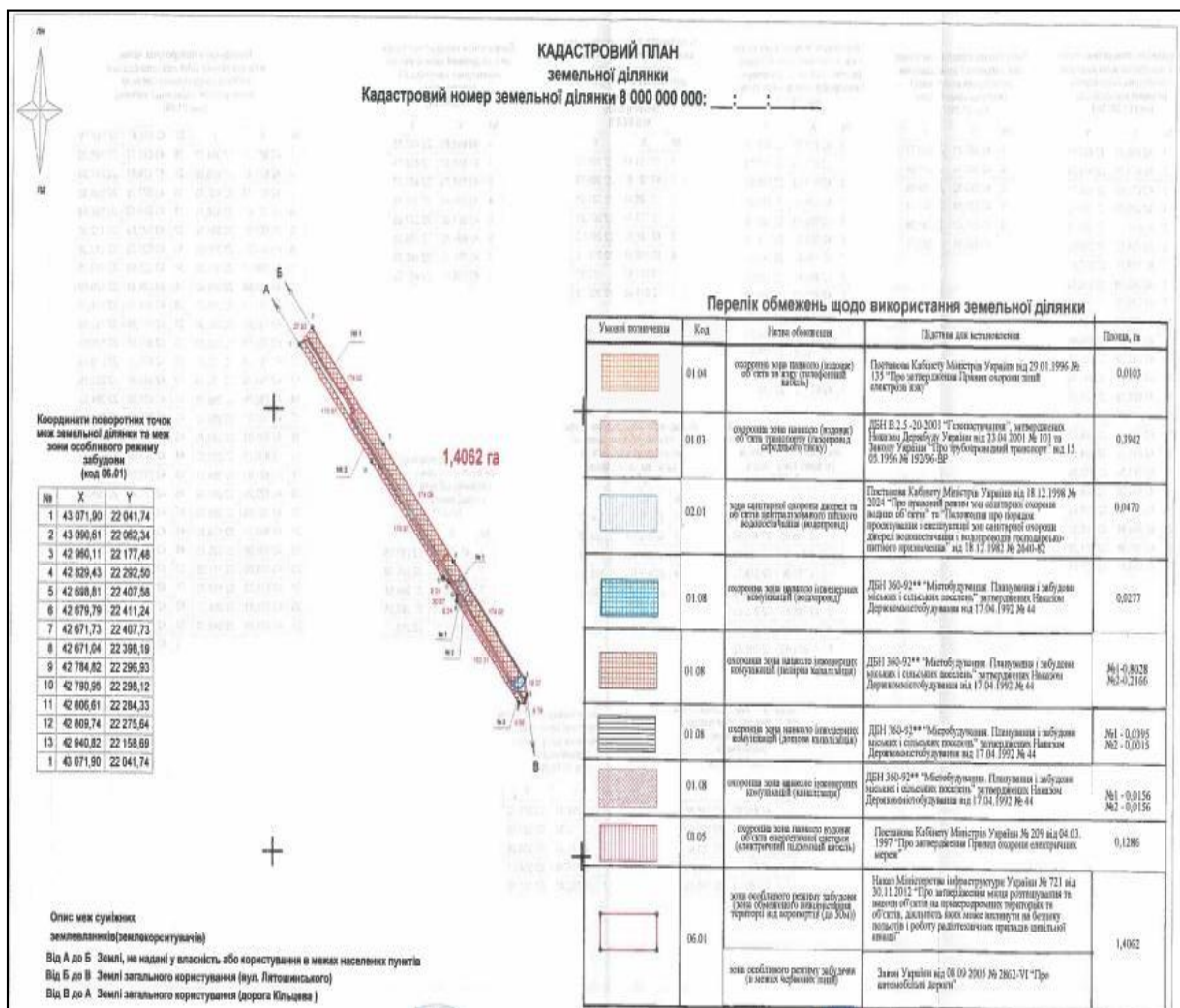


Fig. 2.34. Cadastral plan of a land plot with restrictions on use [39]

Land plot № 1. When preparing the land management project for the land plot, it was established that the land plot of 1.4062 hectares, located on the boulevard along Lyatoshynskoho Street in Holiivskyi district of Kyiv for the arrangement, operation and maintenance of green spaces (park), is bounded by:

- (code 01.03)* - security zone around (along) the transport facility: medium pressure gas pipeline - 0.3942 ha;
- (code 01.04)* - security zone around (along) the communication facility: telephone cable with an area of 0.0103 ha;
- (code 01.05)* - protection zone around (along) the energy system: electric underground cable - 0.1286 ha;
- (code 01.08)* - protection zone around (along) engineering

Scientific basis for sustainable development of urban land use

communications: water supply - 0.0277 ha; pressure sewerage - 0.8028 ha and 0.2166 ha; storm sewerage - 0.0395 ha and 0.0015 ha; sewerage - 0.0156 ha and 0.0156 ha;

– (code 02.01)* - sanitary protection zone for sources and facilities of centralised drinking water supply: water supply - 0.0470 ha;

– (code 06.01)* - zones of special development regime: restricted use zone from airports - 1.4062 hectares; within the red lines - 1.4062 hectares. Dimensions and location around (along) a transport facility (code 01.03)*, security zone around (along) a communication facility (code 01.04)*, security zone around (along) an energy system (code 01.05)*, security zone around (along) engineering communications (code 01.08)*, zone of sanitary protection of sources and facilities of centralised drinking water supply: water supply (code 02.01)*, zones of special development regime (code 06.01)*, shown on the cadastral plan and land plot plan with definition of restriction zones. [39]

Land plot № 2. When preparing the land management project for the land plot, it was established that the land plot of 1.4270 hectares, located on the boulevard along Lyatoshynskoho Street in Holsiivskyi district of Kyiv for the arrangement, operation and maintenance of green spaces (park), is bounded by:

– (code 01.03)* - security zone around (along) the transport facility: high-pressure gas pipeline - 0.5570 ha; medium-pressure gas pipeline - 0.0087 ha and 0.0242 ha;

– (code 01.04)* - security zone around (along) the communication facility: telephone cable with the areas of 0.0086 ha and 0.0091 ha, 0.0030 ha; long-distance cable with the area of 0.7759 ha.

– (code 01.05)* - protection zone around (along) the energy system: electric underground cable - 0.0043 ha;

– (code 01.08)* - protection zone around (along) engineering communications: water supply - 0.0229 ha; storm sewerage - 0.0130 ha; sewerage - 0.0130 ha and 0.0130 ha

– (code 02.01)* - sanitary protection zone for sources and facilities of centralised drinking water supply: water supply - 0.5730 ha;

– (code 06.01)* - zones of special development regime: restricted use

zone from airports - 1.4270 ha; within the red lines - 1.4270 ha. [39]

Dimensions and location around (along) the transport facility (code 01.03)*, security zone around (along) the communication facility (code 01.04)*, security zone around (along) the energy system (code 01.05)*, security zone around (along) the utility lines (code 01.08)*, zone of sanitary protection of sources and objects of centralised drinking water supply: water supply (code 02.01)*, zones of special development regime (code 06.01)*, shown on the cadastral plan and land plot plan with definition of restriction zones attached (Annex A).

Land plot № 3. When preparing the land management project for the land plot, it was established that the land plot of 1.5972 hectares, located on the boulevard along Lyatoshynskoho Street in Holsiivskyi district of Kyiv for the arrangement, operation and maintenance of green spaces (park), is bounded by:

- (code 01.03)* - security zone around (along) the transport facility: high-pressure gas pipeline - 0.7553 ha;
- (code 01.04)* - security zone around (along) the communication facility: telephone cable - 0.2540 ha; long-distance cable - 0.7119 ha.
- (code 01.05)* - protection zone around (along) the energy system: electric underground cable - 0.0554 ha;
- (code 01.08)* - protection zone around (along) utility lines: stormwater drainage - 0.0136 ha;
- (code 02.01)* - sanitary protection zone for sources and facilities of centralised drinking water supply: water supply - 0.0452 ha
- (code 06.01)* - zones of special development regime: restricted use area from airports - 1.5972 ha; within red lines - 1.5972 ha.

Dimensions and location around (along) the transport facility (code 01.03)*, security zone around (along) the communication facility (code 01.04)*, security zone around (along) the energy system (code 01.05)*, security zone around (along) the utility lines (code 01.08)*, zone of sanitary protection of sources and objects of centralised drinking water supply: water supply (code 02.01)*, zones of special development regime (code 06.01)* shown on the cadastral plan and land plot plan with definition of restriction zones.

Land plot № 4. When preparing the land management project for the land plot, it was established that the land plot of 1.3914 hectares, located on the boulevard along Lyatoshynskoho Street in Holsiivskyi district of Kyiv for the arrangement, operation and maintenance of green spaces (park), is bounded by:

– (code 01.05)* - protection zone around (along) the energy system: electric underground cable - 0.0848 ha;

– (code 01.08)* - protection zone around (along) utility lines: water supply - 0.069 ha, 0.049 ha, 0.0252 ha and 0.0246 ha; stormwater drainage - 0.0343 ha, 0.0201 ha, 0.0147 ha, 0.0155 ha;

– (code 02.01)* - sanitary protection zone for sources and facilities of centralised drinking water supply: water supply - 0.1562 ha, 0.1123 ha, 0.0518 ha;

– (code 06.01)* - zones of special development regime: restricted use of the territory from airports - an area of 1.3914 ha;

– within the red lines - an area of 1,3914 ha.

The size and location of the protection zones around (along) the energy system (code 01.05)*, the protection zone around (along) engineering communications (code 01.08)*, the zone of sanitary protection of sources and objects of centralised drinking water supply: water supply (code 02.01)*, zones of special development regime (code 06.01)* are shown on the cadastral plan and the plan of the land plot with the definition of the restriction zones attached. [39]

CHAPTER 3.
MAIN DIRECTIONS OF DEVELOPMENT OF THE SYSTEM OF
SUSTAINABLE URBAN LAND USE

3.1 Forecasting a sustainable land use system

The laws and principles of the territorial organisation of the country's productive forces can be realised only if the factors influencing the development and location of various sectors of the national economy are taken into account and analysed. Assessment of the factors of location is the main content of the science of territorial organisation of production, since only when they are studied can the effectiveness of this location be justified. [33]

Socio-economic factors play an extremely important role in the location of any production. They are designed to ensure rational employment of the population, environmental protection, development of education and healthcare, housing and communal services, and the improvement of working conditions and living standards. With the development of productive forces, the role of socio-economic factors is constantly increasing. The environmental factor plays a decisive role in the location of productive forces and the development of regional economies.

One of the types of socio-economic programmes is land use and protection programmes, which are divided into national, regional and local levels. The national programme has the following main objectives:

- substantiation of the land needs of each sector of the national economy in accordance with the forecasts of their development and location in the future;
- identification of land that can be used to increase agricultural production or to locate non-agricultural facilities without compromising the sustainability of the soil and biological ecosystem;
- determining the areas of land that need to be protected from adverse processes and factors;
- determination of the amount of capital investments required to improve the use and protection of land, the priority and economic efficiency

of the planned measures. National programmes of land use and protection are developed in accordance with the programmes of economic, scientific, technical and social development of Ukraine and approved by the Verkhovna Rada of Ukraine. [33]

The legal basis for the development of these national programmes is the Constitution of Ukraine, Chapter 30 «Land Use Planning» of the Land Code of Ukraine, the Laws of Ukraine «On State Target Programmes», «On State Forecasting and Development of Programmes for Economic and Social Development of Ukraine», Article 6 of the Law of Ukraine «On Environmental Protection» and Resolution of the Cabinet of Ministers of Ukraine №106 of 31 January 2007 «On the Procedure for Development and Implementation of State Target Programmes».

The Law of Ukraine of 07.02.2002 approved the General Scheme of Planning of the Territory of Ukraine. The national programme for land use and protection has not yet been approved, although the Cabinet of Ministers of Ukraine approved the Concept for the development of this programme for the period up to 2032 on 19 January 2022.

In accordance with the Law of Ukraine "On State Forecasting and Development of Programmes for Economic and Social Development of Ukraine", the system of forecasting and programme documents for economic and social development includes forecasts for the development of the Autonomous Republic of Crimea, oblasts, districts and cities for the medium term, as well as programmes for the economic and social development of the same administrative-territorial units for the short term.

According to the Land Code (Article 178), such programmes are also being developed for the cities of Kyiv and Sevastopol. The Land Code does not provide for development of regional programmes of land use and protection for other cities. The Cabinet of Ministers of Ukraine did not approve the Procedure for development of national and regional programmes of land use and protection, as provided for in Article 44 of the Law of Ukraine "On Land Management". Due to the lack of a proper regulatory and technical framework for the development of regional and local land use and protection programmes, the programmes developed have different focuses. Only the Kyiv Regional Council has approved a programme for land use and

Scientific basis for sustainable development of urban land use

protection. Some oblast councils have approved programmes for the development of land relations and land protection (Dnipropetrovs'k, Volyn, Luhansk, and Odesa oblasts). Most regions (Volyn, Poltava, Lviv, Rivne, etc.) have developed programmes for the development of land relations.

In today's environment, measures to forecast planning, organise rational use and protection of land at the national, regional, local and economic levels are relevant and form a new type of work in the field of land management. These are the issues addressed in the Programmes for monitoring, land protection, rational organisation of the territory, improvement of land fertility, protection and elimination of the consequences of active involvement of land resources in the production process, as well as implementation of measures to reduce the effects of land erosion and improve soil reclamation measures, etc. (Table 3.1)

Table 3.1. Regional Programmes for Forecasting, Planning, Organisation of Rational Land Use and Protection

Region	Name of the Programme
1	2
Vinnytsia	Regional Programme for Environmental Protection and Natural Resources for 2013-2018. Decision of Vinnytsia Regional Council of 18.12.2012 No. 418
	Regional Programme of the Vinnytsia Oblast Environmental Network for 2014-2015 Decision of Vinnytsia Regional Council of 22.10.2003 No. 429
Volyn	Regional Environmental Programme «Ecology 2011-2015 and Forecast to 2020» Decision of the Volyn Regional Council of 28.12.2010 No. 2/42
Dnipropetrovs'k	Environmental Protection Programme for Dnipropetrovska oblast for 2005-2015. Decision of the Dnipro Regional Council of 24.12.2004 No. 495-24/IV.
	Programme for improving the environmental situation in Dnipropetrovska oblast by reducing environmental pollution by major polluting enterprises for 2007-2015. Resolution of the Regional Council of 04.12.2007 No. 295-13

Scientific basis for sustainable development of urban land use

1	2
Zhytomyr	Regional Comprehensive Programme for Environmental Protection in Zhytomyr Oblast for 2014-2017. Decision of the Regional Council of 20.11.2014 № 1329
Zakarpattia	Regional Programme for the Development of Land Relations in Zakarpattia Oblast for 2018-2020. Approved by the decision of the Regional Council
Kyiv	Programme «Conservation and rational reproduction of soil fertility of eroded arable land in Kyiv region for 2017-2021». Decision of the Regional Council session of 19.05.2016 № 281-14-VII
	Regional comprehensive programme for the development of the forest (municipal) fund of the Kyiv region for the period up to 2022. Decision of the Regional Council session of 19.05.2017 № 282-14-VII
Kirovohrad	Programme of Land Relations in Kirovohrad Oblast for 2016-2020 (in terms of using the regional budget funds received as compensation for losses of agricultural and forestry production). Decision of the Regional Council session of 16.06.2016 № 129 (as amended)
Kyiv city	Programme for the use and protection of land in the city of Kyiv for 2016-2020. Decision of the Kyiv City Council of 14.07.2016 №729/729
	On approval of the City Target Programme for the Use and Protection of Land in Kyiv for 2019-2021. Decision of the Kyiv City Council of 4 December 2018 № 229/6280
	On approval of the City Target Programme for the Use and Protection of Land in Kyiv for 2022-2025. Decision of the Kyiv City Council of 7 October 2021 № 2727/2768

Scientific basis for sustainable development of urban land use

1	2
Chernivtsi	Comprehensive programme for the development of land relations in Chernivtsi region for 2017-2021. Decision of the Regional Council of 04.07.2017 № 101-14/17
Chernihiv	Sustainable Development Strategy of Chernihiv Oblast for the period up to 2020. Order of the Head of the Regional State Administration of 14.05.2015 No. 216, decision of the Regional Council of 28.05.2015
	Programme of Land Use and Protection in Chernihiv Oblast for 2011-2020. Resolution of the Regional Council of 25.03.2011

These programmes differ in terms of implementation (from 2 to 8 years), structure, validity of proposals, and identification of funding sources. There are dozens of programmes and strategies of national, regional and local importance that directly or indirectly relate to sustainable land use development. As a result of a permanent lack of funds, or the "freezing" of the implementation of state targeted programmes, their effectiveness is very low. As a result, the goals set out in these target programmes are mostly not achieved. Thus, there is an urgent need to identify specific key problems in achieving sustainable development of cities (territories) with the development of specific measures and determination of appropriate resources to address them. In addition, there is a lack of coordination between national, regional and local concepts, strategies and programmes focused on sustainable development.

Taking into account the requirements of regulatory legal acts and the General Scheme of Planning of the Territory of Ukraine, the land use system for the medium term should be formed in the following main areas [24]:

- significant increase in the areas of environmental, recreational, health, historical and cultural designation;

- improvement of residential and public buildings with increased efficiency of land use in settlements, reduction of production areas and

Scientific basis for sustainable development of urban land use

transfer of vacated areas for other uses;

creation of a national network of international transport corridors, construction and reconstruction of existing main and regional transport communications and transport bypasses of cities with a population of more than 500,000 people

regulation of urban development with reconstruction and modernisation of the economic base of territories with intensive, mainly industrial, urban residential and public buildings (urbanisation zone), and territories (zones) of radiation contamination with their environmental rehabilitation;

modernisation of existing and construction of new generating capacities, development of unconventional energy;

expanding the area of the national ecological network.

Most city councils have not developed or approved programmes for land use and protection. The only exception to this practice is the Kyiv City Council, which in recent years has approved five relevant programmes for five-year periods. These programmes were based on the principles of state forecasting and were developed in accordance with the Concepts of Strategic Development of the capital of Ukraine for the relevant periods. [33]

The strategic directions of use and protection of the city's land are focused on a significant increase in the role of land in the formation of the city budget and ensuring the comprehensive development of land relations that would fully contribute to meeting the socio-economic needs of the population and forming a high-quality environmental environment of the city.

The Land Reform Programme for 2001-2005, approved by the Kyiv City Council on 8 November 2001, was based on the principles of inviolability of private land ownership, inclusion of land in market circulation, ensuring social justice in land redistribution, combining high economic efficiency and environmental safety of land use, the possibility of land transactions and introduction of land use fees.

The development of land relations was supposed to be ensured through the formation of a rational city boundary, registration of rights to land under the jurisdiction of the city council outside the capital of Ukraine, as well as within the city limits, determination of the boundaries of adjoining territories, functional zoning of the territory and land and economic structure of

Scientific basis for sustainable development of urban land use

administrative districts, and improvement of the land use structure. Considerable attention is paid to the development of land circulation, land cadastre, and land protection. The amount of expenditures for the Programme's activities (UAH 84.8 million), as well as the sources of funds received as a result of the Programme's implementation (UAH 646.2 million) were calculated..).

The mechanisms and stages of implementation of the Programme include proposals for improving the management system in the field of land use and protection, regulatory, scientific, topographic and geodetic, land management, land cadastre, urban planning and financial support. The cost of the measures envisaged by the Programme for 2006-2010 amounted to UAH 366 million, and the amount of revenues from land fees and sale of land plots was UAH 6285 million. [24]

The purpose of the Programme for the use and protection of land in Kyiv for 2011-2015, approved by the Kyiv City Council on 17 February 2011, is to ensure efficient use of land resources and increase annual revenues to the city budget from land use from UAH 2.3 billion in 2010 to UAH 3.4 billion in 2015 [41]

The article analyses the main issues of land use, outlines the ways and identifies measures to solve the problems of urban land use. The main directions of ensuring sustainable social, ecological and economic use of land resources are proposed, taking into account the conceptual provisions of the master plan of the city under development and optimisation of the land and economic structure of the territory. Measures to organise the implementation of the Programme include land management, improvement of the land management system, organisation of land cadastral works, urban planning, research, topographic and geodetic works, regulatory, financial and personnel support.

The measures and tasks of the Programme include 21 titles (those to be financed from the budget) and their cost is UAH 202.4 million. Projected revenues from the Programme are estimated at UAH 15,323 million.

The Kyiv City Land Use and Protection Programme for 2016-2020, approved by the Kyiv City Council on 14 July 2016, aims to:

- establishing city boundaries;

Scientific basis for sustainable development of urban land use

- formation and registration of rights to land plots of communal property of the city's territorial community;
- identify ways to improve management in the area of land use and protection, increase the role of local government in regulating land relations;
- organising the completion of land titling by all land users;
- optimisation of the city's land and economic structure;
- simplifying the procedure for registering land rights;
- improving the efficiency of urban land use and increasing revenues to the city budget from land fees, land sales and land lease rights;
- improving the environmental and economic efficiency of urban land use.

To implement the 19 tasks of the Programme, it is necessary to attract UAH 129.8 million from the Kyiv city budget, and the budget revenues as a result of its implementation will amount to UAH 16.2 billion.

As the experience of the capital of Ukraine shows, the implementation of municipal land use and protection programmes has fully justified its purpose. A set of works is being carried out in all key areas of land relations reform. The value of land resources is growing and conditions are being created for a significant increase in social, economic, investment and production potential.

Comparison of the content of regional programmes for the development of land

relations, land use and protection in the Dnipro, Donetsk and Kyiv regions and four programmes for land use and protection in Kyiv (for 2001-2005; 2006-2010; 2011-2015; 2016-2020, 2022-2027) shows that in the absence of an approved procedure for the development of such programmes in the country, the structure of the programmes is incomparable, overloaded with secondary provisions, lacks consistency in the presentation of material, and contains a significant number of tables that are not directly related to the development and assessment of land use systems in regions and cities.

It is also unjustified for programmes of regions and cities to borrow the composition, content, development and approval procedures approved for state target programmes. This applies, in particular, to the passport of the state target programme, the form of which is approved but changed by local executive authorities and local self-government bodies. In some regions,

these bodies have also approved their own procedures for developing programmes.

The City Target Programme for the Use and Protection of Land in Kyiv for 2022-2025 was approved by the Kyiv City Council on 7 October 2021. The financial resources required from the city budget amount to UAH 1.32 billion. However, its goal remains to increase the role of land resources and ensure the comprehensive development of land relations that would help meet the social and economic needs of the population and create a quality living space. It has a number of features. In particular, an information model will be created as a tool for accounting for land plots and other real estate, fiscal purposes, monitoring land plantations or building number of storeys.

Determining the value of the city's land resource requires establishing the boundaries of the categories, restrictions and regimes of the regime-forming objects of specially protected land. An inventory of land will be completed, and the boundaries of all existing municipal property plots will be determined. Kyiv is to become the first city in Ukraine to have "no white spots" in the State Land Cadastre. As an integral part of the automated information system for accounting and management of land resources, the city land cadastre requires additional resources for its functioning.

The problems of establishing the boundaries of the city of Kyiv and its districts remain unresolved. With the approval of the territories of the territorial communities surrounding Kyiv, the establishment (change) of the boundaries of the capital of Ukraine has become more complicated. The efficiency of the use of industrial and landscape recreational areas remains low.

The primary land market needs to be revitalised, and a new urban geodetic network, including regular digital aerial photography, needs to be further developed. The control system in the field of land relations needs to be significantly improved.

The main provisions, definition of the problems of the direction, justification of ways and means of solution, list of tasks, measures and performance indicators of the city target programme are given in the appendix.

3.2 Basic principles of territory formation and problems of establishing city boundaries

Based on the established trends and patterns that have developed in the conditions of modern land use and protection, the system of sustainable land use development should be built with them in mind and be based on the following basic principles:

The principle of purpose. It should provide for a continuous increase in the efficiency of land use through the application of economic and environmental intensification of production.

Legal principle. It should include regulatory and legal support for land use so that each landowner and land user has clearly defined rights and obligations that would enable them to ensure high efficiency and environmental friendliness of land use. In the case of private land ownership, each landowner should be clearly informed of his or her obligations regarding the intended use of the land plot, as well as restrictions on his or her rights.

The principle of utilitarianism. It means that the right of private ownership of land to land allows a landowner to organise the use of a land plot on market conditions in order to maximise material benefits from the use of land.

The principle of responsibility. According to this principle, land users assume full responsibility for the rational and efficient use of land, its preservation and protection from degradation, and for the fact that the land should be used only for its intended purpose, without violating environmental requirements.

The principle of optimality. According to this principle, a land user should use a land plot in such a way that it does not lose its quality characteristics due to negligent exploitation.

The principle of realism. It means that the land user should use the land plot based on its potential material and technical capabilities and market demands.

The principle of unity of purpose of the state and land users. According to this principle, the state and land users should be guided by the same desire

to ensure that the land plot yields maximum productivity, so that the landowner is interested in using it in a highly productive and economical manner.

The principle of social orientation. It means that efficient and environmentally friendly use of land plots should contribute to the improvement of working and living conditions of people and their reproduction.

The principle of rational land management. It involves the organisation of the territory, development and implementation of the elements of a scientifically based project for the use of a land plot, based on its potential capabilities, market demands, and achievements of scientific and technological progress. Land management should be carried out on the basis of unified state requirements so that the land user can ensure environmentally safe and highly efficient use of the land plot and protect it from degradation.

The principle of scientific justification of land use. It means that all activities carried out on the land plot in the course of production should be scientifically justified at the level of modern achievements of scientific and technological progress. For this purpose, in addition to land management design, special training of land users, consulting assistance of specialised institutions and firms should be widely used.

The principle of environmental friendliness of scientific and technological progress aimed at applying it to land use. Unfortunately, scientific and technological progress cannot always ensure a new and more efficient result without environmental damage. Therefore, it is necessary that scientific and technological developments provide for their environmentally safe use and at the same time contribute to the increase in efficiency.

The principle of state control. Applies to the system of land use, greening of production, land protection and provides for the improvement and democratisation of control over land use, its logistical support, clear definition of the functions of state bodies and commodity producers in organising environmentally safe and efficient production and bodies exercising control over greening of production.

The principle of unity of indicators. It refers to the environmental and economic assessment of land use sustainability, which involves the

simultaneous use of indicators of the economic and environmental state of the economy, economic assessment of costs associated with the greening of land use, environmental protection, economic assessment in the system of commodity-money relations (prices, taxes, lending), etc.

The principle of environmental friendliness of land use management stipulates that all requirements of landowners and the state to land users should be environmentally sound, safe in land use, and contribute to environmental protection and improvement of its condition.

To ensure sustainable development, the main directions of urban policy should include the following measures:

- coherence of social, economic, urban planning and environmental aspects of the development of the city and surrounding areas;
- rational use of land, water, recreational and other natural resources, creating conditions for their restoration.
- proper regulation of the process of planning and development of the city through the development of a master plan, other urban planning documentation and local development rules, control over their implementation (taking into account state, public and private interests);
- creating a full-fledged living environment, balancing social and economic development of the city;
- improvement of the current legislation and development of new regulations on planning and development of the city, reform of social, housing, investment policy, land use, environmental protection, activities of executive authorities and local self-government bodies, citizens and legal entities in the field of sustainable development of the city.

Sustainable urban land use is a process of effective land management to form a rational functional zoning of the territory and an ecologically balanced environment in order to ensure ecological and economic balance in the development of the city (Fig. 3.1).

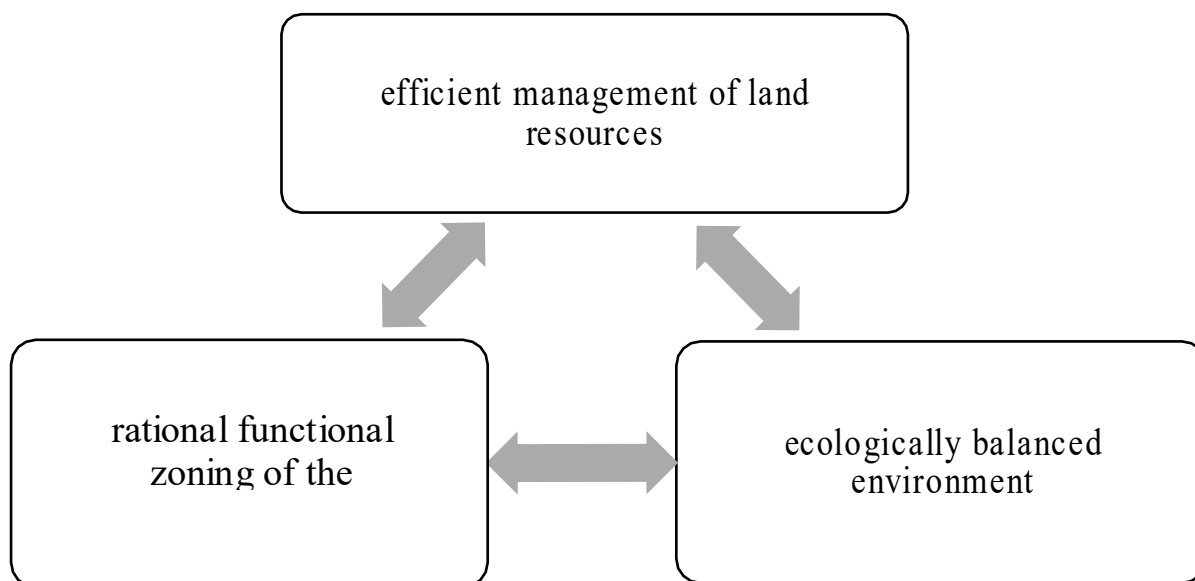


Fig. 3.1. Scheme of interrelations of semantic blocks of sustainable development of urban land use

The management of the city's territorial development processes can only be successful if the decisions taken on current land use issues are based on strategic, long-term development programmes, the offensive nature of planning ideas, and the consistency of land protection measures.

The sustainable spatial development of Kyiv is defined as a balanced functioning of the city, ensuring economic growth and the needs of the population while improving the ecological state of the urban environment as a whole, as well as the rational use of all resources, including land, technological re-equipment and restructuring of enterprises, improvement of the social, industrial, transport, and engineering infrastructure of the city, improvement of living conditions, recreation and health, preservation and enrichment of natural landscapes and cultural heritage.

The formation of an effective citywide unified land management system should be carried out by:

- improving the system of the citywide land management centre;
- formation of regional management centres; provision of management bodies with management tools (legal, economic, organisational).

In order to ensure real self-governance in the city that is consistent with the sustainable development strategy, it is necessary to introduce new

Scientific basis for sustainable development of urban land use

effective methods in the management activities of the city authorities, their work with the population, enterprises and organisations. This will require the city authorities to strengthen communication with each of its residents, competence, management and marketing skills. An active international dialogue with financial, technological and environmental donors will help to finalise the city's sustainable development strategy and implementation plans.

In order to transform land resources into the main resource of sustainable socio-economic development of a city's territorial community in a market economy, certain measures should be taken. (Fig. 3.2.)

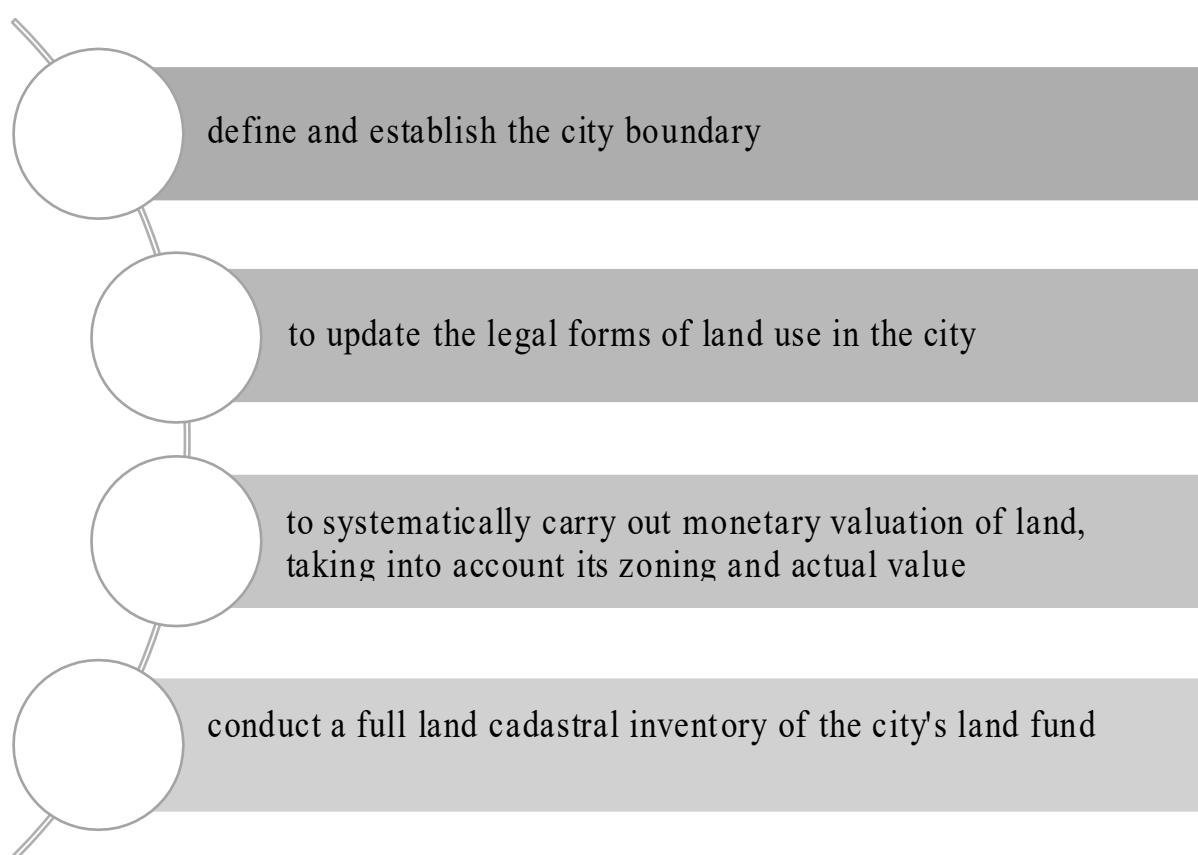


Fig. 3.2. Measures to transform land resources into the main resource for sustainable socio-economic development of the city's territorial community

Establishing city boundaries

It has taken almost 30 years to complete the formation and registration of the boundaries of the capital of Ukraine. The absence of the boundaries of the city of Kyiv and the boundaries of the city's administrative districts registered in the State Land Cadastre is one of the key problems for the Kyiv City Council and the executive body of the Kyiv City Council (Kyiv City

State Administration) in exercising their powers to regulate land use and land protection. In this regard, since 1994, the Kyiv City Council has been working on the development of a project to establish the city's boundaries and its approval. The absence of approved boundaries of the city of Kyiv leads to a violation of the rights of the territorial community of Kyiv. [42]

The current state of territorial development of the capital of Ukraine was formed in 1957-1988. According to the Decree of the Presidium of the Supreme Soviet of the Ukrainian SSR of 21 June 1957, the territory of the city of Kyiv was increased by 7133 hectares. In particular, the city limits included the villages of Pirogovo and Chapaivka, the village of Dnipro Shipping Company (Zhukivka Island), Feofaniya, the area of summer cottages in the Koncha Zaspas tract, and part of the forests (green zone) of Khotiv and Trypillia forestries. Later, the Presidium of the Verkhovna Rada included the urban-type settlement of Bilychi (02.02.1966), the village of Mykilska Borshchahivka together with a land plot of 450 hectares (30.08.1971), the villages of Zhulyany and Troyeshchyna, the urban-type settlement of Bortnychi together with adjacent lands with a total area of 3440 hectares (26.08.1988) (Fig. 3.3).

Since 26 August 1988, the boundaries of Kyiv have not changed. According to the state land cadastre, the city's territory currently covers 83558 ha.

For the first time in the post-war years, according to the decision of the Executive Committee of the Kyiv City Council of 9 June 1959, No. 899, in 1959-1964, the city boundary was established in kind (on the ground) and fixed by 1982 boundary markers. The description of the city boundary and the map of adjacent land users (appendix to the description of the city boundary) are kept in the State Archives of Kyiv. By the decision of the Kyiv City Executive Committee of 30 September 1976 No. 1103, the city boundaries and their description were approved on the ground.

The correctness of the graphic boundaries of the Kyiv region and the city of Kyiv on the 1:100,000 scale topographic map was confirmed by the Kyiv Regional Executive Committee (21.12.81) and the Kyiv City Executive Committee (25.03.1985). The work carried out later to establish the city's

Scientific basis for sustainable development of urban land use

boundaries was not properly coordinated, and the changes to the boundaries were not approved.

Due to the need to implement the problems of the city's territorial development in accordance with the general plan approved in May 1986, the Kyiv City Council appealed to the President of Ukraine in 1994 to reserve the territories adjacent to the city and include them in the city limits.








in 1957 increased by 7133 ha		The territory included the villages of Pyrohiv and Chapayivka in the Kyiv-Svyatoshyn district, the village of Dnipro Shipping Company (Zhukivka Island) and Feofaniya, as well as a zone of summer cottages in the Koncha Zaspа tract, part of the forests (green zone) of the Khotiv and Trypillia forestries
1959-1964		first established in kind (on the ground) and fixed with boundary markers
1971		the village of Mykilska Borshchahivka, Kyiv-Svyatoshynskyi district, was included in the city of Kyiv, together with a land area of 450 hectares
1988		included the villages of Zhulyany in Kyiv-Svyatoshynskyi district, Troyeshchyna in Brovarskyi district and Bortnychi in Boryspil district together with the adjacent land - 3440 ha
1989		Osokorki urban-type settlement was included
1989-1990		work was carried out to establish the boundaries of the city of Kyiv in kind (on the ground) and to fix them with boundary markers of the established standard (Ukrainian State Institute of Engineering and Geodetic Surveys and Surveys «UkrDIIGis»)
from 1989 to the present day		the boundaries of the city of Kyiv were not officially changed

Figure 3.3: Formation of the Kyiv city boundary [41]

In 1995-1999, the State Land Cadastre Centre of the State Committee for Land Resources of Ukraine developed a new project for the boundary of Kyiv. This project was mainly agreed with the neighbouring village, town and city councils of Vyshgorod, Boryspil and Kyiv-Svyatoshyn districts of the Kyiv region. The city's boundary with Brovary district can be considered practically agreed upon. As for the boundary with Obukhiv district, it has not yet been agreed.

When developing a land management project to change the boundaries of Kyiv on 04.09.2019, the working group of the Kyiv Institute of Land Relations found official materials on the establishment in kind (on the ground) and fixing with boundary marks of the established sample of the boundaries of Kyiv by the Ukrainian State Institute of Engineering and Geodetic Surveys and Surveys «UkrDIIGis» in 1989-1990 (Fig. 3.4) [41]

To date, the draft land management plan for establishing (changing) the boundaries of Kyiv has not been approved by some village and settlement councils of Kyiv region, whose territories are directly adjacent to the boundaries of Kyiv. [42]

By the decision of the Kyiv City Council of 12 December 2019 No. 445/8018 "On Approval of the Land Management Project for Establishing (Changing) the Boundaries of the City of Kyiv", the project for land management for establishing (changing) the boundaries of the city of Kyiv with a total area of 85351.0849 hectares, developed by the municipal enterprise Kyiv Institute of Land Relations, was approved. It is necessary to resolve the disputes caused by the adoption of the Resolution of the Cabinet of Ministers of Ukraine No. 715-r dated 12 June 2020 "On Determination of Administrative Centres and Approval of Territories of Territorial Communities of Kyiv Region", which approved the territories of territorial communities of Kyiv region, including those bordering the territory of Kyiv, without taking into account the city boundaries defined by the land management project for establishing (changing) the boundaries of Kyiv. The works on establishing the boundaries of the city of Kyiv, envisaged by the measures of the Kyiv City Development Strategy until 2025, should be carried out during the Programme period and require the involvement of

budget funds of the city of Kyiv;

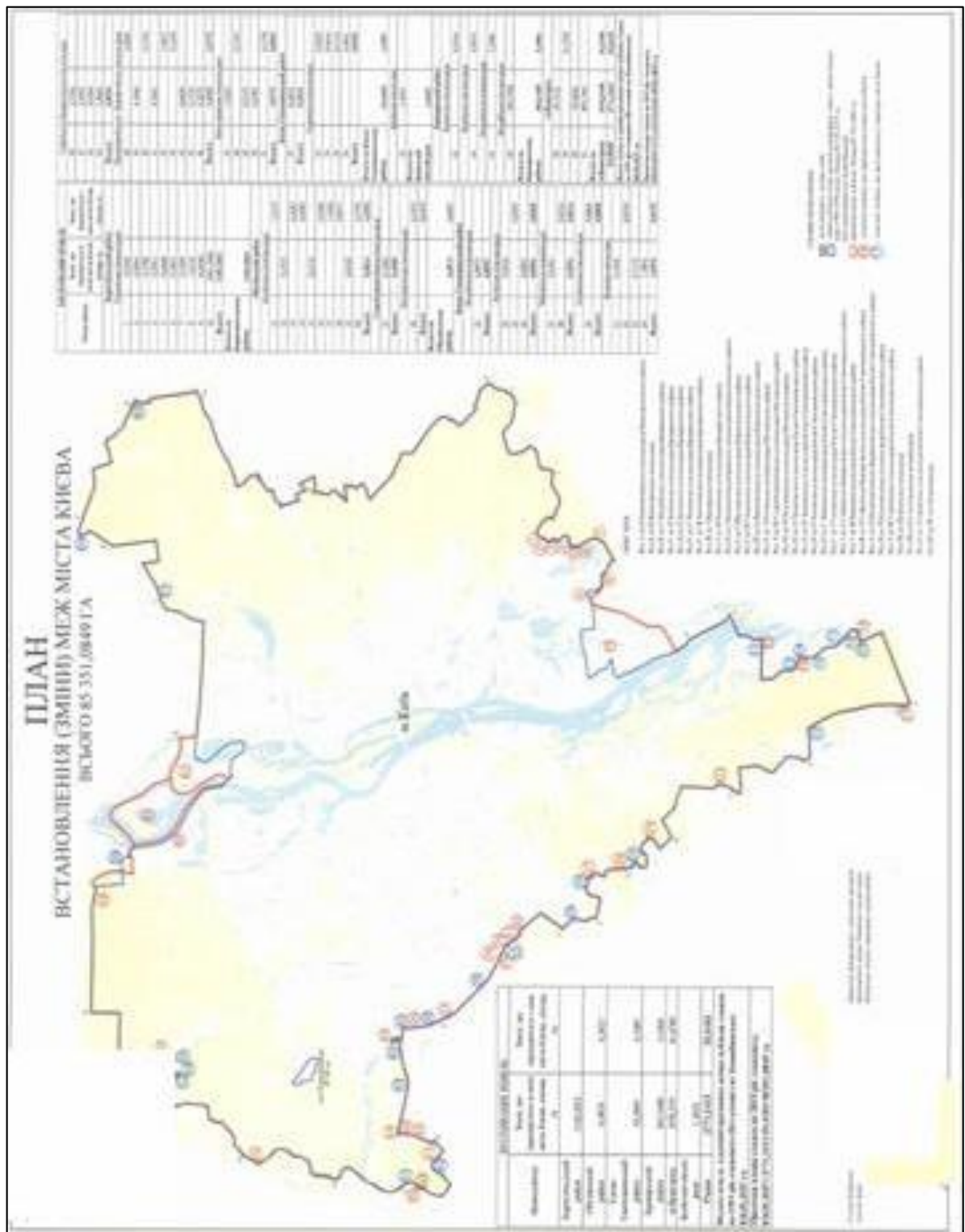


Fig. 3.4. Plan for establishing (changing) the boundaries of the city of Kyiv [47]

Establishing the boundaries of administrative districts in Kyiv will enable state administrations in Kyiv to ensure the proper exercise of their powers. [47]

It is an undeniable fact that in order to improve the planning structure, rationally route engineering and transport infrastructure, and to build a comprehensive array of affordable housing and social housing, communal land free from restrictions and encumbrances is needed. Therefore, according to the master plans of the city of Kyiv and the suburban zone planning projects approved in 1986 and 2002, the Southern Osokorky district was designated for integrated development. This area in the suburban zone is adjacent to the corridor of the southern main gas pipeline and, according to the approved Detailed Plan, the territory of the Osokorky massif is also planned for future development. In addition, in the future, to improve the water supply conditions in the settlements of the northern part of the suburban zone and the left-bank planning zones of Kyiv, it is necessary to create a backup water intake on Velykyi Island. It is also planned to take measures to preserve urban forests in the Sviatoshynskyi district of Kyiv, improve the maintenance of the Kotsiubynske settlement and create an innovation park, which currently have no planning links with the engineering and transport infrastructure and street and road network of Kyiv. [6]

The outer boundary in the draft of the new Kyiv City Master Plan is given in accordance with the Plan for establishing (changing) the boundaries of the city of Kyiv, as set out in the annex to the decision of the Kyiv City Council of 12.12.2019 № 445/8018 «On approval of the land management project for establishing (changing) the boundaries of the city of Kyiv».

Based on the analysis of territorial resources and needs in the territories to ensure sustainable development of the city on the principle of compactness, the following measures to establish the boundary of Kyiv are envisaged by the land legislation:

– In order to meet the social needs and constitutional rights of the population of Kyiv to affordable and social housing, it is proposed to include the territory of 1102.2 hectares of Hnidyn village council in Boryspil district in the city of Kyiv (Fig. 3.5);



Fig. 3.5. Existing and projected boundaries of the city of Kyiv

УМОВНІ ПОЗНАЧЕННЯ:

- ▭ - межа м.Києва згідно каталога координат і висот знаків міської межі 1989-1990 років
- ▭ - проектна межа м.Києва 2019 року
- ▭ - межа міста згідно проекту землеустрою щодо встановлення та зміни межі міста Києва 2013 року
- ▭ - земельні ділянки, які сформовані відповідно до міського земельного кадастру м.Києва
- 1
0.2104 га - номер та площа земельної ділянки, що передається в межі міста Києва

Проектом передбачено включити в межі м.Києва частини земельних ділянок з кадастровими номерами згідно Державного земельного кадастру 8000000000:90:226:0010 (власність фізичної особи) та 8000000000:90:226:0017 (власність фізичної особи) та ділянку з обліковим номером згідно міського земельного кадастру 90:226:0012к, що забезпечує цілісність їх обслуговування та використання

– To ensure the creation of a reserve water intake and protection zone for the water supply source on Velykyi Island in the future, it is proposed to include 893.7 hectares of the territory (including the water area) of Vyshhorod City Council in the boundaries of Kyiv, or to provide it for permanent use, as well as 87.7 ha, taking into account the existing planning formation of garden and summer cottage development (Fig. 3.6);

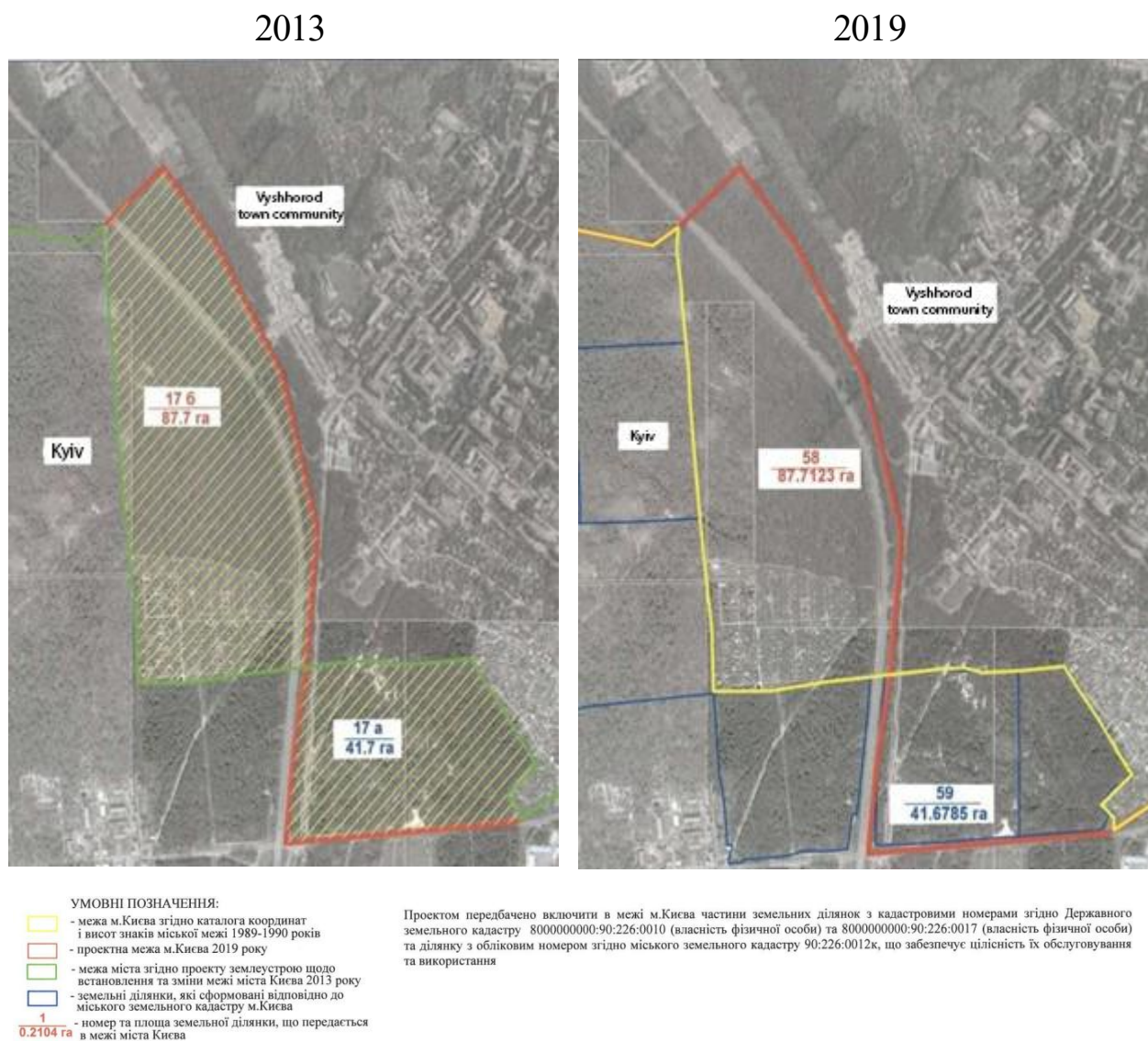


Fig. 3.6. Existing and projected boundaries of the city of Kyiv

– to take into account the needs of the population of Kotsiubynske village in engineering support, construction of streets coordinated with the highways of Kyiv, accessibility of metro stations, as well as preservation of the Sviatoshynskiy forest area, it is proposed to clarify the boundaries of the territory of Kotsiubynske village of Irpin City Council or to regulate its administrative status in accordance with the law (Fig. 3.7);

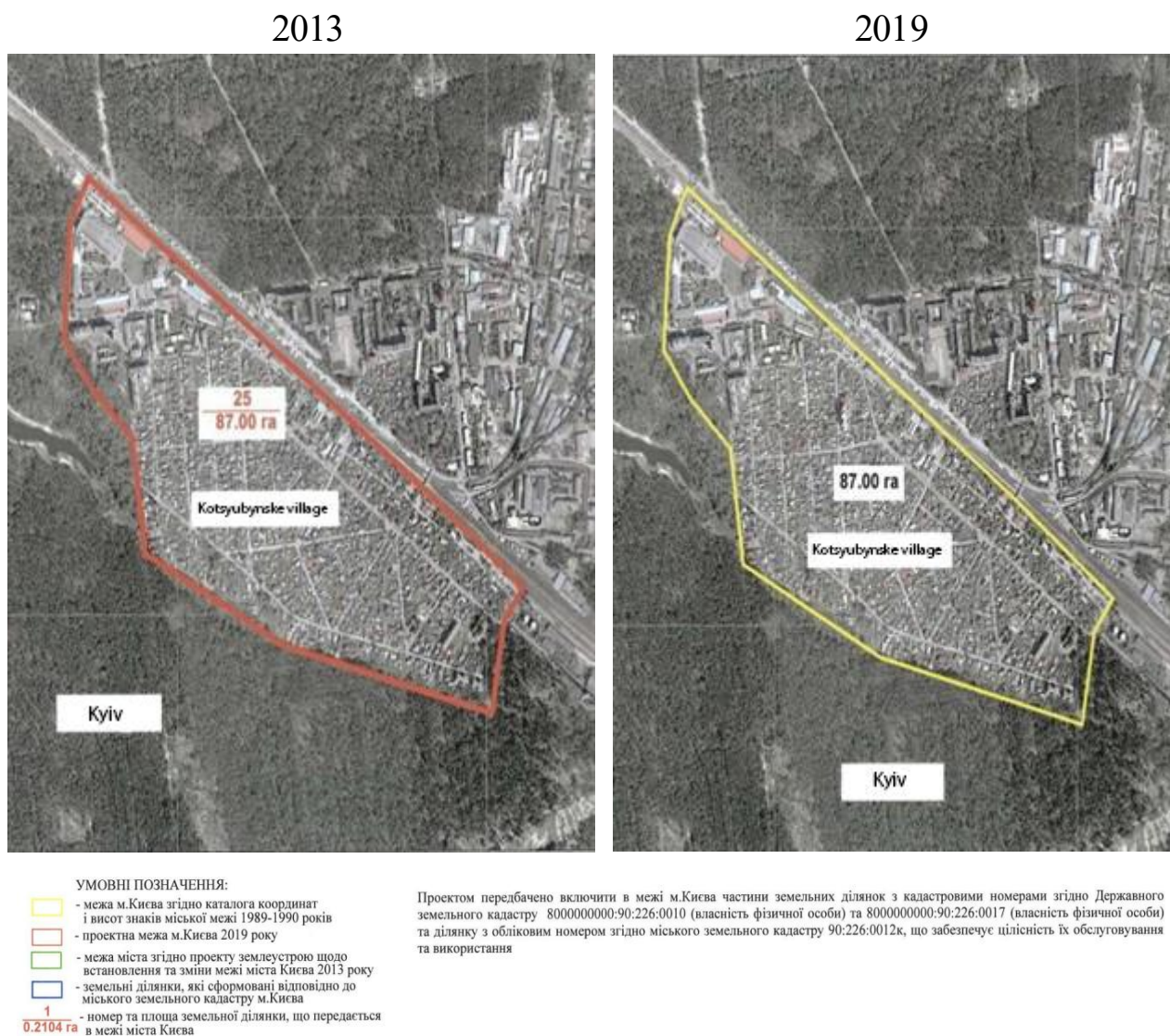


Fig. 3.7. Existing and projected boundaries of the city of Kyiv

– taking into account the existing planning formations of estate development in Obukhiv district, to transfer from the boundaries of Kyiv city the land area of 4.2 hectares to the boundaries of Kozynske village council and 0.15 hectares to Pidhirtsi village council of Obukhiv district. (Fig. 3.8) [6]

In general, according to the planning conditions, in order to coordinate the boundary with the planning structure of the city, existing settlement, existing natural landscape formations, household yards, roads, utility corridors, it is proposed to transfer land of 2771.14 hectares to the boundaries of Kyiv, and the remaining 55.4 hectares to the adjacent territorial communities.

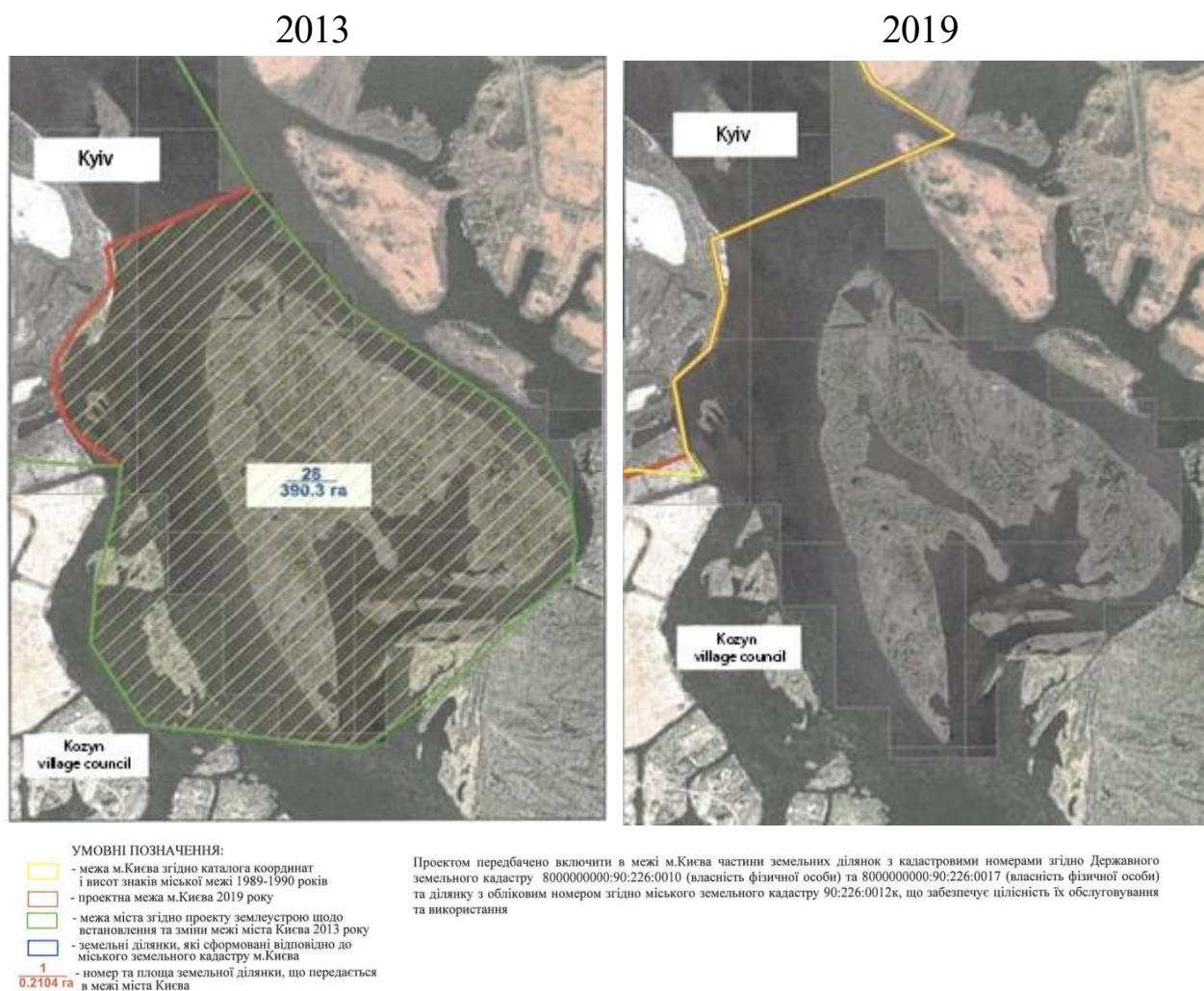


Fig. 3.8. Existing and projected boundaries of the city of Kyiv

Table 3.2 Areas of land to be changed according to the draft Kyiv city boundary [6]

№ п/п	District name	Land to be transferred to the boundaries of the city of Kyiv, ha	Land to be excluded from the boundaries of the city of Kyiv, ha
1	Boryspil district	1102,2	-
2	Obukhiv district	6,5	4,3
3	Kyiv-Sviatoshyn district	19,3	4,2
4	Brovary district	365,1	5,2
5	Vyshgorod	1076,5	41,7
6	Irpın City Council	1,4	-
	Total	2771,1	55,4

Certain sections of the city boundary are being clarified in accordance with the planning structure, directions of roads and external engineering networks in Boryspil, Brovary, Kyiv-Svyatoshyn, Obukhiv districts and in Vyshhorod. The territory of the city of Kyiv will then increase by a total of 2,715 thousand hectares and will amount to 85,351 thousand hectares. [6]

3.3 Theoretical and legal basis of special land protection

With its unique land and resource potential, Ukraine has been a leader in the production and global export of grain and sunflower in recent years, meeting the grain needs of 500 million people worldwide. However, an unbalanced deficit farming system has led to increased soil degradation, reduced fertility and lower land use efficiency in recent years.

The protection and rational use of land is recognised as one of the most important tasks of society, as overcoming hunger and achieving food security are in second place among the 17 Sustainable Development Goals set by the UN. The amount of food produced through land use reaches 98%. Goal 11 provides for ensuring the openness, safety, livability and environmental sustainability of cities and other human settlements.

Ukraine, with its land fund consisting of almost 2/3 of chernozems and meadow-chernozem soils, is one of the world's leading countries in terms of soil quality. It is black soil that is the predominant part of the main national wealth, which determines its high potential fertility.

The Concept of the National Target Programme for Land Use and Protection approved by the Cabinet of Ministers of Ukraine describes the current state of land in most of Ukraine as tense and sometimes crisis-like, with a tendency to deterioration. The main reason for this situation is the irrational use of land and the deterioration of its quality in the absence of a unified state system of land protection.

Due to Russia's armed aggression against Ukraine, a large part of the territory needs to be demined, fortifications removed, and the surface soil restored. Some residential and industrial buildings, engineering infrastructure, forest resources, and agricultural land have been destroyed. At the same time, the highest legal act in the country, the Constitution of Ukraine, states that "land is the main national wealth under special protection of the state" (Article 14). In this regard, the question of the legal content that the legislator has put into this legal prescription and how it should be reflected in the legislation that is adopted and implemented in practice has become relevant.

A feature of our Constitution that distinguishes it from the constitutions of other states is the special constitutional status granted to the country's land resources. It enshrines the social significance of land for the Ukrainian people and the principle of its special protection, which are designed to ensure the rational use of land, the restoration and enhancement of soil fertility, and the proper regulation of land relations.

As an object of the right of the Ukrainian people, the use of property may not harm the rights, freedoms and dignity of citizens, the interests of society, or worsen the environmental situation and natural qualities of the land.

The Land Code of Ukraine and the Law of Ukraine "On Land Protection" are the leading laws in the system of laws as sources of land law of Ukraine, which define the legal content of the concept "land is the main national wealth under special protection of the state". The Land Code is an integrating and cementing basis for the establishment and development of land legislation, detailing and developing the provisions of the Constitution of Ukraine on the regulation of the use and special protection of land as the country's national wealth. The Law of Ukraine "On Land Protection" is a regulatory legal act that provides the most detailed and elaborate legal provisions on the protection of the country's land fund. The obligation of the state to ensure special protection of land, enshrined in Article 14 of the Basic Law of the country, is actually a public law provision that may be an integral part of the public or public-private law. That is why land law, as a public-private law of our legal system, is designed to ensure the implementation of

the constitutional provision that land is the main national wealth under special protection of the state.

As for the Civil Code of Ukraine, which contains a separate Chapter 27 "Ownership of Land (Land Plot)", it is not a source of land law by virtue of the direct indication of Article 9 of this Code. It states that the provisions of this Code apply to the regulation of land relations (relations of natural resources use) only if such relations are not regulated by special legislation. Land legislation is special in relation to civil legislation in terms of regulating land relations.

However, some provisions of the Civil Code of Ukraine, which are not contained in the Land Code of Ukraine and other acts of land legislation, are applicable to the regulation of land relations. For example, such norms include civil law provisions on combating illegal development of land plots and unauthorised construction on them.

The content of the articles of the Constitution of Ukraine (Article 14), the Land Code of Ukraine (Article 1), and the Civil Code of Ukraine (Article 373) indicate that they have the same constitutional wording, namely, "Land is the main national wealth under special protection of the state". At the same time, the Law of Ukraine "On Land Protection" does not fully comply with the content of part two of Article 14 of the Constitution of Ukraine. First of all, instead of national wealth as an object of special protection, all lands within the territory of Ukraine are considered to be the object of such protection. Secondly, the title of Article 2 of the Law "On Land Protection" recognises land not as an object of special protection, but as an object of simple protection (ordinary protection), although further in the text of this article land is recognised as an object of special protection.

Some authors associate land as the main national wealth only with agricultural land that has fertility and is used for agricultural production. Both the Land Code of Ukraine and the Law of Ukraine "On Land Protection" use the same definition of the term "land protection". The term "soil protection" is defined in the Land Protection Law, but it is not used in the text of the Law itself. As for the concept of "special protection of land", there is no official interpretation for the object "all land within the territory of Ukraine" and for land as the main national wealth.

In our opinion, the term "under special protection of the state" used in relation to land as the main national wealth in Article 14 of the Constitution of Ukraine is not a political provision, but a legal prescription, which cannot be ignored in the land legislation of Ukraine. In our opinion, special protection of land as the main national wealth of Ukraine should be understood as the right and obligation of the state to establish a legal regime of land that best meets the interests of the Ukrainian people. It is the State, as the representative of the interests of the Ukrainian people represented by the Verkhovna Rada of Ukraine, that should implement in legislation such a legal mechanism for the use and protection of land resources that ensures the most efficient use of land under the dominant condition of its preservation as a means of production, operational basis and natural resource of the present and future generations of the Ukrainian people.

The Land Code of Ukraine and the Law of Ukraine "On Land Protection" detail the constitutional provision on land as the main national wealth under special protection of the state in legal norms that define the basic requirements for the protection of land resources in Ukraine.

First of all, this constitutional provision is manifested in the principles of land legislation (Article 5 of the Land Code of Ukraine), as well as in Section II "Lands of Ukraine" on the categories of land that have a special legal regime; Section III - Right to Land; Section VI - Land Protection; Article 150 "Particularly Valuable Lands and the Procedure for Termination of Rights to Them". [23]

At the same time, it should be noted that the proclamation by the Constitution of Ukraine adopted on 28 June 1996 that land is the main national wealth under special protection of the law is a "red line" running through the entire Code. In our opinion, the content of this article should be understood in such a way that land is the main national wealth that is especially protected by the state in any land legal relations, including both legal relations of use and protection of land, in which public law rules dominate, and legal relations on acquisition and exercise of land rights, in which private law rules play an important role. This means that the peculiarity of land law as a branch of the legal system of Ukraine is its public-private nature. As rightly noted in the scientific literature, land as the basis of

national wealth is primarily a sphere of public law relations. Moreover, public law and private law norms of land law are not divided by sector - in exclusively public law or private law institutions and sub-institutions - but are integrated in the vast majority of them. That is why the provision of Art. 14 of the Constitution of Ukraine on the recognition of land as the main national wealth under state protection can be implemented with the help of the entire complex of land law provisions of Ukraine, since environmental law ensures the protection of land as a natural resource, and civil law recognises land as immovable property and ensures the exercise of only property rights to land.

In this regard, we believe that the new codification of land legislation should not lead to the division of land law provisions into civil law and environmental law with their subsequent incorporation into the Civil Code of Ukraine or the Environmental Law. The experience of legal regulation of land relations has demonstrated the validity of the doctrinal provision on the expediency of preserving in the twenty-first century the independence of land law as a separate branch of the legal system of Ukraine.

In recent years, the process of deregulation of land relations has intensified in land legislation, which is associated with the abolition of not only certain legal norms, but also their certain groups and institutions of a public law nature. Some researchers have proposed to abolish the institution of division of land into categories as a means of ensuring the intended use of land. Thus, A.I. Ripenko, substantiating the idea that the entire territory of the country, without exception, is the spatial basis for urban development and defending the principle of ubiquity of urban development, is supported by many researchers regarding «division of land in Ukraine into categories».

The division of the territory into urban and rural areas, as well as the use of the term «rural area», have become increasingly controversial in recent years. This is especially evident in the division of territorial communities into rural and urban on the basis of which of the settlements is the centre of the community - a city or a village. Perhaps, this example could be used to defend the principle of ubiquity of urban planning in the country, although it should not be forgotten that in Ukraine, cities occupy only 2.2% of the total territory of the state.

In our opinion, the idea of abolishing land categories is based on a not

entirely reasonable interpretation of the essence of Ukrainian land legislation. After all, it does not provide for the physical division of the country's land into land categories, although the relevant terminology is used in Articles 19-20 of the Land Code of Ukraine. An analysis of these and other articles of the Code shows that it does not provide for the division of land into separate categories of land as part of the country's land fund, but rather for the division of the general legal regime of Ukrainian land into categories of separate legal regimes of land: the legal regime of agricultural land, the legal regime of water fund land, etc. The basic principles of land law as a branch of the legal system of Ukraine are based on localisation and specialisation of legal regulation of land relations, the objects of which are lands of different quality and public purpose. The need to move away from the rather rigid system of establishing a designated purpose for each land plot is explained by the replacement of this system with zoning. Zoning operates with a much larger number of permitted uses compared to the nine categories of land, which significantly increases the variability of planning. [23]

Undoubtedly, zoning is a better way to ensure the intended use of land than assigning a designated purpose to each plot. However, the abolition of the division of the legal regime of Ukrainian land into separate categories of legal regimes will make it impossible or significantly reduce the potential of zoning as a way to ensure its intended use. The system of assigning a designated purpose to each land plot is not based on the division of land into categories. Determining the legal regime of land plots on the basis of planning documentation alone, as suggested by some authors, in the absence of legal norms defining the specifics of protection and use of different lands, will lead to chaotic development, when land plots are developed mainly at the personal discretion of government officials.

Finally, it should also be taken into account that the division of land in Ukraine into categories is a reflection in the legislation of two factors: the full development of the land territory of Ukraine and the lack of free land for new types of social activity and the need to maintain a favourable ratio of different types of land in the country, which is favourable for the environment, development of the production base of society and infrastructure. This function is provided by land categorisation, which is the division of the legal

regime of the country's land into separate categories of land and their varieties. Moreover, it is quite possible that new categories of legal regime of land may appear in the land legislation of Ukraine, which will differ from the existing categories of legal regime of land in our country. At the same time, in order to bring the name of categorisation in the land law of Ukraine in line with its essence, we support the introduction of the term "categories of land" instead of «categories of legal regimes of land».

At the same time, a number of provisions of the Law "On Land Protection" need to be improved. It should be emphasised that Article 168 of the Land Code of Ukraine - Soil Protection - also recognises soils as an object of special protection, while the Law on Land Protection does not contain such a provision at all. In our opinion, the existence of such discrepancies in the reflection of the constitutional provision on land as the main national wealth in this Law does not contribute to the formation of an effective legal mechanism for its implementation in the laws of Ukraine and should be eliminated. [23]

It appears that the definition and legal regime of specially valuable lands needs to be more clearly defined and enshrined in legislation. As of November 1, 1989, their area within agricultural land was 39.6 million hectares, or 36.9% of the total area; and the size of arable land reached 14.2 million hectares (44.8% of the total arable land). These valuable arable lands were mainly comprised of two types of soil: non-eroded black soil and dark grey podzolic soil. In addition to the above-mentioned soil types, particularly valuable lands included peat bogs with a peat depth of more than one metre, as well as lands of the nature reserve fund and other environmental protection purposes, lands of historical and cultural purposes, and experimental fields of research institutions and educational institutions. Pursuant to the Law of Ukraine No. 1442-VI dated 4 June 2009, the following lands were classified as particularly valuable: lands granted for permanent use to the National Association «Massandra» and 8 enterprises that were part of it.

Order of the State Committee of Land Resources of Ukraine No. 245 of 6 October 2003 divided particularly valuable soil types into national and regional lands.

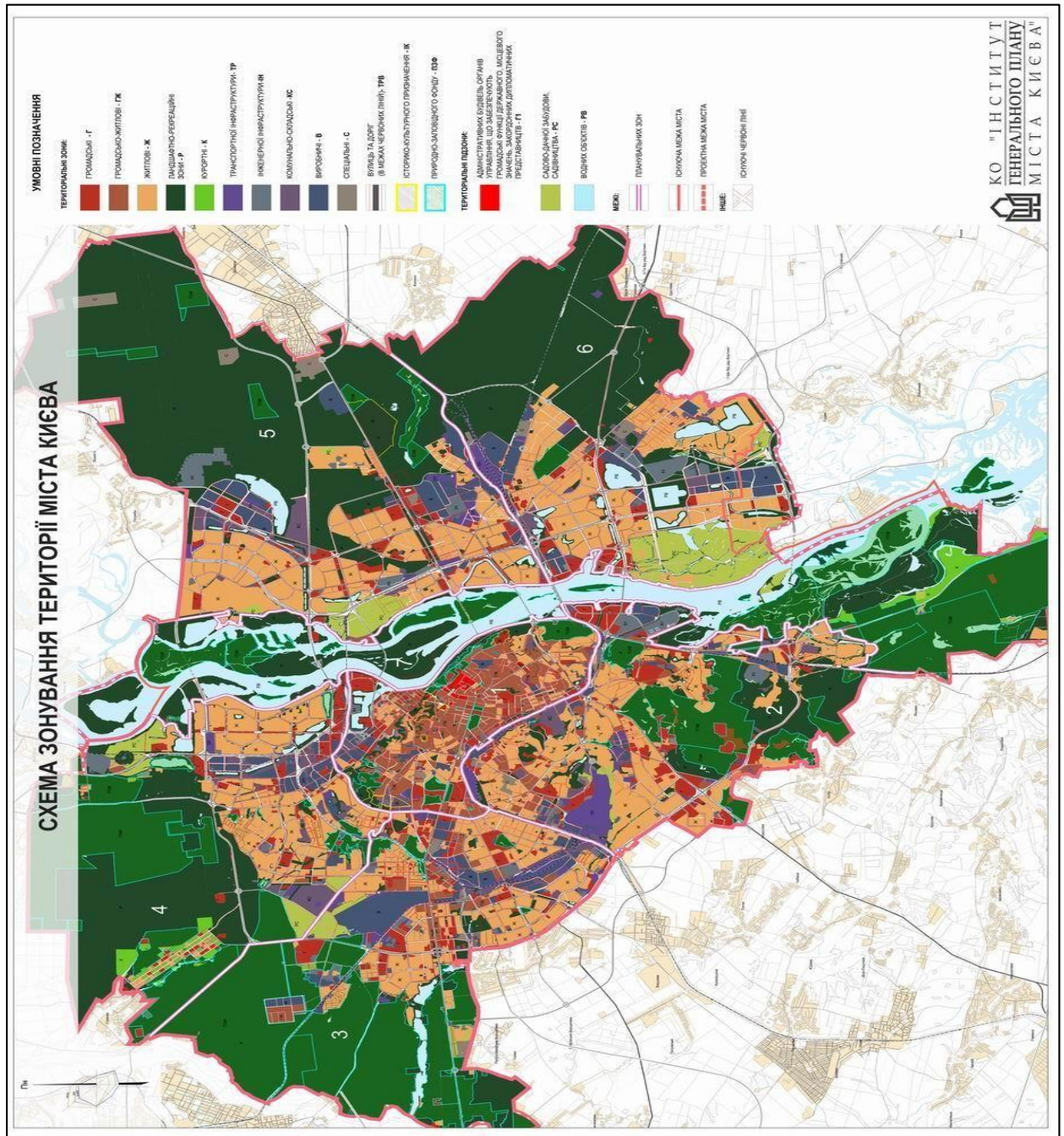


Fig. 3.9. Zoning of the city of Kyiv

The total area of valuable land was reduced by 2.5 million hectares of agricultural land and 3.2 million hectares of arable land. In particular, certain areas where construction of non-agricultural facilities was later permitted were excluded from the list of valuable lands. For example, in the Southern Coast of Crimea province, the entire area (6,019 hectares) is classified as regionally valuable land, of which 1,508 hectares are arable, represented by

brown crushed stone soils. The measures taken to reduce the area of specially valuable lands in the country are largely due to the fact that the State Land Cadastre did not include the boundaries of agricultural production groups of each type of specially valuable soil, and their contours were indicated only on soil maps, not specified or changed, i.e. not updated, since large-scale soil surveys were not carried out in the country at the frequency established by law. [23]

The monetary normative valuation of agricultural land began in 1995, and the ranking of soils into specially valuable and ordinary soils based on soil boning and economic valuation of land in previous years cannot be considered sufficiently justified. Indeed, compared to other soil types, non-eroded non-saline loamy chernozems on loess rocks are valuable (the total area of arable land of this type is 11.5 million hectares). However, their true value can only be confirmed by a real monetary valuation of land plots and land. We have the materials of this assessment and should reflect it in the land cadastre documentation.

In early 2015, a draft law was submitted to the Verkhovna Rada of Ukraine to exclude the category of "especially valuable land" from the Code. In 2019, this issue was again considered by the Parliament, but was not supported. Only the procedure for approving the termination of the right to permanent use of valuable land by the Verkhovna Rada of Ukraine and the specifics of the legal regime for the use of peatland by the Cabinet of Ministers of Ukraine have been changed.

The largest area of particularly valuable land is within agricultural land. It is impossible to protect them without reflecting updated information about them in the State Land Cadastre. The law generally recognises that land designated for agricultural purposes should be provided primarily for agricultural production, and the determination of such land should be made only on the basis of the State Land Cadastre.

The creation of a unified state system of land protection will be facilitated by the adoption of a law on a national target programme for land use and protection. Its main goal is to implement the state policy of Ukraine to ensure sustainable land use and create environmentally safe living and business conditions.

References

1. Bezlyubchenko, O.S., Zavalniy, O. V., Chernonosova, T. O. (2011). Planuvannya i blagoustriy mist: navch. posibnik. dlya studentiv usih form navchannya ta sluhachiv drugoyi vischoyi osvIti za napryamom pidgotovki 0921 (6.060101) – «Budivnitstvo» Kharkiv nats. akad. misk. gosp-va. [Planning and improvement of cities: a textbook. for students of all forms of education and students of the second higher education in the field of training 0921 (6.060101) – «Construction» of Kharkiv National Academy of Municipal Economy.], Kharkiv: HNAMG, 191. (in Ukrainian)
2. British Standards Institute. URL: <https://gost-snip.su/razdel/bs>
3. «Cardboard» houses, or Why were flat buildings built, and how is such an optical illusion achieved. URL: <http://polyinform.zp.ua/budinki-kartonki-abo-navishho-buduvali-ploski- budivli-i-yak-dosyagayetsya-taka-optichna-ilyuziya/> (date of application:19.11.2022).
4. Vasylenko, I.A., Pivovarov, O.A., Trus I.M., Ivanchenko, A.V. (2017). Urboekologiya [Urban ecology]. Dnipro: Aktsent PP, 309. (in Ukrainian)
5. Industries of the future: «smart» cities and houses: URL: <https://mind.ua/publications/20188390> (in Ukrainian) (date of application: 11.09.2018).
6. General Plan of Kyiv until 2020 (current). Regulation, use and development of the territory of Kyiv. URL: <http://kyiv-landuse.com/content/genplan-kieva-do-2020-r-diyuchiy>
7. General plan of Kyiv. Kyiv until 2025 (Draft): URL: <https://kievgenplan.grad.gov.ua/wp-content/uploads/2019/12/%iD0%BF%D1%80%D0%BE%D0%B5%D0%BA%D1%82.pdf>
8. Hayko, Yu.I., Zhidkova, T.V., Apatenko, T.M. ta In. (2019). Problemi ta perspektivi rozvitku zhitlovoyi zabudovi v umovah kompleksnoyi rekonstruktsiyi mista [Problems and prospects of residential development in the context of comprehensive urban reconstruction]: A monograph / edited by

- Yu.I. Gayka, T.V. Zhidkovoyi. Harkiv: HNUMG Im. O. M. Beketova, 247(in Ukrainian)
9. Holovnya, O.M., Kondratova, M.V. (2021) Kontsepsiya Integrovanogo rozvitku mist: Evropeyskiy dosvid ta mozhlivosti yogo zastosuvannya v Ukrayini. Ekonomika, finansi, menedzhment: aktualni pitannya nauki i praktiki [The concept of integrated urban development: European experience and possibilities of its application in Ukraine. Economics, finance, management: topical issues of science and practice]. № 3. 178-194. DOI: 10.37128/2411-4413-2021-3-12. (in Ukrainian)
 10. Grand constructions of mankind. *Grandstroy*. URL: http://grandstroy.blogspot.com/2011/03/blog-post_19.html (in Ukrainian) (date of application: 19.03.2011).
 11. Hunko, L.A. (2022). Formuvannya stalogo (zbalansovanogo) zemlekoristuvannya - bazova osnova rozvitku ekonomiki zemlevporyadkuvannya v Ukrayiny [Formation of sustainable (balanced) land use is the basic basis for the development of land management economy in Ukraine]. Agrosvit. № 9-10. 51–61. DOI: [10.32702/2306-6792.2022.9-10.51](https://doi.org/10.32702/2306-6792.2022.9-10.51). (in Ukrainian)
 12. DBN B.2.2–12:2019 Planning and development of territories. URL: <https://dreamdim.ua/wp-content/uploads/2019/07/DBN-B22-12-2019.pdf>
 13. Trees of Kyiv: what the city needs for clean air and coolness. Vechirniy Kiyiv: URL: <https://vechirniy.kyiv.ua/news/43005/> (in Ukrainian) (date of application 19.11.2022)
 14. Environmental passport. City of Kyiv. Department of Ecology and Natural Resources. URL: https://ecodep.kyivcity.gov.ua/files/2020/9/1/eco_pasport_2019.pdf
 15. Land Code of Ukraine : Law of Ukraine of 25.10.2001 № 2768-III. URL: <http://zakon5.rada.gov.ua/laws/show/2768-14> (date of application 19.11.2022)
 16. Integrated urban development: the experience of Berlin and Potsdam for

- Ukraine. Zhytomyr 2030. URL: <https://2030.zhitomir.ua/news-and-events/news/integrovanyy-rozvytok-mistdosvid-berlina-ta-potsdama-dlya-ukrayiny/> (date of application: 19.11.2022).
17. Information on the socio-economic development of Kyiv. Department of Economics and Investments of the executive body of the Kyiv City Council: veb-sayt. URL: https://dei.kyivcity.gov.ua/files/2022/2/16/Cichen_gryden_2021.pdf
 18. Kalina, T.E., Shushulkov, S.D. (2020). Rekreatsyyne zemlekoristuvannya urbanizovanih teritoriy. Naukovo-virobnichiy zhurnal «Biznes-navigator» [Recreational land use in urbanized areas. Scientific and production journal «Business Navigator»]. № 2 (58). 59-64. DOI: <https://doi.org/10.32847/business-navigator.58-12>. (in Ukrainian)
 19. Kvitka, G. (2009). Dosvid zemlevolodinnya: agrariyam ob'ednanoyi Evropi zatisno gospodaryuvati. Zemlevporyadny visnik [Land tenure experience: farmers in united Europe find it difficult to manage. Land Management Bulletin]. № 8. 40-46. (in Ukrainian)
 20. Kononenko, O.Yu. (2016). Aktualni problemi stalogo rozvitku: navchalno-metodichniy posibnik [Actual problems of sustainable development: a study guide]. Kyiv: DP «Print servis», 109. (in Ukrainian)
 21. The concept of integrated development of Poltava 2030. Poltava 2030. URL: https://city2030.org.ua/sites/default/files/documents/Poltava%202030%20FINAL_new1-compressed_0.pdf (date of application: 19.11.2022).
 22. Krivosheeva, T.I. (2020). Prirodoohoronna diyalnist v rozvinutih krayinah svitu. Ekologichni ta sotsialni aspekti rozvitku ekonomiki v umovah Evrointegratsiyi: tezi dopovIdey VII-Yi Vseukr. nauk.-prakt. konf. m. Mikolayiv/ Mikolayivskiy nats. agrar. un-t. [Environmental protection activities in developed countries. Ecological and social aspects of economic development in the context of European integration: abstracts of the VII All-Ukrainian scientific and practical conference. Mykolaiv, May 20-22/

- Mykolaiv National Agrarian University]. 41-43. (in Ukrainian)
23. Kulinich, P.F., Novakovska, I.O. (2022). Osobлива ohorona zemel Ukrayini yak osnovnogo natsionalnogo bagatstva: teoretiko-pravovi aspekti. Zemleustriy, kadastr i monitoring zemel [Special protection of Ukrainian lands as the main national wealth: theoretical and legal aspects. Land management, cadastre and land monitoring]. № 2. 97- 106. (in Ukrainian)
24. Materials of the General Scheme of Planning of the Territory of Ukraine, Program 2006-2010. Ministry of Community and Territorial Development of Ukraine: URL: <https://www.minregion.gov.ua/napryamki-diyalnosti/building/city-build/materiali-generalnoyi-shemi-planuvannya-teritoriyi-ukrayini/> (date of application: 07.02.2018).
25. Leyptsizka hartiya «Mista Evropi na shlyahu stalogo rozvitku», 24-25 travnya 2007. - Informatsiya schodo prostorovogo rozvitku [Leipzig Charter «European Cities on the Path to Sustainable Development» , May 24-25, 2007.- Information on spatial development]. Issue 4, 315-319. URL: http://city2030.org.ua/sites/default/files/documents/DL_LeipzigCharta_0.pdf (date of application: 19.11.2022).
26. Markevich, K., Sidenko, V. (2021). Smart-Infrastruktura u stalomu rozvitku mist: svitoviy dosvid ta perspektivi Ukrayini [Smart infrastructure in sustainable urban development: world experience and prospects for Ukraine]. Kyiv: «Zapovit» Publishing House., 400 . (in Ukrainian)
27. Martyn, A.G., Gunko, L.A., Kolganova, I.G. (2015). Planuvannya rozvitku teritoriy. Kyiv: DP «Komprint», 276. (in Ukrainian)
28. Melnichuk, G. (2018). Schilne misto - dobre, murashnik – pogano. *Velikiy Kiyiv* [Dense city is good, anthill is bad. Big Kyiv.]. URL: <https://bigkiev.com.ua/plotnyy-gorod-horosho-muraveynikploho/> (date of application: 19.04.2018). (in Ukrainian)
29. Population of Ukraine. Ministry of Finance: website: URL: <https://index.minfin.com.ua/ua/reference/people> (date of application:

- 01.02.2022).
30. Our Common Future. International Commission on Environment and Development (ICED or World Commission on Environment and Development - WCED): website. URL: <https://sd4ua.org/shho-take-stalij-rozvitok/istoriya/> (date of application:19.11.2022).
 31. Novakovska, I.O. (2018). *Ekonomika zemlekoristuvannya: navch.posibn* [Economics of land use: a textbook]. Kyiv: Agrarian Science, 400. (in Ukrainian)
 32. Novakovska, I.O. (2016). *Monitoring silskogospodarskogo zemlekoristuvannya. Visnik agrarnoyi nauki* [Monitoring of agricultural land use. Bulletin of Agrarian Science]. №4. 63- 69. (in Ukrainian)
 33. Novakovska, I.O. (2016). *Upravlinnya miskim zemlekoristuvannyam* [Urban land use management]: a monograph. Kyiv: Agrarian Science, 304 . (in Ukrainian)
 34. Novakovskiy, L.Ya., Bistryakov, I.K., Shkvir, M.I., Novakovska, I.O. etc. (2008). *Pravovi problemi stalogo rozvitku miskogo zemlekoristuvannya: zvit pro naukovo-doslidnu robotu* [Legal problems of sustainable development of urban land use: report on research work]. Kyiv, 192. (in Ukrainian)
 35. Official website of the UN Department of Economic and Social Affairs: veb-sayt. URL: <https://www.un.org/development/desa> (date of application: 19.11.2022).
 36. *Transforming our world: The 2030 Agenda for Sustainable Development. Resolution of the Seventieth Session of the UN General Assembly of 25.09.2015*: website: URL: <https://undocs.org/A/RES/70/1> (date of application: 19.11.2022).
 37. Petrakovska, O.S., Tatsiy, Yu.O. (2015). *Development neruhomosti ta stalij rozvitok mist* [Real Estate Development and Sustainable Urban Development]. – Kyiv: Kiy Publishing House, 504. (in Ukrainian)
 38. *Urban Development Strategies: Improving Approaches. The case of Kyiv:*

- website. URL: <https://cedos.org.ua/researches/strategii-rozvytku-mist-udoskonalennia-pidkhodiv-pryklad-kyieva/> (date of application: 19.11.2022).
39. Proekt zemleustroyu schodo vIdvedennya komunalnomu pidpriEmstvu po utrimannyu zelenih nasadzhen na bulvarI uzdovzh vul. Lyatoshinskogo Golosiyvskogo rayonu m. Kieva zagalnoyu ploscheyu 5,8218 ga. [Land management project for the allocation of greenery to a municipal enterprise on the boulevard along Lyatoshynskoho Street in Hosiivskiyi district of Kyiv with a total area of 5.8218 hectares.]
40. Rishennya Kiyivskoyi miskoyi radi vid 07.10.2021 roku «Pro zatverdzhennya Kompleksnoyi miskoyi tsilovoyi programi ekologichnogo blagopoluchchya mista Kieva na 2022-2025 roki» Kiyivska miska rada. Kiyivska miska derzhavna administratsiya [On approval of the Comprehensive City Target Program for Environmental Well-Being of the City of Kyiv for 2022-2025: Decision of the Kyiv City Council of 07.10.2021 No. 2728/2769. Kyiv City Council. Kyiv City State Administration.]. № 2728/2769: URL: <https://ecodep.kyivcity.gov.ua/files/2021/5/24/Prog.pdf> (date of application: 19.11.2022).
41. Rishennya Kiyivskoyi miskoyi radi vid 04.12.2018 roku «Pro zatverdzhennya Miskoyi tsilovoyi programi vikoristannya ta ohoroni zemel mista Kieva na 2019-2021 roki» Rozrobnik: komunalne pidpriemstvo «Kiyivskiy Institut zemelnih vidnosin» [On approval of the City Target Program for the Use and Protection of Land in Kyiv for 2019-2021: Decision of the Kyiv City Council of 04.12.2018 No. 229/6280. Developer: municipal enterprise «Kyiv Institute of Land Relations»]. № 229/6280: URL: https://kyivcity.gov.ua/npa/pro_zatverdzhennya_misko_tsilovo_programi_vi_koristannya_ta_okhoroni_zemel_mista_kiyeva_na_2019-2021_roki/File_7ii2o6fl7p_229-6280/ (date of application: 19.11.2022).
42. Rishennya Kiyivskoyi miskoyi radi vid 07.10.2021 «Pro zatverdzhennya Miskoyi tsilovoyi programi vikoristannya ta ohoroni zemel mista Kieva na

- 2022-2025 roki» Rozrobnik: komunalne pidprirmstvo «Kiyivskiy Institut zemelnih vidnosin» [On approval of the City Target Program for the Use and Protection of Land in Kyiv for 2022-2025: Decision of the Kyiv City Council of 07.10.2021 Developer: Municipal enterprise «Kyiv Institute of Land Relations»]. № 2727/2768: URL: <https://kmr.gov.ua/sites/default/files/2727-2768.pdf> (date of application: 19.11.2022).
43. Nakaz Ministerstva budivnitstva, arhitekturi ta zhitlovo-komunalnogo gospodarstva Ukrayini vid 10.04.2006 r «Pro zatverdzhennya Pravil utrimannya zelenih nasadzen u naselenih punktah Ukrayini» [On Approval of the Rules for the Maintenance of Green Areas in Settlements of Ukraine: Order of the Ministry of Construction, Architecture and Housing and Communal Services of Ukraine of 10.04.2006 № 105.] № 105: URL: <http://zakon5.rada.gov.ua/laws/show/z0880-06>. (date of application 05.01.2022)
44. Pro zatverdzhennya Strategiyi rozvitku mista Kieva do 2025 roku : Kiyivskoyi miskoyi radi vid 15.12.2021 r. Kiyivska miska rada. Kiyivska miska derzhavna administratsiya [On approval of the Kyiv City Development Strategy until 2025: Kyiv City Council of 15.12.2021. Kyiv City Council. Kyiv City State Administration.]. № 824/7060: URL: <https://kmr.gov.ua/uk/content/strategiya-rozvytku-mista-yyeva>(date of application: 19.11.2022).
45. Rishennya Kiyivskoyi miskoyi radi vid 03.07.2014 r. «Pro zatverdzhennya tehnichnoyi dokumentatsiyi z normativnoyi groshovoyi otsinki zemel mista Kieva ta poryadku YiYi viznachennya» [On approval of technical documentation on normative monetary valuation of land in Kyiv and the procedure for its determination: Decision of the Kyiv City Council of №23/23]. Khreshchatyk. № 97. p. 2.
46. Zakon Ukrayini vid 22.05.2003 r.«Pro zemleustriy [On land management]» № 858-IV.: URL: <https://zakon.rada.gov.ua/laws/show/858-15#Text> (date of application: 19.11.2022).

47. Rishennya Kyyivs'koyi mis'koyi rady vid 12.127.2019 r. «Pro pogodzhennya proektu zemleustroyu schodo vstanovlennya (zmini) mezh mIsta Kieva» [On approval of the land management project for establishing (changing) the boundaries of the city of Kyiv] № 445/8018. *Kiyivska miska rada. Kiyivska miska derzhavna administratsiya*. Kyiv City Council. Kyiv City State Administration]: URL: https://kyivcity.gov.ua/npa/pro_pogodzhennya_proektu_zemleustroyu_schod_o_vstanovlennya_zmin_mezh_mista_kiyeva/ (date of application: 19.11.2022).
48. Program of comprehensive development of the green zone of Kyiv until 2030. Project. «KIEVZELENBUD»: URL: https://drive.google.com/drive/folders/1cLpX1TNF3WLnKoN5hWMBmiV7S'i9V9KsO?fbclid=IwAR3FFt8tjIaLonEloxozwwwcVLo5mEgsdqfiRXtcKS_nxf1woPJ-YIuet99k (date of application: 29.07.2021).
49. Stolberg, F.V. (2000). *Ekologiya goroda: Uchebnik*. Kiev: Libra [Urban Ecology: Textbook. Kiev : Libra], 464
50. Fesyanyov, P.O. (2011). *Derzhavne reguluvannya zabezpechennya ekologichnoyi bezpeki na regionalnomu rivni: dosvid providnih krayin svitu*. Visnik Natsionalnoyi akademiyi derzhavnogo upravlinnya pri Prezidentovi Ukrayini [State Regulation of Environmental Safety at the Regional Level: Experience of the Leading Countries of the World. Bulletin of the National Academy of Public Administration under the President of Ukraine]. № 4. p142-150.
51. Who in Kyiv earns more: what are the salaries of workers in different industries? Comments.ua: website: URL: <https://kyiv.comments.ua/ua/news/society/developments/7500-hto-z-kiyan-zaroblyae-bilshe-yakiy-rozmir-zarplat-v-pracivnikiv-riznih-galuzey.html> (date of application: 02.02.2022).
52. Tsvyah, O. M. (2018). *Ekologo-ekonomichni zasady vikoristannya postIndustriialnih zemel v umovah velikogo mIsta: dis ... kand. ekon. nauk:*

Scientific basis for sustainable development of urban land use

- 08.00.06 / NUBIP Ukrayini [Ecological and economic bases of post-industrial land use in a large city: PhD in Economics: 08.00.06 / NULES of Ukraine]. Kyiv, 378. (in Ukrainian)
53. Balloun D. Pros and cons of High density housing: URL: <http://mymetrotextblog.com/almanac?author=56c63bf1f8508296a63070bc>
54. Center of Economics and business research (CEBR): URL: <https://www.cebr.com/>
55. Floor Area Ratio: URL: <https://www.planning.org/pas/reports/report111.htm>
56. Glossary of Zoning Terms. URL: <https://www.nyc.gov/site/planning/zoning/glossary.page>
57. Habitat iii issue papers - urban and spatial planning and design. веб-сайт: URL: http://www.europeanhabitat.com/wpcontent/uploads/2016/03/8_Urban-and-Spatial-Planning-and-Design.pdf
58. RBC.UA: URL: www.rbc.ua/ukr/travel/rossiyane-izgnanii-kuda-edut-turisty-rf-evropy-1660216368.html
59. Wikipedia: URL: <https://uk.wikipedia.org>

APPENDICES

MODERN RESEARCH AND STRATEGIES FOR PRESERVING LAND RESOURCES AS THE MAIN WEALTH

Novakovska I.O. (2022) Suchasni problemy zemleustroyu v konteksti okhorony zemel' [Modern problems of land management in the context of land protection] Zemleustriy, kadastr i monitorynh zemel', No. 3. 4-17 DOI: <http://dx.doi.org/10.31548/zemleustriy2022.03.01>

УДК 332.3:332.27

**MODERN PROBLEMS OF LAND MANAGEMENT IN CONTEXT
LAND PROTECTION**

I.O. Novakovska, Doctor of Economics, Corresponding member of NAAS

National university of life and environmental sciences of Ukraine

ORCID 0000-0002-1473-7543

***Abstract.** In January of this year, the Government approved the Concept of the National Targeted Program for the Use and Protection of Land. Prerequisites have been created for the development and implementation of updated provisions on land management of rural areas, agricultural enterprises and households with the aim of organizing special protection of land as the main national wealth.*

The article presents an analysis of the main types of project-research works on land management that have been carried out since Ukraine gained independence. The special effect of anti-erosion and moisture-saving measures, which were achieved when the contour-ameliorative system of territory organization was introduced, was emphasized. The changes and features of land management with the cessation of quantitative and qualitative land accounting and the expansion of the composition of land management documentation at the expense of urban planning projects are considered. The structure of the land fund related to the implementation of the Concept of the Land Use and Protection Program and the development of land management

Scientific basis for sustainable development of urban land use

documentation according to the stages of its implementation is characterized. The need to expand the constituent parts of land management schemes of territorial communities and to improve land monitoring. It was proposed to transfer the Institute of Soil Protection to the National Academy of Agrarian Sciences of Ukraine, and its main tasks were defined, In connection with the above

Key words: land management, land use management, land protection, land relations, land monitoring, soil fertility.

Formulation of the problem.

The unique land and resource potential of Ukraine, in accordance with the constitutional provisions, requires special state protection. The constitutional principle of land protection as the main national wealth provides for the prevention of unjustified reduction of the area of agricultural lands, ensuring their rational, ecologically safe, economical use and protection. With Ukraine gaining independence in 1990, a new land system was formed, private ownership of land was introduced, the structure and system of agricultural management on land was reorganized, and the principles of a market economy were implemented.

The state-wide support of agrarians and local authorities was implemented on an area of more than 9 million hectares during the eighties and nineties by the contour-ameliorative system of agriculture. It made it possible to ensure the yield of grain at the level of 50 million tons per year with the simultaneous positive dynamics of nutrients in the soil.

Starting from March 1991, an unprecedentedly large amount of legal and organizational, research, design and research, land management and agricultural works related to reforming land relations was carried out in the country. However, in the process of land reform, as a result of a fundamental change in the system of agricultural territory organization, the size of land uses was reduced, and the framework of the contour-ameliorative system of agriculture and crop rotation was lost. The rental model of land use, which covered the majority of arable land, did not allow the introduction of reliable economic

incentives to protect the land fund from the effects of erosion and other negative processes. The extremely low level of budgetary land protection funding, insufficient control of land use, lack of formation of state land protection led to the fact that soil protection has become a national ecological problem. In the conditions of global climate change, it complicates the solution of food security, limits the possibilities of reproducing the fertility potential of the soil cover. The inefficient use of part of the arable land and its lack of protection are due to the fact that the system of special land protection initiated by the Constitution of Ukraine has not been implemented in the state.

The use and protection of land is complicated in the conditions of martial law with the Russian Federation's aggression against Ukraine: large areas of land have been seized, crops and other material resources have been destroyed. Part of the territory requires demining. Reclamation requires large financial resources, time, and changes in the structure of land use.

Analysis of recent research and publications.

In recent years, the number of scientific publications by domestic scientists on the problems of land use economics, land use management, land monitoring, land management in domestic journals has increased. A number of relevant monographs and works of reference and educational literature have been published, articles by economists, ecologists and land managers have been published in the international scientometric databases Scopus and WoS and published articles by economists, ecologists and land managers: S.A. Balyuk, V.A. Velichko, D.S. Dobryak, Y.M. Dorosh, O.P. Kanash, A.G. Martyn, V.V. Medvedev, L.Ya. Novakovsky , O.G. Tarariko, A.M. Tretyak, M.A. Khvesik [2, 3, 4, 5, 7, 9, 11, 12, 13]. However, the problems of land protection and monitoring require additional research.

The purpose of the study is to analyze the development, design and organizational support of the process of land resources protection in the country, the justification of the system, composition and features of the compilation of land management documentation at different levels of management; improvement of state policy in the field of land use and protection

in conditions of decentralization of power and global climate change.

Research results and their discussion.

The protection and rational use of land is identified as one of the most important tasks of society, since overcoming hunger and achieving food security are in second place among the 17 Sustainable Development Goals defined by the United Nations «The amount of food due to the use of land reaches 98%. By the end of 2021, Ukraine provided almost 10% of the world export volume of wheat, 16% of corn and 55% of sunflower oil trade. More than 400 million people in the world depended on Ukrainian grain supplies». [14]

Ukraine, having a land fund that consists of almost 2/3 of chernozems and meadow-chernozem soils, still occupies one of the leading places in the world in terms of the quality of soil resources. Black soils are the major part of our main national wealth, which are characterized by a deep humus layer, an agronomically valuable structure, and a significant supply of nutrients, which determine their high potential fertility.

At the end of the six decades of the 20th century, a large-scale survey of the soil cover of agricultural land was conducted in Ukraine on an area of more than 42 million hectares, which until now had no analogues in the world. Soil plans and a series of soil maps from district to national scales 1:200000, 1:750000, 1:1500000 have been drawn up, recommendations on increasing the efficiency of land use and increasing soil fertility have been substantiated. Later, selective additional soil surveys were conducted, a nomenclature list of agrogroups was compiled, and a geobotanical survey of natural fodder lands was carried out.

The specified materials were used as a basis for land evaluation, keeping records of the quantitative and qualitative composition of land plots, and organizing land management planning. The developed General scheme of anti-erosion measures, similar schemes for each of the regions, schemes of anti-erosion measures for rafter-beam systems, basins of individual rivers, complex

Scientific basis for sustainable development of urban land use

use of Lower Dnieper sands, working projects of complexes of anti-erosion hydrotechnical structures deserve attention. In order to implement these schemes, working and pilot projects, 450,000 ha of forest strips were created, 10,000 ha were filled and lined with ditches, and 15,000 ha were terraced. [10, сТ. 96]

The greatest effect of anti-erosion and moisture-saving measures, as evidenced by scientific research and the practice of many agricultural enterprises, was achieved in the conditions of the implementation of land management projects with contour-reclamation organization of the territory. During the period from 1980 to 1992, such projects were developed for 2,445 farms, the contour boundaries of fields and working areas were fixed with forest strips, earthen mounds, strips of perennial grasses, construction of hydrotechnical structures was carried out for 42% of the total number, protective forest plantations were created on the area of 65% from the designed area (table)

Table 1. Development and mastering of land management projects with contour and reclamation organization of the territory for the period 1980-1992 [15]

The name of the administrative-territorial unit	Land management projects have been developed		Complete fixation in nature has been carried out		
	Number of farms	Area, thousand ha	Number of farms	Area, thousand ha	% development
1	2	3	4	5	6
Autonomous Republic of Crimea	41	258	23	131	51
Vinnitsia region	114	337	6	20	6
Volyn region	95	215	3	8	4
Dnipropetrovsk region	60	389	48	303	78
Donetsk region	68	365	23	116	32
Zhytomyr region	39	126	5	12	9
Transcarpathian region	66	460	32	230	50
Zaporizhzhia region	112	725	21	147	20

Scientific basis for sustainable development of urban land use

Ivano-Frankivsk region	141	154	31	33	21
Kyiv region	129	369	96	273	74
Kirovohrad region	112	560	2	13	2
Luhansk region	125	758	78	603	79
Lviv region	100	265	57	134	51
Mykolaiv region	88	478	12	60	12
Odesa region	36	199	31	180	90
Poltava region	150	596	78	369	62
Rivne region	98	225	70	158	70
Sumy region	79	300	68	259	86
Ternopil region	75	159	46	72	45
Kharkiv region	153	855	1	18	2
Kherson region	35	141	35	141	100
Khmelnyskyi region	193	421	99	264	63
Cherkasy region	155	419	25	82	19
Chernivtsi region	88	213	29	59	28
Chernihiv region	91	344	27	103	30
m. Sevastopol	2	5	1	3	60
In total	2445	9336	948	3791	45

Therefore, at the beginning of the reform, almost 50% of the borders of the framework of the contour-ameliorative system were fixed in kind (on the ground). A fundamental change in the system of territory organization (land parceling) did not allow mastering the planned system of agriculture.

A number of changes were made in the practice of organization and provision of land management in the future. With the entry into force of the Law "On the State Land Cadastre" on January 1, 2013, a dual registration of land was introduced in the state: in the cadastre - state registration of land plots; in the State Register of property rights to them. As a result, the Land Book is opened when the plot has not yet been formed. The boundaries of the plot are established in kind and transferred to the customer by deed, when the decision on the transfer (grant) of the plot has not yet been made. Duplicate registration leads to numerous abuses in this area, promotes land use raiding. The dual state registration of land by two different central bodies of the executive power (State Geocadaster, Ministry of Justice) does not justify itself and is an archaic measure that the time has come to abandon. [16]

As of January 1, the quantitative accounting of land according to forms 6-

Scientific basis for sustainable development of urban land use

zem and 2-zem, which had been carried out since 1998, was discontinued. New forms of accounting (11-zem, 12-zem, 15-zem, 16-zem) were approved, but its management with July 1, 2016, as requested, is not implemented. In the absence of information on land monitoring and accounting for their quality characteristics, there is no basis for managing the processes of soil fertility, land protection, and land management. [17]

The list of bodies that approve land management documentation has been excessively expanded. With the presence of an institute of certified land surveyors and state cadastral registrars, it would be possible to drastically reduce the number of conciliation authorities. We went the other way - we introduced additional extraterritorial approval of land allocation projects and called it a pilot project. More than 300,000 units of project documentation circulated throughout the country every year, at a time when, according to the law, the involvement of other persons in the approval of the project was prohibited.

Currently, the composition of land management documentation has been expanded by including the urban planning documentation system. However, the types of this documentation are not identified as part of territorial planning at the local level.

This type of land management projects as an ecological and economic justification of crop rotation and land management, surprisingly, is not accepted at all, but is approved only by the customer. According to part 18 of Art. 16-1 of the Zakon Ukrayiny "On Regulation of Urban Development Activities" [18] in the presence of approved comprehensive plans for the spatial development of territorial communities, land management schemes and land management projects of nine types are not developed at all, which contradicts the requirements of the Zakon Ukrayiny "Pro zemleustriy". [19]

As pointed out at the meeting of the Round Table "Ukrainian chernozem: protection, monitoring, land management", held on June 23, 2022 at the National Academy of Sciences, the most significant drawback of all chernozem

Scientific basis for sustainable development of urban land use

soils of the Forest Steppe and especially the Steppe of Ukraine is the lack of moisture during the flowering period of the main agricultural crops. Obtaining higher yields is also associated with insufficient reserves and a negative balance of nutrients, a deficiency of organic matter and degradation processes. [2, 20]

Due to excessive plowing of the territory (54% in Ukraine versus 35% in European countries), the area of eroded arable land increased to 10.6 million hectares. "Up to 500 million hectares of top soil is washed away from arable land every year, and losses of agricultural products from soil erosion, according to expert estimates, exceed 9-12 million tons of grain units per year." [16] According to the level of acidity, salinity, salinity, part of the land is already in a state of crisis. The amount of organic fertilizers was reduced by 17 times, a negative balance of humus, nitrogen, phosphorus, potassium was formed in agro-ecosystems. It is believed that one of the main reasons for the situation in the field of land protection is the lack of a single program for the special protection of land as the main national wealth in Ukraine. Unlike other natural resources, since 2004, land has been awaiting the development and adoption by the Verkhovna Rada of Ukraine of the Law "On the Nationwide Program for the Use and Protection of Land." [1]

According to the Concept approved by the Cabinet of Ministers of Ukraine on January 19, 2022, a draft of the specified target program should be developed within a nine-month period. The key predictive indicator for solving the problem is provided by the Concept to reduce the level of plowing of the territory to 44 percent by removing unfit for arable land, the area of which, according to expert estimates, exceeds 6.5 million hectares. According to the data of soil surveys and correction of materials, it was considered that 5.1 million hectares of arable land could be subject to conservation, of which 54.3% were washed away and degraded, 11.5% were overmoistened and waterlogged, and 9% were saline. [21] This area is smaller by 1.4 million hectares than the area of land unsuitable for arable land proposed by experts. However, the state of war in which Ukraine has been for six months shows that the area of 6.5 million hectares will have to be increased after conducting an

Scientific basis for sustainable development of urban land use

inventory of the territory and remote sensing of the land. During the war, 3.5 million hectares of spring crops were not sown.

However, when developing a forecast of the ratio of agricultural land for a ten-year period, one cannot ignore the dynamics of changes in the area of arable land in the state. During 1991-2020, the area of arable land decreased by 813 thousand hectares. However, during the five-year period 2011-2015 and 2016-2020, it increased by 64.8 and 216 thousand ha, respectively. If the arable land area according to the State Statistics Service is 32.8 million hectares, the increase in the area under the objects of the natural and land fund and forested territories over the five-year period reached 0.26 percent (their total area is 24.5%), to offer an arable land area of 22 .6 million hectares (taking into account expert proposals) is unrealistic. This area will be much larger. It will be determined not only by the possibilities of attracting funds for the conservation of private unproductive and degraded lands, but also by the actual areas for possible use in the post-war period.

The Concept clearly defines the problems to be solved by the Program, an analysis of the causes of their occurrence and justification of the solution using the program method is carried out, the purpose of the Program is defined, options for solving the problem, ways, methods and deadlines for solving the problems are considered. It is proposed to carry out the measures of the Program provided by the development of appropriate land management documentation; development of projects, monitoring of the implementation of the specified measures. Land management will once again become a socio-economic and ecological measure for the implementation of the policy in the field of land relations, based on the principle of special protection of land as a special national wealth.

Due to the lack of a proper system of legal acts that would actually regulate the use of land in Ukraine and form a single state system of land protection, it is necessary to additionally develop draft laws, other legal acts, standards and norms.

In particular, the scientific level of the documentation that should be

Scientific basis for sustainable development of urban land use

developed for the implementation of the National Targeted Program for the Use and Protection of Land at the first stage of its implementation (by 2028) should be increased. These are: regional programs by regions; schemes of land management and technical and economic justifications of administrative-territorial units, as well as territories of territorial communities; comprehensive plans for the spatial development of the territories of territorial communities; criteria for monitoring; principles of monitoring based on automated information and analytical systems and remote sensing of the Earth. Similar documents are planned to be developed at the second stage of the Program implementation (2028-2032). So, in total, it is necessary to develop at least 6 types of regional scientific and project documentation.

Currently, Ukraine has 140 districts, 1,880 local councils, and 1,469 territorial communities. If similar documentation had to be developed for all administrative-territorial units, it would be drawn up four times for the same territory. It is advisable to review both the composition and the structure of the specified works in order to reduce their volume and cost as much as possible.

However, the problems of updating the land use information base due to the state of war in Ukraine remain. According to the analysis of the Food Research Center for Land Use of the KSE Institute as of June 17. In 2022, the total amount of losses caused to the agricultural industry as a result of the Russian invasion amounted to 4.29 billion dollars USA. In the structure of damages, the destruction or partial destruction of agricultural land and crop shortages make up the most - 2.135 million dollars USA. There is no updated information on the structure of the land fund, its dynamics, the state of use by administrative territories, land categories, land users, the quality of land resources, the characteristics of degradation processes, the efficiency of land use, land and soil protection. It is extremely difficult and very expensive to update the land cadastral documentation now, and therefore it may lead to a change in the terms of implementation of the measures provided for in the Concept of the program.

In the presence of the approved national target program of land use and

Scientific basis for sustainable development of urban land use

protection, relevant regional programs, all attention, in our opinion, should be focused on the development of land management schemes of territorial communities. [22,23] These schemes must contain at least three main components:

- 1) general regulations regarding the use and protection of the lands of the territorial community as a whole;
- 2) anti-erosion measures in river basins, rafter-beam systems, on reclaimed lands within the community;
- 3) formation of massifs of agricultural land, features of their use and protection.

It is important to remind that the possibilities of restoration of the contour-ameliorative system of territory organization have not yet been exhausted. [11] A return to the implementation of its individual elements, as well as the landscape principle of land use regulation appears again. The system of land management documentation, which was developed in the pre-reform period, from the problems of combating soil erosion, has many advantages that should also be taken into account (types of work projects: hydrotechnical structures, forest amelioration plantations, the organization of cultural pastures, gardens and vineyards; schemes of anti-erosion measures on rafters and beams systems, river basins, etc.). Other types of land management documentation must be developed in accordance with the land management schemes of territorial communities, do not duplicate their provisions, and agree with the minimum required number of organizations. For this, it is necessary to make changes to the Zakon Ukrayiny "Pro zemleustriy".

The monitoring system in Ukraine should also be improved. "In order to protect soil resources, in accordance with the Government's resolution, a unified state agrochemical service was established by organizing a network of 25 zonal agrochemical laboratories at regional agricultural research stations, research institutes and agricultural higher educational institutions." [24]

In 2000, this Service was reorganized into the State Technological Center for Soil Fertility Protection, in 2010 it was renamed into the State Institution,

Scientific basis for sustainable development of urban land use

and in 2013 into the Soil Protection Institute of Ukraine. "The main directions of the institute's activities are: development of proposals for the protection of soil fertility, rational use and ecological safety of agricultural lands; conducting agrochemical certification to determine indicators of soil fertility and the level of their contamination with toxic substances, as well as monitoring changes in these indicators as a result of economic activity; production and issuance of agrochemical passports of fields and land plots". [24]

According to the information that existed before, the issue of liquidation of the specified institute in general or its transfer to the State Geocadastr of Ukraine was considered. However, this does not take into account the fact that updated land monitoring is not established in the country, indicators are not established that would serve as a basis for state control of land use.

Land monitoring, the procedure for which was approved back in 1993, is not properly conducted due to the lack of sufficient information on the quality of land records in the state land cadastre. The satellite monitoring implemented in Ukraine is contemplative in nature. Its information on the national cadastral map does not contain the actual parameters of the dynamics of fertility, erosion, salinity, etc. The data of agricultural technical passports maintained by the Institute of Soil Protection are non-binding and fragmentary, non-binding.

In the absence of subsidies, the amount of which regulates the process of full and rational use of land in countries abroad, this process is not regulated in Ukraine.

State control is mainly limited to establishing violations of the current legislation regarding registration of rights to land and its transfer. The very nature of land use and protection is not controlled and fixed (maintenance of the fertility level, crop rotation, fertilization, erosion control, etc.). The main reason for this situation is the legislative non-regulation of land use regulations and the lack of levers of economic influence on land use.

The State Fund for the Protection of Ukrainian Black Soils was not established as a fiscal regulator of the efficiency of land use in order to finance measures related to the rational use and preservation of land resources, land

management and land and soil monitoring.

The creation of an independent scientific institution for the study of the listed problems and the actual implementation of soil cover monitoring tasks has become particularly relevant. Taking into account the experience of the countries of the European Union, such a scientific institution can be created by transforming the Institute of Soil Protection into a Research Institute of Soil Monitoring, with its transfer to the National Academy of Agrarian Sciences of Ukraine. The proposal to transfer land monitoring to an independent non-governmental organization - NAAS was supported by the participants of the Round Table in its appeal to the Government. [2]

The newly created institute should be entrusted with the following tasks:

1. Conducting fundamental and applied research on the problems of land protection, soil cover monitoring, economics of fertility protection;
2. Formation of information on the use and protection of anthropogenic processes of land in administrative territories, territories of territorial communities, city, settlement, village councils, individual land holdings and land use, with the development of projects for their localization;
3. Preparation and transfer to the relevant state and communal authorities of the necessary data for the implementation of state control over the use and protection of lands with calculations of the amounts of necessary compensation to the fund for the protection of Ukrainian chernozems;
4. Development of the necessary predictive and project-research and working documentation for land protection.

According to the methodical coordination of the NSC "Institute of Soil Science and Agrochemistry named after O.N. Sokolovsky" of the National Academy of Sciences and with the participation of the Institute of Land Use and the newly created Institute of Soil Monitoring, it would be possible to ensure the organization of scientific research on the problems of protection and rational use of land at the appropriate level, to protect Ukrainian chernozems based on the principles of economic settlement in order to implement the constitutional provision on special protection by the state of the main national wealth – land

Scientific basis for sustainable development of urban land use

The introduction of a compensation mechanism for damages and losses for violation of land protection standards and preservation of soil fertility can be implemented according to a similar system of economic stimulation of soil protection, which operates in the European Union countries within the framework of the common agricultural policy, in the form of direct payments to farmers in exchange for their compliance with environmental protection standards environment. This fund can be formed by paying land owners and land users for violations of regulations, standards on land protection and compensation for losses of agricultural production related to the expropriation of land. [17]

Conclusions.

The Concept of the National Target Program for the Use and Protection of Land for 2022-2032, approved by the Cabinet of Ministers of Ukraine, recognizes the state of land use as tense, and in some places crisis, with a tendency to deteriorate. The main reason for this situation is the irrational use of land, the deterioration of its quality, and the absence of a unified state land protection system. The constitutional principle of Art. 14 of the Constitution of Ukraine regarding the special protection of land as the main national wealth is not widely implemented in the legislation on the regulation of land relations in the context of the most important tasks of society to overcome hunger and achieve food security, defined by the 2nd UN Sustainable Development Goal.

Thanks to the completion of a large-scale soil survey of 42 million hectares of agricultural land, a scientific basis was obtained for land assessment, quantitative and qualitative accounting, and organization of land management planning in Ukraine. National, regional and local schemes of anti-erosion measures, land management projects have been compiled. A set of planned measures was implemented. During the period of 1980-1992, land management projects were developed on the area of 9.3 million hectares for the contour and melioration organization of the territory, which confirmed the greatest effect of the implemented anti-erosion and moisture conservation measures. In

Scientific basis for sustainable development of urban land use

connection with the violation of the framework of the contour system during the introduction of land reform, starting in 1991, a number of shortcomings were admitted: land management turned into a process of land demarcation and allocation of land plots, the accounting of the qualitative state of land was stopped; the composition of land management documentation has been unreasonably expanded; land management projects for land protection are not being developed.

Approved by the Government of Ukraine, the Concept of the National Targeted Program for Land Use and Protection is able to return socio-economic and ecological functions to land management, transferring the development and implementation of the entire set of forecast and pre-project documents, as well as project schemes, working projects, and technical documentation on land management. Attention is focused on the need to expand the composition and structure of land management schemes of territorial communities, restore the elements of contour and melioration organization of the territory, and expand the types of work projects.

It is time to organize the State Land Protection Fund and create an independent scientific institution for land monitoring problems with its transfer to the National Academy of Agrarian Sciences of Ukraine.

References.

1. Postanova Kabinetu Ministriv Ukrainy № 70-r vid 19.01. 2022 r. «On the approval of the Concept of the National target program of land use and protection». Available at: <https://zakon.rada.gov.ua/laws/show/70-2022-%D1%80#Text>(Accessed 19 Aug. 2022)
2. Balyuk S. A. and others. (2022) Appeal to the Government of Ukraine to take measures to protect and restore land resources under martial law. Herald of Agrarian Science. № 7 (832). 5-8. (DOI: <https://doi.org/10.31073/agrovisnyk202207>)
3. Velichko V.A., Martin A.G., Novakovskaya I.O. (2020) Soil monitoring of Ukraine - problems of land management, soil science and scientific support. Bulletin of Agricultural Science. 7/808. 5-16. (DOI: <https://doi.org/10.31073/agrovisnyk202007-01>)
4. Dobryak D.S., Kanash O.P., Babmindra D.I., Rozumny I.A. (2009) Classification of agricultural lands as a scientific prerequisite for their ecologically safe use. 2nd ed., supplement. K.: Urozhai, 2009. P. 464
5. Dorosh J.M., Martin A.G., Novakovska I.O. (2021) Development of land management science in Ukraine: history, modernity, prospects. Bulletin of agrarian science №.4. (99). 67-76. (DOI: <https://doi.org/10.31073/agrovisnyk202104-0>)
6. Martyn A. (2015) Decentralization of power in Ukraine: land management aspect. Land Management Bulletin. № 4. P. 20-25.
7. Medvedev V.V. (2012) Monitoring of soils of Ukraine. P. 536
8. Handbook of land management (2015) ed. L.A. Novakovsky. 4 species. rework. P. 492
9. L.Ya. Novakovskyi, I. O. Novakovska, O. O. Bredikhin, M. P. Stetsiuk, L. R. Skrypnyk. (2019) Municipalization of land management under conditions of power decentralization in Ukraine . Ukraine geogr. Journal № 2(106). 13-21. (DOI: <https://doi.org/10.15407/ugz2019.02.023>)
10. Novakovsky L.Ya. (2020) Why, why, my land: reflections on land use. Kyiv: Agrarian Science. P. 516
11. O.H. Tarariko, T.V. Iliencko, T.L. Kuchma, I.O. Novakovska. (2019) Satellite agroecological monitoring within the system of sustainable environmental management archive of Agricultural Science and Practice Journal issues/ Agric. sci. pract. № 6(1): 18-27. (DOI: <https://doi.org/10.15407/agrisp6.01.018>)

12. Novakovskiy L., Tretyak A., Dorosh Y.(2018) State and problems of land management of united territorial communities in the context of increasing their financial stability. Land Management Bulletin. № 12. 14–19.
13. Socio-economic potential of sustainable development of Ukraine and its regions: national report (2014) ed. E. M. Libanova, M. A. Khvesyk. Kyiv: State University of IEPSSR of the National Academy of Sciences of Ukraine, 2014. P. 776
14. Kulinich P.F., Novakovska I.O. (2022) Special protection of lands of Ukraine as the main national wealth: theoretical and legal aspects. Land management, cadastre and land monitoring. №2. 97–106.
15. Leonets V.O. (2001) Ecological and economic aspects of land management at the modern stage. Land management science, production and education of the 20th century: materials of the international scientific and practical conference. K.: Institute of Land Management of the Ukrainian Academy of Sciences. 162-168
16. Novakovskaya I.O. (2018) Economics of land use. textbook. P. 400
17. Novakovskiy L.Ya., T.O. Yevsyukov T.O., Novakovska I.O. (2022) Land use management: problems of protection of the main national wealth. Land management, cadastre and land monitoring. № 1. 4–17
18. Zakon Ukrayiny № 3038-VI vid 17.02.2011 r. «On the regulation of urban planning activities». Available at: <https://zakon.rada.gov.ua/laws/show/3038-17#Text> (Accessed 21 Aug. 2022)
19. Zakon Ukrayiny № 858-IV redaktsiia vid 22.05.2003 r. «Pro zemleustriyu». Available at: <http://zakon0.rada.gov.ua/laws/show/858-15> (Accessed 20 Aug. 2022)
20. Round table «Ukrainian chemozem: protection, monitoring, land management»(2022). Herald of Agrarian Science. № 7 (832). 9-12. (DOI: <https://doi.org/10.31073/agrovisnyk202207>)
21. Novakovska I. (2017) Methodological aspects of preservation of the main national wealth of Ukraine. Herald of Agrarian Science. № 8 (95) . 71-76. (DOI: <https://doi.org/10.31073/agrovisnyk201708-12>)
22. Proposals of the Round Table «Land Planning of United Territorial Communities». October 17, 2018. About drawing up land management schemes and agro-landscape arrangement of territories. Economist. № 11. 8–10.
23. Novakovskiy L., Novakovska I. (2018). Formation of united territorial communities and problems of their land management. Economist. № 8. 11–16.

24. Official website of the State University «Institute of Soil Protection of Ukraine»
Available at: <https://www.iogu.gov.ua/>

Novakovska I.O., Matveeva I.V. (2022) Systema monitoringhu zemel': zasady formuvannya ta problemy rozvytku [Land monitoring system: principles of formation and development problems] . Zemleustriy, kadastr i monitoringh zemel', No. 4. 57-71 (<http://dx.doi.org/10.31548/zemleustriy2022.04.06>)

LAND MONITORING SYSTEM: PRINCIPLES OF FORMATION AND PROBLEMS OF DEVELOPMENT

I. Novakovska, Doctor of Economics ,

Corresponding member of the National Academy of Sciences

National University of Life and Environmental Sciences of Ukraine

I. Matvieieva, Doctor of Engineering, professor

National Aviation University

The article examines the structure, content and procedure of land monitoring, features of its development and legal regulation, substantiates the need to monitor the state of land in the process of decentralization of power and improvement of local self-government in Ukraine.

Analyzing the relevance of land monitoring to the state environmental monitoring system as its constituent part, it was established that the specified norm is absent in the Regulation on land monitoring, which does not allow these monitoring to be considered a single system. The Regulations approved by the Ministry of Agrarian Policy on February 26, 2004 regarding soil monitoring have not yet been codified, and the agrochemical system of land certification as one of the sources of obtaining reliable information about soil cover has not been streamlined.

It has been recognized as natural and timely to introduce monitoring of land relations and the development of pilot projects for their implementation and implementation in the country from September 1, 2017. The objects of this monitoring are presented, its tasks and essence are defined, and the peculiarities of the methodology of introducing land market monitoring into the monitoring of land relations are defined. It is emphasized that the selection of

monitoring indicators corresponds to the practice of developed countries. At the same time, the principles of its implementation can be considered well-founded and objective.

Ways to improve the Procedure for monitoring land relations, the draft of which has been published, and the monitoring of the land market are proposed.

Key words: *land relations, land monitoring, soil monitoring, land relations monitoring, land market monitoring.*

Analysis of recent research and publications.

During the last decade, thanks to the initiative of international organizations, primarily the World Bank, monitoring of land relations was introduced in Ukraine as a new legal category. Implementation of relevant pilot projects was organized, two statistical yearbooks were published: "Monitoring of land relations in Ukraine. 2014- 2015"[1] (prepared by Denys Nizalov, Kateryna Ivinska, Serhiy Kubakh, Oleg Nivyevskyi, Oleksandra Prokopenko) and "Monitoring of land relations in Ukraine. 2016-2017" [2] (prepared by Denys Nizalov, Vitaly Dankevich, Kateryna Ivinska). On August 23, 2017, the Cabinet of Ministers of Ukraine adopted a resolution "On the implementation of a pilot project on monitoring land relations and introducing changes to some resolutions of the Cabinet of Ministers of Ukraine" [3], which, in fact, played the role of a regulation on the status, structure, principles and organization conducting this monitoring and publishing its results.

The scientific community has held a number of collective events related to the establishment of monitoring of land relations, improvement of land protection, development of land management in modern conditions. On October 4, 2017, the National Academy of Agrarian Sciences of Ukraine hosted an All-Ukrainian round table on the topic: "Monitoring and protection of land: directions of revival" [4], and on June 23, 2022, a mixed mode (face-to-face and online) Round Table was held "Ukrainian chernozem: protection, monitoring, land management". [5] In total, more than 150 scientists and practitioners took part in these events. 22 academicians and correspondent members of the

Scientific basis for sustainable development of urban land use

national academies of sciences, 11 people's deputies of Ukraine, heads of central executive bodies, scientists and teachers of higher education institutions, employees of environmental and land management organizations made presentations and discussed them. An Appeal to the State Leadership on overcoming the crisis situation in the field of land protection and to the Government of Ukraine on taking measures to protect and restore land resources under martial law was accepted and sent.

Scientific research on the application of methods of remote sensing of the Earth, the establishment of land monitoring, the development of land relations, the landmarket, and land use management was also intensified. Articles in scientific journals on the specified problems were published by scientists: V.A. Velichko, A.G. Martyn, I.O. Novakovska, A.M. Tretyak, P.F. Kulinich, E.V. Butenko, S.M. Smirnova and other. [6-13]

However, the problems of the development of the land monitoring system, in particular, land relations, the land market, the use of information sources and legal support require additional research, elimination of duplication of information of constituent parts and structural units of monitoring.

The purpose of the study is to establish the peculiarities of the formation of land monitoring in Ukraine, its development with inclusion in the structure of land monitoring, soil monitoring, as well as the initiation of a new legal category - monitoring of land relations with the inclusion of the land market as a component and determination of their improvement and functioning as an integral system of land management monitoring at the current stage of development of land relations in the country.

Research materials and methods. The work uses materials from land legislation, research by domestic and foreign scientists, pilot projects developed with the support of the World Bank and the EU "Supporting transparent management of land resources in Ukraine". In the research process, methods of analysis and synthesis were used, monographic, comparative-legal, system-analytic, depending on the tasks that were determined to achieve reasonable results.

Research results.

The land is the only universal condition of life, the natural basis of production, the all-encompassing factor of any human activity. It is not only a general territorial base for the placement of all productive forces and population settlement, but also the main means of agricultural and forestry production. It is common knowledge that without land the production process would be impossible at all. 98% of the total volume of all food is produced on earth.

The Constitution of Ukraine, based on the irreplaceability of land as a natural resource, quite naturally recognized it as the main national wealth under special state protection. Economical, effective, rational and ecologically safe use of lands, their protection in every way in modern conditions is one of the most urgent problems of the state's national security.

The unique land resource potential of Ukraine, which in 2021 provided the grain needs of 400 million people in the world, ranks first in the area of agricultural land in Europe, ranks fourth after Russia, the USA, and China in terms of the area of black earth soils. In connection with the specified principle of compliance with the priority of ecological safety requirements in the use of land, protection from harmful anthropogenic influence, reproduction of soil fertility, prevention of unjustified extraction of agricultural and forestry lands, provision of a special land use regime depending on the categories of the land fund, can be considered constituent parts of the constitutional regulations regarding the special protection of lands as the main national wealth.

Land monitoring plays an important role in the management system in the field of land use and protection. For the first time in Ukraine, land monitoring was introduced by the Land Code (as amended by Law of Ukraine No. 2196-12 dated 13.03.1992). In Chapter V "Control over the use and protection of lands and their monitoring" by Article 95, monitoring is defined as "a system of monitoring the state of the land fund, including lands located in radioactive contamination zones, with the aim of timely detection of changes, their assessment, reproduction and liquidation of the consequences of negative

Scientific basis for sustainable development of urban land use

processes". [14] It is noted that "the structure, content and procedure of land monitoring is established by the Cabinet of Ministers of Ukraine" The Resolution of the Cabinet of Ministers of Ukraine dated August 20, 1993 No. 661 approved the "Regulations on Land Monitoring", which during 2003-2021 included Changes were made seven times. [15]

In connection with the adoption of the new Land Code on October 25, 2001, which entered into force on January 1, 2002, land monitoring is determined by an independent Chapter 33 of Chapter VII "Management in the field of land use and protection". [16] This chapter contains Art. 191 - Assignment of land monitoring and Art. 192 - Land monitoring tasks. Therefore, land monitoring, in comparison with the previous Code, became an independent constituent part - a chapter of the new Code, fundamentally changing and expanding the content, structure and order of presentation. Only item 1 of Art. 191 of the new Code repeats the provisions of the first part of Art. 95 of the Code of 1992. Five items (items 2-6) of Art. 191 and Art. 192 have a different edition. It should be noted that the wording of Chapter 33 "Land Monitoring" of the current Land Code in many cases repeats the wording of some clauses of the Regulation on land monitoring, approved on August 20, 1993 (with amendments) by the Cabinet of Ministers of Ukraine. Concluding the analysis of the provisions regarding the presentation of land monitoring articles in the Land Codes of 1992 (Article 95) and 2001 (Article 191), we note that "The structure, content and procedure of land monitoring shall be established by the Cabinet of Ministers of Ukraine" (Article 95). According to Art. 191 "The Cabinet of Ministers of Ukraine establishes only the procedure for land monitoring." Such a document was not adopted by the Cabinet of Ministers, which negatively affects the formation of the land monitoring system in the country and is evidence of conflicting legal provisions.

According to the legislation, the object of monitoring is all land, regardless of the forms of ownership of it. Depending on the purpose of observations and the degree of coverage of territories, monitoring is divided into:

Scientific basis for sustainable development of urban land use

- national (on all lands),
- regional (on territories with a unity of physical and geographical, ecological and economic conditions);
- local - on separate land plots and parts of landscape and ecological complexes.

According to the Regulations on land monitoring, soil monitoring is a component of land monitoring. It is conducted by the Ministry of Agrarian Policy in accordance with the Regulation approved by it.

"Land monitoring consists of systematic observations of the state of the land (agrochemical certification of land plots, surveying, inspection and search), detection of changes in it, as well as assessment:

- processes associated with changes in soil fertility (development of water and wind erosion, loss of humus, deterioration of soil structure, waterlogging and salinization), overgrowth of agricultural land, land contamination with pesticides, heavy metals, radionuclides and other toxic substances;
- state of coastlines of rivers, seas, lakes, bays, reservoirs, estuaries, hydrotechnical structures;
- processes related to the formation of ravines, landslides, rural streams, earthquakes, karst, cryogenic and other phenomena;
- the condition of the lands of settlements, territories occupied by oil and gas production facilities, treatment facilities, manure storage facilities, warehouses of fuel and lubricants, fertilizers, parking lots for vehicles, disposal of toxic industrial waste and radioactive materials, as well as other industrial facilities." [15]

At the local and regional level, land monitoring is carried out by territorial bodies of the State Geocadastre, and at the national level by the State Geocadastre. Land monitoring is carried out by the State Geocadastre with the participation of the Ministry of Environment, the Ministry of Agrarian Policy, the National Academy of Agrarian Sciences, and the State Space Agency. According to Art. 191 of the Land Code, land monitoring is carried out by the

Scientific basis for sustainable development of urban land use

central executive body that implements state policy in the field of land relations, by the central executive body that implements state policy in the field of environmental protection. According to the Order of the Ministry of Agrarian Policy of Ukraine dated February 26, 2004 No. 51 "On the approval of the Regulation on soil monitoring on agricultural lands" [17] executive authorities, which currently do not exist (the Ministry of Agrarian Policy, the Ministry of Natural Resources, the State Committee for Agriculture, the State Water and Gas Administration) are proposed as executors).

Therefore, there is no system and logic in the determination of those responsible for conducting land monitoring according to the Regulation approved by the Cabinet of Ministers of Ukraine. No automated monitoring technical support system has been created. Approved by the Derzhkomzem of Ukraine in March 1997, the main measures to create a land monitoring system during 1997-2005 remained unfulfilled. Reports, forecasts and recommendations for taking appropriate measures to prevent the elimination of the consequences of negative processes were very rarely submitted to central executive authorities and local self-government bodies. [11]

At the national, regional, and local levels, the implementation of the moratorium is connected with the administrative-territorial division. However, in connection with the reform of local self-government and the decentralization of power beyond the regions and districts, monitoring is also extremely necessary for territorial communities. Considerable areas of state-owned agricultural lands outside settlements are transferred to their ownership. Therefore, monitoring the condition of lands in the territory of communities in order to identify changes, evaluate them, prevent and eliminate the consequences of negative processes becomes a rather urgent task of organizing rational land use. [10] Despite the fact that the Regulation on the state environmental monitoring system was approved by the Cabinet of Ministers of Ukraine on March 30, 1998 [18] (the Regulation on land monitoring was approved by the Cabinet on August 20, 1993) and according to the current Land Code (Article 191) land monitoring is a component part of the state

Scientific basis for sustainable development of urban land use

environmental monitoring system, the Regulations on land monitoring still do not contain such a norm. This can partially explain why there is no unified land monitoring system in Ukraine.

The state environmental monitoring system is a system of observation, processing, transmission, preservation and analysis of information about the state of the environment, forecasting its changes, and developing scientifically based recommendations for making decisions on preventing negative changes in the state of the environment and complying with environmental safety requirements. [18] The environmental monitoring system is an integral part of the national information infrastructure compatible with similar systems in other countries. The indicated system is an open information system, the priorities of which are the protection of the vital ecological interests of man and society; preservation of natural ecosystems; averting crisis changes in the ecological state of the environment and preventing emergency environmental situations.

The environmental monitoring system is aimed at:

- increasing the level of study and knowledge about the ecological state of the environment;
- ensuring efficiency and quality of information service for users;
- improving the quality of substantiation of environmental protection measures and the effectiveness of their implementation;
- promoting the development of international cooperation in the field of
- environmental protection, rational use of natural resources and environmental safety. [18]

In accordance with the Regulations, as part of environmental monitoring, the monitoring of soils, landfills and household waste, land in radioactive contamination zones, pesticide content, agricultural use of land and soils, forest fund lands, dangerous natural phenomena, irrigated and drained lands, soils and landscapes is carried out by the Ministry of Environment, Ministry of Health, Ministry of Agrarian Policy, State Emergency Service, State Geocadastre, State Geodesy, State Hydrometeor, State Water Agency, State Forestry Agency.

However, the implementation of the main tasks of monitoring, defined by

Scientific basis for sustainable development of urban land use

Article 192 of the Land Code of Ukraine, regarding the forecast of ecological and economic consequences of the degradation of land plots in order to prevent or eliminate the effect of negative processes, is impossible due to the lack of legal, economic, ecological and other information necessary for this. Forecasts of the most negative phenomena that can cause land degradation due to water and wind erosion, flooding, landslides, waterlogging, soil compaction, land contamination with radionuclides, heavy metals, chemicals, etc., are relevant when forecasting the consequences of land degradation. [10]

The object of special protection, as specified in Art. 168 of the Land Code of Ukraine, there are soils of the land plot. Soil cover is also considered one of the important objects of the country's environmental monitoring system. Soil monitoring as an independent component of land monitoring was introduced in 2003 in accordance with the Law of Ukraine "On Land Protection". [19]

Article 16 of this Law places the provision of soil monitoring and agrochemical certification of agricultural lands under the authority of the central executive body that implements state policy in the field of land relations, in the field of land protection (State Geocadastre). State Geocadaster, according to Art. 54, soil monitoring is also carried out on agricultural lands. However, the Regulation on land monitoring approved by the Cabinet of Ministers on 20.08. 1993 (with amendments) soil monitoring must be carried out by the Ministry of Agrarian Policy in accordance with the regulations approved by it (this regulation was approved by the Ministry on February 26, 2004, but it is not codified).

Since the approval, the very name of the ministry has also changed. It is also difficult to establish the specific boundaries of agricultural lands, since there are no boundaries of this category of land in the State Land Cadastre. Perhaps it would be more appropriate to conduct this monitoring in an area that includes "agricultural land", as it is called in the countries of the European Union. The agrochemical land certification system should also be streamlined. The basis for the economic regulation of soil cover protection could be the system operating in the countries of the European Union and the creation of a

Special Land Protection Fund. [20]

According to the current legislation, from 1993 to 2017, land monitoring and soil monitoring functioned as a component of land monitoring in Ukraine. In practice, it can be assumed that during this period there was one land monitoring (Land monitoring), which was called - land monitoring. In scientific literature, in addition, the terms "monitoring of land resources", "monitoring of land use", "monitoring of agricultural land use" were used. Like land monitoring and soil monitoring, they had an ecological orientation - preservation of one of the types of ecosystems – land resources, averting crisis changes in the ecological state of the environment and prevention of emergency ecological situations. Undoubtedly, the information contained in the specified monitoring is incomplete, mostly has limited access, is not systematized and dispersed, and most importantly, cannot be effectively applied to solve extremely important social and economic problems of rational land use, development of land relations in the country. This applies equally to issues of greening of land use and socio-economic problems of special protection of land as the main national wealth in accordance with current legislation. [21]

In connection with the above, it is completely natural and timely to introduce monitoring of land relations in Ukraine in 2017 in accordance with the Decree of the Cabinet of Ministers of Ukraine dated August 23, 2017 No. 639 "On the implementation of a pilot project on monitoring land relations and making changes to some resolutions Cabinet of Ministers of Ukraine". [3]

It is common knowledge that land relations are social relations. Therefore, they concern society as a whole, i.e. the subjects of land relations are citizens, legal entities, local self-government bodies and state authorities. The objects of the specified relations are lands within the territory of Ukraine, land plots and rights to them, including land shares (shares). Land relations are considered to be related to the ownership, use and disposal of land. This triad unites land ownership relations. It is believed that the types of land relations should also include land protection and land use management.

The procedure for the implementation of the pilot project on the monitoring of

Scientific basis for sustainable development of urban land use

land relations, which was approved by the Cabinet of Ministers Resolution No. 639 of 23.08.2017, established that "monitoring of land relations (hereinafter monitoring) is the systematic collection, preservation, generalization and publication of information about the state of land relations, which is provided by subjects of information interaction, according to the recommended list of data and indicators that are submitted in the process of information interaction for monitoring." [3]

The recommended list of indicators that are submitted in the process of information interaction is given in the appendix, which allows, if necessary, to supplement or change them in a timely manner, keeping in mind the creation of an open information system that reflects the state of development of land relations in Ukraine, and ensuring their transparency. The determination of the essence of monitoring of land relations is not established at the legislative level. However, the mechanism of mutual exchange of information between the subjects of information interaction for the purpose of systematization and generalization of data on the ownership, use and disposal of land plots cannot be considered a complete monitoring of land relations. More precisely, it is a system of mutual information exchange.

The existence of monitoring of land relations at the legislative level is confirmed by the norm of Art. 25 of the Law of Ukraine "On Land Appraisal" regarding land market monitoring as amended by Law No. 1423-IX dated 28.04.2021 "The monitoring of the land market is carried out as part of the monitoring of land relations by the central executive body that implements state policy in the field of land relations, based on information State register of property rights to immovable property and their encumbrances on the price (value) of land plots, the price (value) of other property rights to land plots, the amount of fees for using other people's land plots. The results of land market monitoring are published at least once every three months. Monitoring of the land market is carried out in accordance with the procedure established by the Cabinet of Ministers of Ukraine." [22]

It should be noted that another name was proposed for the new legal category-

Scientific basis for sustainable development of urban land use

monitoring of land relations. The draft Law on Amendments to Certain Legislative Acts on the Restoration of the System for Registration of Lease Rights for Agricultural Land Plots and Improvement of Land Protection Legislation dated 05.08. No. 7636 of 2022, which is recommended for adoption in the second reading by the Verkhovna Rada of Ukraine on amendments to the Law of Ukraine "On Land Valuation", refers to the specified monitoring as "public monitoring of land relations". In particular, it is indicated that "monitoring of the land market is carried out as part of public monitoring of land relations", and public monitoring of land relations and monitoring of the land market as part of it is carried out in accordance with the procedure established by the Cabinet of Ministers of Ukraine. [23]

Thus, the status of public monitoring of land relations, which has been legally functioning since September 1, 2017, and the monitoring of the land market (introduced in the version of Law 1423-IX dated 04/28/2021) as a component of the first monitoring remains ordinary, that is, non-public. When the Cabinet of Ministers approves the Procedure for monitoring land relations, these discrepancies can be eliminated, but the question remains regarding the Government's establishment of the Procedure for conducting land monitoring, which should replace the current Regulation on land monitoring, approved on August 20, 1993. The name "monitoring of land relations" could win as a uniting problem of land - resource, land relations, land use, use and special protection of land as the main national wealth, land market, etc.

The lack of detailed and reliable information that should characterize the development of land relations in the country based on available reporting data in local authorities and the high level of corruption in land relations led to the need to accelerate work related to ensuring the transparency of the use and protection of land resources. Within the framework of the Project "Supporting the reform of agriculture and land relations in Ukraine" with the assistance of the World Bank in cooperation with the Ministry of Agrarian Policy and Food of Ukraine, the State Geocadastre and other central bodies of the executive power, two stages of drafting pilot projects for monitoring land relations were

Scientific basis for sustainable development of urban land use

carried out:

- 1) an unofficial pilot stage (during 2014-2017), which was carried out by the relevant authorities on the initiative and with the support of the World Bank;
- 2) the official pilot stage (2017-2019), which is carried out on the basis of a subordinate legal act - Resolution of the Kabinet Ministriv Ukrayiny dated August 23, 2017 No. 639 "On the implementation of a pilot project on monitoring land relations and making changes to postanov Kabinetu Ministriv Ukrayiny.

The procedure for the implementation of the pilot project on land relations monitoring, approved by the specified resolution, became a normative document for the implementation of the moratorium itself. In accordance with the resolution of the Cabinet of Ministers of Ukraine, 65 indicators are included in the monitoring.

Preference was given to those of them that correspond to the practice of developed countries and the recommendations of the World Bank (LGAF, 2013). These indicators are combined and include various characteristics of transactions with land plots, land tax, litigation, land privatization, land acquisition, ensuring the rights of different categories of land owners and land users. The introduction of monitoring of land relations corresponds to the principles declared in the UN FAO Voluntary Declaration on Land Management. [2]

Monitoring is based on the following principles: timeliness and complexity of obtaining information: objectivity of information, promptness of providing and inputting information; openness of results. The provision of information is carried out on electronic media or through direct automated exchange of electronic data or other agreed methods. The organization of monitoring is entrusted to the Ministry of Agrarian Policy. A land monitoring portal has been launched on the website of the State Geocadastre. Information on the agricultural land market is published in a timely manner.

Therefore, monitoring of land and monitoring of land relations began to work

Scientific basis for sustainable development of urban land use

as a complex mechanism. This will make it possible to create a system of observation of land resources on a scientific basis, which would be unified, automated, public and reliable. Ensuring the publicity of information and its availability became a prerequisite not only for the organization of effective and environmentally safe ownership, use and disposal of land, but also a means of forming a system of special protection of land as the main national wealth of the state in compliance with the principles of land use greening and socio-economic principles of land turnover in market conditions.

In accordance with the Land Code of Ukraine, the Law of Ukraine "On Land Protection", the Law of Ukraine "On Land Appraisal", we need to have normative legal acts on the procedure for land monitoring, soil monitoring on agricultural land, land relations monitoring, land market monitoring. Approved by the Cabinet of Ministers of Ukraine in August 1993 The regulation on land monitoring (with amendments and additions) is outdated, does not correspond to the name that this document should have according to the legislation (Land Code), contains a number of conflicting provisions. The regulation on soil monitoring, which was approved by the Ministry of Agrarian Policy in February 2004, has not been codified since its adoption, entrusts the implementation of soil monitoring works to the central bodies of the executive power, which have not existed for a long time, a number of regulations contradict the Land Code and the Regulation on land monitoring approved by the Cabinet of Ministers.

Instead of the procedure for monitoring land relations, which has not yet been approved, there is a temporary document on the implementation of a pilot project on monitoring land relations and making changes to some resolutions of the Cabinet of Ministers of Ukraine, which was approved by a resolution of the Cabinet of Ministers in August 2017. A draft resolution of the Cabinet of Ministers of Ukraine has been prepared. On ensuring the monitoring of land relations" and the corresponding draft of the Procedure for this monitoring, including the monitoring of the land market. [24]

Thus, the Cabinet of Ministers of Ukraine can adopt four regulations (on land,

Scientific basis for sustainable development of urban land use

soil, land relations, land market monitoring); three regulations (on land, soil, land relations monitoring, including the land market); two regulations (on land and soil monitoring; on monitoring land relations, including the land market). As an option, a single document, the draft of which could be adopted and which could have the name - Procedure for conducting monitoring of land or Procedure for conducting monitoring of land relations, cannot be considered

Since one of the main sources of land cadastral information is called a public cadastral map, and the use of an electronic procurement system related to the functioning of the land market is considered public procurement, land monitoring or monitoring of land relations should also be public. At the same time, it is important to define in one of the legislative acts the essence of land monitoring, especially monitoring of land relations. First of all, such norms should be contained in the Land Code of Ukraine as one of the fundamental sources of land legislation. This proposal is supported by many scientists. [9, 13]

As for the published project "Procedure for monitoring land relations, including monitoring of the land market", this title does not contain the norms of the Law "On Land Valuation" regarding the implementation of monitoring, meaning "monitoring" not as a process (action), but as system name. In our opinion, the name of the draft Government resolution "On ensuring the monitoring of land relations" is more justified. It is unnecessary to indicate in the title of the Procedure that the monitoring of the land market is laid out, including as part of the monitoring of land relations.

These are editorial reflections, but the fact of the specified project is the lack of structure of both projects. If the composition, structure, procedure for implementation and publication of land relations monitoring materials are laid out on six pages of computer text and number 31 items, then the provision in it on monitoring the land market includes only one section "Features of monitoring the land market". It has two points (32 and 33), the first of which lists monitoring objects, including: the price (cost) of the land plot); the price (value) of other property rights to the land plot; the amount of payment for the

Scientific basis for sustainable development of urban land use

use of someone else's land plot. Their total number is four times less than the list of similar information contained in the published statistical yearbook "Monitoring of Land Relations in Ukraine: 2016-2017". The content of paragraph 33 is a reference, which indicates that the procedure of information interaction, processing of land market monitoring objects, publication of the results and their use are carried out in accordance with the requirements of this Procedure, i.e. in a similar way to the monitoring of land relations. Features of market monitoring occupy 14 lines of text. There are also a number of other editorial proposals.

And yet, the main problem of the specified draft of the Order, in our opinion, is the confirmation of the use for monitoring of only available data in the order of information interaction, as well as public information in the form of open data published on the state web portal. This is not enough to have the characteristics of many processes that occur in the regulation of land relations, which are absolutely necessary, but are currently missing for various reasons in public access. This can be confirmed by the current situation of martial law in the country, the period of recovery and reconstruction of the economy, unforeseen circumstances that do not have the necessary information support.

In such cases, the creation of new information sources, which are not provided for in the structure of land relations monitoring, should be encouraged by the purpose, the composition of the subjects of information interaction should be expanded and specified, the objects of monitoring may be data sets that have not been made public before. Monitoring of land relations should be not only the result of processing, systematization and coordination of available data, but also provide, in necessary cases, the creation of elements of one's own information base.

Conclusions.

The initiation of land monitoring in the country coincided in time with the beginning of land reform, the introduction of private ownership of land, and the legalization of the principles of legal regulation of the organization of land

protection.

The thirty-year period of formation and development expanded the spheres of influence of the indicated monitoring to the observation of soil cover (2003), land relations (2017), land market (2021). Bases, environmental monitoring, scientifically based development and regulation of land relations, effective circulation of land plots (land market).

The Regulation on land monitoring (1993) needs a significant substantive update. The information base regarding the quantitative and qualitative condition of lands and lands, inventory updating of land resources and soil cover remains unsatisfactory. Necessary norms and standards in the field of reproduction of soil fertility, permissible anthropogenic load and the level of agricultural development of the land fund have not been developed.

The legal regulation of the further development of land monitoring should aim to create a system of monitoring land resources that would be unified, automated, public, reliable, based on satellite observation materials and take into account the structure and practice of the European Community Land Monitoring Service. Taking into account the peculiarities of the formation of the existing monitoring system, it should include land monitoring and monitoring of land relations with the corresponding legal framework.

The priority tasks to be implemented should be considered:

- making changes to the Land Code and other legislation regarding establishing the status and features of monitoring land relations, as well as developing provisions(procedures) for conducting monitoring;
- development of regulations and standards regarding land protection and restoration of soil fertility, which were provided for in 2003 by the Law of Ukraine "On Land Protection";
- development of a scientific program of continuous soil surveys taking into account the consequences of changes in the soil cover in connection with the armed aggression of the Russian Federation and preparation of a project of decisions and proposals regarding the sources of funding for the specified works.

References.

1. Monitoring of land relations in Ukraine: 2014-2015. Statistical yearbook. Available at: <http://land.gov.ua/wp-content/uploads/2016/03/pdf>
2. Monitoring of land relations in Ukraine: 2016-2017. Statistical yearbook. Available at: <https://land.gov.ua/wp-content/uploads/2018/10/monitoring.pdf>
3. Postanova Kabinetu Ministriv Ukrainy № 639 vid 23.08.2017 r. «Pro 1. realizatsiyu pilotnoho proektu shchodo provedennya monitorynhu zemel'nykh vidnosyn ta vnesennya zmin do deyakykh postanov Kabinetu Ministriv Ukrainy» Available at: <https://zakon.rada.gov.ua/laws/show/639-2017-%D0%BF#Text>
4. Zvernennya do Uryadu Ukrainy pro vzhyttya zakhodiv shchodo okhorony ta vidnovlennya zemel'nykh resursiv v umovakh voyennoho stanu..(201) Bulletin of Agricultural Science. № 11 5-8
5. Zvernennya do Uryadu Ukrainy pro vzhyttya zakhodiv shchodo okhorony ta vidnovlennya zemel'nykh resursiv v umovakh voyennoho stanu (2022). Bulletin of Agricultural Science. № 7. 5-12
6. Velichko V.A., Martin A.G., Novakovska I.O. (2020) Soil monitoring of Ukraine - problems of land management, soil science and scientific support. Bulletin of Agricultural Science. 7/808. 5-16 p.p. (DOI: <https://doi.org/10.31073/agrovisnyk202007-01>)
7. Tretyak A. M., Tretyak V. M., Pryadka T. M., Kapinos N. O., Lobunko Yu. V. (2022) Land monitoring in Ukraine: concept and methodology of formation. Ahrosvit. № 1. 3-12. DOI: 10.32702/2306&6792.2022.1.3
8. Kulinich P.F., Novakovska I.O. (2022) Special protection of lands of Ukraine\ as the main national wealth: theoretical and legal aspects. Land management, cadastre and land monitoring. №2. 97–106.
9. Kulinich P.F. (2019) Monitoring of land relations in the system of legal monitoring: concept, development, prospects. Almanac of law. Legal monitoring and legal expertise: issues of theory and practice. – Issue 10. – K.: Institute of State and Law named after V. M. Koretsky National Academy of Sciences of Ukraine,., № 10. 50-56.
10. Novakovska I.O. (2016) Monitoring of agricultural land use. Visnyk ahraryoi nauky. №4. 69-75

11. Novakovska I. (2017) Methodological aspects of preservation of the main national wealth of Ukraine. Herald of Agrarian Science. № 8 (95). 71-76. (DOI: <https://doi.org/10.31073/agrovisnyk201708-12>)
12. Butenko E.V., Kononyuk A.V. (2020) Monitoring of land relations in Ukraine: status and development prospects. Land management, cadastre and land monitoring. № 1. 118-125
13. Smyrnova S. M., Smyrnov V. M., Mas A. Yu., Borisova A. V. (2021) The current state and prospects for the development of monitoring of land relations. Investments: practice and experience. № 4. 62-66 DOI: 10.32702/2306-6814.2021.4.62
14. Land Code of Ukraine v red. Zakonu Ukrayiny 2196-12 vid 13.03.1992 r. Available at: <https://zakon.rada.gov.ua/laws/show/561-12#Text>
15. Postanova Kabinetu Ministriv Ukrayiny № 661 vid 20.08.1993 r. «Polozhennya pro monitorynh zemel'» Available at: <https://zakon.rada.gov.ua/laws/show/661-93-%D0%BF#Text>
16. Land Code of Ukraine 2001, Available at: <https://zakon.rada.gov.ua/laws/show/2768-14#Text7>.
17. Nakaz Ministerstva Ahromoyi Polityky Ukrayiny vid 26.02.2004 r. № 51 «Pro zatverdzhennya Polozhennya pro monitorynh gruntiv na zemlyakh sil's'kohospodars'koho pryznachennya» Available at: <https://zakon.rada.gov.ua/laws/show/z0383-04#Text>
18. Postanova Kabinetu Ministriv Ukrayiny vid 30.03. 1998 r. «Pro zatverdzhennya Polozhennya pro derzhavnu systemu monitorynhu dovkillya». Available at: <https://zakon.rada.gov.ua/laws/show/391-98-%D0%BF#Text>
19. Zakon Ukrayiny vid 19.06.2003 r. № 962-IV «Pro okhoronu zemel'». Available at: <https://zakon.rada.gov.ua/laws/show/962-15#Text>
20. Novakovsky L.Ya., T.O. Yevsyukov T.O., Novakovska I.O. (2022) Land use management: problems of protection of the main national wealth. Land management, cadastre and land monitoring. № 1. 4–17
21. Novakovska I.O. (2018) Economics of land use. textbook.. P. 400
22. Zakon Ukrayiny № 1378-IV vid 11.12.2003 r. «Pro otsinku zemel'». Available at: <https://zakon.rada.gov.ua/laws/show/1378-15#Text>
23. Projekt Zakonu Ukrayiny v red. vid 05.08.2022 r. № 7636 «Pro vnesennya zmin do deyaknykh zakonodavchykh aktiv shchodo vidnovlennya systemy oformlennya

Scientific basis for sustainable development of urban land use

prav orendy zemel'nykh dilyanok sil's'kohospodars'koho pryznachennya ta udoskonalennya zakonodavstva shchodo okhorony zemel'». Available at: <https://itd.rada.gov.ua/billInfo/Bills/Card/40167>

24. Projekt Postanovy Kabinetu Ministriv Ukrayiny «Poryadok monitorynhu zemel'nykh vidnosyn, u tomu chysli monitorynhu rynku zemel'». Available at: <https://land.gov.ua/wp-content/uploads/2021/07.pdf>

Novakovsky L.Ya., Novakovsky I.O. (2023) Pravovi zasady i dosvid rozroblennya rehional'nykh prohram vykorystannya ta okhorony zemel'. [Legal basis and experience of development of regional land use and protection programs]. Zemleustriy, kadastr i monitorynh zemel' No. 2, 4-14. DOI: <http://dx.doi.org/10.31548/zemleustriy2023.02.01>

UDK 332.3:332.27

**LAND USE PLANNING AND PROBLEMS OF LAND USE CONTROL
AND PROTECTION IN UKRAINE**

L. Novakovskyi, Doctor of Economics, Professor, Academician NAAS,
National Academy of Agrarian Sciences of Ukraine,

Email: novmailll@ukr.net

ORCID: 0000-0002-2561-918X

I. Novakovska, Doctor of Economics, Professor,
Corresponding member NAAS,

National University of Life and Environmental Sciences of Ukraine

Email: novakovska@nubip.edu.ua

ORCID: 0000-0002-1473-7543

Abstract. *The concept of the National Target Program for Land Use and Protection, approved by the Government in January 2022, defines the current state of land resources in the majority of the country as tense, and in some areas, as crisis-prone with a tendency to deteriorate. One of the reasons for the irrational use of land is the absence of a unified state system for their protection.*

This article explores the problems of improving the legal framework for special land protection in accordance with the provisions of Article 14 of the Constitution of Ukraine. Emphasis is placed on the need to codify the norms of the current legislation in accordance with the constitutional requirement and the official legal definition of this term. The unified land protection system should include a central executive authority responsible for land relations, returning the social, economic, and ecological functions of land preservation, rational use, and protection of land resources potential, as well as the

Scientific basis for sustainable development of urban land use

development and implementation of legislative norms and regulations for land protection, justified land use restrictions, ecological incentives, and land monitoring.

The state of scientific developments in land use forecasting and planning is examined, as well as the features of preparing predictive (pre-project) land management documentation. Legislative changes related to the preservation of agricultural agreements and the exemption from losses in agricultural production, caused by land withdrawal from circulation and their deterioration, are analyzed.

Proposals for reforming the land use and protection control system are substantiated, with a focus on concentrating state control in an executive authority that is independent and not responsible for implementing state land policy. This includes returning local councils' functions for self-governing control, aligning their powers with those of state bodies regarding land use and protection control, and creating a system of public control under the auspices of local councils and territorial communities.

Keywords: Forecasting, planning, land use, special land protection, land survey documentation.

Problem Statement:

The Constitution of Ukraine recognizes the societal significance of land for the Ukrainian people and the principles of its special protection as the country's primary national wealth. [1] The primary wealth of land is determined not by its market value indicators in a market economy but by its indispensability as a means of production in agriculture since nearly 98% of the total food production comes from the land. [2]

Comparisons regarding the use of the same land plot for agricultural production or the placement of industrial facilities based on the volume of production generated on this area are inappropriate. The value of industrial production is incomparably higher, but achieving food security and promoting sustainable agricultural development in the world ranks second among the

Scientific basis for sustainable development of urban land use

Seventeen Sustainable Development Goals defined by the United Nations Summit in 2015.

In the current legislation, the term "special protection" is replaced with the term "protection" as an object. [3] Soils are recognized as an object of special protection, [4] and there is no official legal definition of the term. We believe it would be appropriate to introduce an official definition of the term "special protection of land as the fundamental national wealth of Ukraine" into the Zakon Ukrayiny "Pro okhoronu zemel' " and codify the provisions of the Zemel'noho kodeksu Ukrayiny, Tsyvil'noho kodeksu Ukrayiny, Zakonu Ukrayiny "Pro okhoronu zemel'" and other legislative acts in accordance with Article 14 of the Constitution of Ukraine.

It is extremely important to specify the legal foundations, principles, and provisions for the implementation of this constitutional requirement. This includes establishing a unified land protection system and having a central executive authority responsible for implementing state policies in the field of land relations. Concentrating land management efforts on creating a favorable economic and environmentally safe environment, as well as fostering the development of productive forces in Ukraine, while returning to land use its social, economic, and ecological functions. Completing the development of regulations in the field of land protection and implementing a scientifically grounded system of land use restrictions and ecological incentives. Furthermore, improving control over land use and protection and monitoring land and soils.

The term "land use" is interpreted as a set of activities carried out by society in the process of studying, allocating, utilizing, and protecting land as the fundamental national wealth, with the purpose of placing productive forces, developing the national economy, and ensuring favorable living conditions for people. [5, 23]

Analysis of the latest research and publications.

Development of the National Target Program for the Use and Protection of Land in Ukraine, regional provincial programs for land use and protection, land relationship development, soil fertility restoration, and the Kyiv City Program related to the activities of the Main Research and Project Institute of Land Management, as well as the teams of regional research and project institutes of land management of the State Land Agency and the State Geodetic Service, as well as the municipal enterprise "Kyiv Institute of Land Relations" of the Kyiv City Council. The development of these programs was directly supervised by many researchers, including Dobryak D.S., Bystriakov I.K., Hutsuliak H.D., Dorosh Y.M., Mukhovykov A.M., Novakovskiy L.Ya., Palekha Yu.M., Tretyak A.M., and others. They have published scientific papers, articles, and prepared projects of regulatory acts on land use forecasting, as well as land use planning and protection. [6-11, 22, 24, 25]

Professors L.Ya. Novakovskiy and A.M. Tretyak generalized the scientific and methodological principles of preparing predictive (preliminary) and planning documentation, which was published in 2015 in the Land Management Handbook (Chapter 3, pp. 192-220) [9].

Due to the decentralization of governance and the reform of local self-government, professors Martyn A.G., Novakovska I.O., Dorosh O.S., Palekha Yu.M., and others have conducted research on the issues of improving territorial planning for territorial communities, including the features of developing land-use documentation and land management schemes in modern conditions. [12-14]

Additionally, attention should be given to a series of pilot projects for comprehensive spatial development plans for territorial communities in the Kharkiv region. These projects were developed by joint teams of developers of land management and urban planning documentation. These projects combine various types of land management and urban planning documentation into a single document, as required by legislation [15].

The purpose of the article is to develop proposals for the creation of a

Scientific basis for sustainable development of urban land use

system of legal acts for special land protection and normative documents for land use forecasting and planning in the field of land regulation and protection, as well as the compilation of relevant land management documentation.

The article analyzes the system of control over land use and protection as one of the most important factors in rationalizing land use and preserving and restoring land resources.

Materials and Methods of Scientific Research:

Depending on the research objectives, a dataset of legal acts and predictive documentation for land use and protection in Kyiv city and certain regions for the period 2001-2025 was analyzed. Various methods of analysis were applied, including monographic, systemic-analytical, and others.

Results of the Research and Their Discussion.

According to the Land Management Handbook, the forecast (preliminary) land management documentation includes:

Land use and protection programs (national, regional, local);

Land management schemes (administrative district, anti-erosion measures of gully-ravine systems, hydrographic basin). [9]

In the Ukrainian Law "Pro zemleustriy", the development of land management schemes for anti-erosion measures of the ravine-gully system and the hydrographic basin is not provided for, although such schemes were previously developed. Currently, technical and economic justifications for the use and protection of lands within the "respective administrative-territorial units are being developed. " [16]

The program has its main objectives: justifying the land needs of each sector of the national economy in accordance with their development forecasts and future placement; identifying lands that can be used to increase agricultural production or for non-agricultural purposes without compromising the stability of soil-biological ecosystems; determining the areas of land that require protective measures against adverse processes and factors; estimating the capital investments required to improve the utilization and protection of

Scientific basis for sustainable development of urban land use

agricultural lands, prioritizing actions, and assessing the economic efficiency of the planned measures.

The main provisions and proposals regarding the development of a nationwide land use and protection program have been discussed in the article "Land Management and Issues of Protecting the National Wealth," while the legal foundations and experience of developing regional land use and protection programs are outlined in an article with a similar title. [17]

Unfortunately, as of October 2023, according to the Concept of the nationwide program dated January 19, 2022, the government has not submitted the actual Program draft for consideration. Moreover, the changes to the Concept, which were influenced by the state of war, have not been implemented. This delay in submitting the Program draft for approval by the Verkhovna Rada of Ukraine hinders the rational redistribution of lands and the acceleration of investment projects aimed at restoring the economy during the state of war and the subsequent reconstruction period (over the course of 10 years following the cessation of the state of war).

Proposals were made to implement the mentioned projects on agricultural and/or industrial lands, excluding lands within the territories of regional centers, Kyiv, and Sevastopol, without changing their designated use, and without compensating for the damages and losses to agricultural production. [18] These projects do not align with the constitutional provisions regarding the special protection of lands and the provisions of Article 23 of the *Zemel'nyy kodeks Ukrayiny* regarding the priority of agricultural lands over other land categories.

The protection of land as a system of legal, organizational, economic, and other measures includes one of the most pressing and top-priority tasks of preserving agricultural and forest lands by preventing their unjustified withdrawal. To achieve this goal, compensation for losses of agricultural lands due to their removal from agricultural use has been introduced since 1962. In October 1991, the need to compensate for losses in forestry production was established. Norms for compensating losses have been established for each region based on the area of 1 hectare. Due to budgetary constraints, local

Scientific basis for sustainable development of urban land use

councils financed the vast majority of land conservation measures using funds from these sources.

The exclusion of compensation for agricultural production losses from the legislation as per Law No. 2698-IX dated October 19, 2022, raises concerns. Its title, "Pro vnesennya zmin do deyakykh zakonodavchykh aktiv Ukrayiny shchodo vidnovlennya systemy oformlennya prav orendy zemel'nykh dilyanok sil's'kohospodars'koho pryznachennya ta udoskonalennya zakonodavstva shchodo okhorony zemel'" [18] not only lacks logic but also fails to relate to the improvement of legislation.

Without any justification or publication in the first reading of the bill, an additional legal norm was introduced for the second reading, which has existed in Ukraine for over 60 years and essentially remains the primary financial resource for land protection. Since forested lands are mostly state-owned, their protection is more reliable, and losses in forestry production are still covered by the Law. Agricultural lands, which are objects of special state security, have not found protection among the elected representatives.

Root improvement requires a system of land use control and protection. Since Ukraine's independence, starting with the Land Code as of March 13, 1992, state control was exercised directly by the People's Deputies Council, the State Committee of Land Resources (Derzhkomzem), the Ministry of Environmental Protection, and other authorized state bodies.[19] With the establishment of a unified system of land authorities in 1996, practical state control was carried out by Derzhkomzem and its territorial bodies. There was no local or public control at that time. There were also no separate bodies for land use control within Derzhkomzem. Later, the State Land Inspection and then the central supervisory (control) body in the agricultural sector, coordinated by the Ministry of Agrarian Policy, were established.

Changes to the Regulation on the Implementation of Public Control were made in October 2012 and were revoked in April 2021. At the same time, the provision regarding self-government control was removed from the Land Code.

Currently, state control is entrusted to the State Geocadastre

Scientific basis for sustainable development of urban land use

(Derzhgeokadastr), and compliance with land protection legislation is overseen by the State Eco-Inspectorate (Derzhekoinspektsiya). This control is also carried out by the executive committees of rural, township, and city councils, where they acquire authority when the respective council decides to conduct such control.

The existing control systems had several serious shortcomings. Primarily, the control was limited to checking land ownership and documentation. The fertility status of the soil, its dynamics, and soil cover monitoring were rarely conducted. Local self-government bodies lacked legislatively defined tools to ensure effective control.

The delegation of powers to the State Geocadastre for the implementation of state control over activities within its scope (land management, state geocadastre, land protection, land and soil monitoring) lacks any logical consistency. Due to the absence of necessary land-use documentation, both quantitative and qualitative land accounting has been neglected. The current state of monitoring does not allow for analysis or the determination of forecast indicators for land use development. According to data from the State Statistics Service, between 2015 and 2020, the area of cultivated land increased by 216,000 hectares (0.26%). According to the Concept approved by the Cabinet of Ministers on January 19, 2022, it is planned to reduce the amount of arable land in Ukraine by 10.2 million hectares over a 10-year period.[2] During the decade from 2011 to 2020, the area of arable land decreased by 813,000 hectares.

Since January 1, 2016, the accounting of land quantities under Forms 6-zem and 2-zem has been discontinued. The quantitative accounting as envisaged by the new forms approved from July 1, 2016, is not being carried out. Without land monitoring and the accounting of their qualitative characteristics, there is no basis for managing soil fertility processes, land protection, land management, control over land use, and land protection. The State Inspection is unable to exercise full state control over compliance with land protection legislation.

Scientific basis for sustainable development of urban land use

The criticism also extends to the amendment of the law regarding the implementation of state control by the executive bodies of rural, township, and city councils only if the respective council decides to carry out such control. In the event that the council does not make this decision, it seems peculiar for the state to abstain from exercising control over a part of the country's territory, which amounts to shirking its national responsibilities. In this regard, the self-government control over land use and protection, which existed previously, was not contingent upon the council's decision to conduct or not conduct control. It was, in essence, universal. Furthermore, it was legally mandatory, and it should have been retained, aligning the fundamental rights of local councils as entities of control with those of state authorities.

The possibility of implementing control by independent bodies is not ruled out, which could be achieved through the reorganization of the State Geocadastre or by excluding the provisions regarding the necessity of resolving control issues through the sessions of the relevant councils, significantly expanding their powers (Article 61).

The primary goal of both state and public control over land use and protection remains the preservation of the potential of agricultural agreements in the face of global climate change, further development of the land market, and decentralization of power, as well as the revival of production in the post-war period.

Conclusions

The absence of a system of regulatory acts, normative documents, especially norms and rules in the field of land management, norms for land protection, and soil fertility restoration, hinders the rational use and proper protection of land. Among them, a decisive role belongs to the specification of the legal foundations, principles, and provisions for implementing the constitutional requirement for special land protection as the country's main national asset. The creation of a unified land protection system with a central executive authority responsible for implementing state policy in the field of land relations and focusing on land management to create an economically and

Scientific basis for sustainable development of urban land use

environmentally safe environment and promote the development of productive forces in the country should be considered the main tasks of land protection activities in the post-war period.

According to the Konstitutsiia Ukrainy, Zemel'noho kodeksu Ukrainy, Zakoniv Ukrainy "Pro zemleustrii", "Pro okhoronu zemel'", "Pro derzhavni tsil'ovi prohramy" land management documentation for forecasting and planning land use should include:

- a nationwide target program for land use and protection;
- regional programs for land use and protection in the autonomous republic of ARK and regions;
- programs for land use and protection in the cities of Kyiv and Sevastopol;
- land management schemes for administrative-territorial units;
- land management schemes for the territories of territorial communities;
- comprehensive plans for spatial development of the territory of territorial communities.

"State programs for economic, scientific-technical, social, national-cultural development, environmental protection, as stipulated by Article 85 of the Constitution of Ukraine, are approved by the Verkhovna Rada of Ukraine." [1] Therefore, their development is a constitutional obligation. The fundamental Law (Articles 116, 119, 138, 142) also regulates matters related to land relations, which are implemented by the Cabinet of Ministers, the Council of Ministers of the Autonomous Republic of Crimea, local self-government bodies, and executive authorities at the respective levels regarding the development of programs (schemes).

State and territorial programs, land use schemes of administrative districts, and territorial community areas must include sections on erosion control measures. Particularly relevant in times of a state of war and during the recovery period is the demining of territories, land reclamation of agricultural lands, and the use of technogenically polluted lands.

Scientific basis for sustainable development of urban land use

Preserving agricultural lands, their priority, and preventing unjustified land seizures require the revision of legislation regarding compensation for agricultural production losses.

Improving the land use monitoring system is impossible without the implementation of advanced information technologies and materials for remote Earth sensing.

References.

1. Konstytutsiya Ukrayiny vid 28.06.1996 r. № 254k/96-VR. URL: <https://zakon.rada.gov.ua/laws/show/254%D0%BA/96%D0%B2%D1%80#Text>
2. Rozporyadzhennya Kabinetu Ministriv Ukrayiny vid 19.01.2022 r. № 70. "Pro skhvalennya Kontseptsii Zahal'noderzhavnoyi tsil'ovoyi prohramy vykorystannya ta okhorony zemel'" URL: <https://zakon.rada.gov.ua/laws/show/70-2022-%D1%80#Text>
3. Zakon Ukrayiny vid 19.06.2003 r. № 962-IV -VR "Pro okhoronu zemel'". URL: <https://zakon.rada.gov.ua/laws/show/962-15#Text>
4. Zemel'nyy kodeks Ukrayiny vid 25.10.2001 r. № 2768-III. URL: https://zakononline.com.ua/documents/show/224977_563543
5. Novakovska, I.O. (2018) Ekonomika zemlekorystuvannya [Economics of land use]. K.: Agrarian. science, 400
6. Rishennya Kyyivs'koyi mis'koyi rady vid 21.12.2006 r. № 485/542 "Pro zatverdzhennya Prohramy vykorystannya ta okhorony zemel' mista Kyyeva na 2006 - 2010 roky". URL: <http://consultant.parus.ua/?doc=053BXFCAB1>
7. Rishennya Kyyivs'koyi mis'koyi rady vid 14.07.2016 r. № 729/729 "Pro zatverdzhennya Mis'koyi tsil'ovoyi prohramy vykorystannya ta okhorony zemel' mista Kyyeva na 2016-2020 roky". URL: [file:///C:/Users/novma/Downloads/729-729%20\(1\).pdf](file:///C:/Users/novma/Downloads/729-729%20(1).pdf)
8. Rishennya Kyyivs'koyi mis'koyi rady vid 07.10.2021 r. № 2727/2768 "Pro zatverdzhennya Mis'koyi tsil'ovoyi prohramy vykorystannya ta okhorony zemel' mista Kyyeva na 2022-2025 roky". URL: <https://ips.ligazakon.net/document/MR212854>
9. Novakovskiy, L. Ya. ed. (2015) Dovidnyk iz zemleustroyu [Handbook of land management]. 4th type processing and additional Kyiv: Agrar. science. 516
10. Novakovska, I.O. (2016) Upravlinnya mis'kym zemlekorystuvannyam. [Management of urban land use]. K.: Agrarian. Science, 304
11. Novakovskiy, L.Ya. (2020) Chom, chom, zemle moya: rozdumy pro zemlekorystuvannya [Why, why, my land: reflections on land use.] Kyiv: Agrarian science, 516
12. Martyn, A.G. (2023) Prostorove planuvannya v Ukraini: vyklyky voyennoho chasu ta pislyavoyennoho vidnovlennya [Spatial planning in Ukraine: challenges

- of wartime and post-war reconstruction.] Proceeding of the international conference. Planning and use of territories within the context of inclusive development. URL: https://repo.btu.kharkov.ua/bitstream/123456789/37547/1/MMNPK_Planning_and_use_of_territories_within_the_context_of_inclusive_development_2023-199-201.pdf
13. Novakovska, I.O. (2022) Suchasni problemy zemleustroyu v konteksti okhorony zemel' [Modern problems of land management in the context of land protection]. Land management, cadastre and land monitoring, 3, 4-17. doi: http://dx.doi.org/10.31548/zemleustriy_2022.03.01
 14. Dorosh, O., Dorosh, A., Zastulka, I.-O. (2022) Sotsial'no-ekonomichni parametry funktsiy terytoriyi terytorial'nykh hromad u konteksti prostorovoho planuvannya [Socio-economic parameters of the functions of the territory of territorial communities in the context of spatial planning]. Land management, cadastre and land monitoring, 2, 43-53. doi: http://dx.doi.org/10.31548/zemleustriy_2022.02.04
 15. Kompleksni plany prostorovoho rozvytku terytoriy Rohans'koyi ta PISOCHYNS'KOYI hromad Kharkivs'koho rayonu Kharkivs'koyi oblasti. URL: <https://nubip.edu.ua/node/105324>
 16. Zakon Ukrainy vid 22.05.2003 r. № 858-IV "Pro zemleustriy". URL: <https://zakon.rada.gov.ua/laws/show/858-15#Text>
 17. Novakovskiyi, L.Ya., Novakovska I.O. (2023) Pravovi zasady i dosvid rozroblennya rehional'nykh prohram vykorystannya ta okhorony zemel' [Legal basis and experience of developing regional land use and protection programs]. Land management, cadastre and land monitoring, 2, 4-14. doi: <http://dx.doi.org/10.31548/zemleustriy2023.02.01>
 18. <https://zakon.rada.gov.ua/laws/show/2698-20#Text>
 19. Zemel'nyy kodeks Ukrainy v redaktsiyi Zakonu Ukrainy № 2196-XII vid 13.03.1992 r. Zemel'ne zakonodavstvo Ukrainy. U 2-kh knyhakh. Kn. 1-sha – K.: Urozhay, 2002, 102-150
 20. Zakon Ukrainy vid 18.03.2004 r. № 1621-IV "Pro derzhavni tsil'ovi prohramy". URL: <https://zakon.rada.gov.ua/laws/show/1621-15#Text>
 21. Postanova Kabinetu Ministriv Ukrainy vid 31.01. 2007 r. № 106. «Pro zatverdzhennya Poryadku rozroblennya ta vykonannya derzhavnykh tsil'ovykh prohram» URL: <https://zakon.rada.gov.ua/laws/show/106-2007-%D0%BF#Text>

Scientific basis for sustainable development of urban land use

22. Iryna Novakovska, Volodimir Bulgakov, Semjons Ivanov, Imars Dukulis.(2018) Formation of sustainable land-use systems in erosion dangerous landscapes. Proceeding of the 17 International Scientific Conference. Engineering for rural development. Volume 17, May 23-25, 2018/ Latvia University of Life Sciences and Technologies Faculty of Engineering. 378 – 386. doi: 10.22616/ERDev2018.17.N489
23. Novakovska, I.O., Kustovska, O.V. (2022). Economics of land use and land management. Part I. Kyiv: NUBiP of Ukraine, 408
24. O.H., Tarariko, T.V., Iliencko, T.L., Kuchma, I.O., Novakovska. (2019) Satellite agroecological monitoring within the system of sustainable environmental management. Agric. sci. pract. 6(1). 18-27. doi: <https://doi.org/10.15407/agrisp.6.01.018>
25. Novakovska, I.O., Hun'ko, L.A., Dolyns'kyy, I.M. (2023). Naukovi zasady staloho rozvytku mis'koho zemlekorystuvannya [Scientific principles of sustainable development of urban land use]. K.: Vydavnychyy tsentr NUBiP Ukrayiny, 243

L. Ya. Novakovskiy, T.O. Yevsyukov, I.O. Novakovska (2022). Upravlinnya zemlekorystuvannyam: problemy okhorony osnovnoho natsional'noho bahat-stva. [Land use management: problems of protecting the main national wealth]. Zemleustriy, kadastr i monitorynh zemel'.No. 1, 4-17. DOI: <http://dx.doi.org/10.31548/zemleustriy2022.01.01>

UDC 332.3:332.27

LAND USE MANAGEMENT: PROBLEMS OF PROTECTION OF BASIC NATIONAL WEALTH

*L Novakovskiy, Doctor of Economics, Professor, Academician of NAAS, National Academy of Agrarian Sciences of Ukraine,
T. Ievsiukov, Doctor of Economics, Professor, National University of Life and Environmental Sciences of Ukraine,
I. Novakovska, Doctor of Economics, Associate Professor, Corresponding Member of NAAS National University of Life and Environmental Sciences of Ukraine*

Abstract. *The Ukrainian people, with the votes of 90.3% of those who took part in the All-Ukrainian referendum on December 1, 1991, in support of the Declaration of Independence of Ukraine, confirmed their right to land established by the Declaration of State Sovereignty of Ukraine. According to the Constitution of Ukraine, the land is recognized as the main national wealth, which is under the special protection of the state.*

The State Committee of Ukraine for Land Resources was established in 1992 which was directly subordinated to the Cabinet of Ministers and implemented the state policy in the field of land relations was carried out by the said central executive body. Beginning in 2000, the State Committee was transformed into the State Agency, which in 2008 was reorganized into the State Committee, then returned to its previous name, and in 2014 was transformed into the State Service of Ukraine for Geodesy, Cartography, and Cadastre (State Geocadastre). For the latter body, the powers to implement state policy in the field of geospatial data infrastructure, topographic, geodetic, and cartographic activities instead of implementing state policy in the field of

land relations became decisive.

Land relations are public relations concerning the possession, use, and disposal of land. They are represented by a separate branch of law - land, which belongs to its profiling branches. This branch exists in direct connection with the basic (fundamental) branches of law that regulate primary social relations. Topographic, geodetic, and cartographic activities, the sphere of the national infrastructure of geospatial data do not belong to land relations. The activities of the State Agency have been directed and coordinated by five Ministries for 17 years. The implementation of state policy in the field of land relations has become a secondary task for the second body.

The purpose of the study is to analyze the process of transformation of public authorities on the formation and implementation of state land policy, its impact on land use in the state, and justification of directions and ways to preserve the main national wealth.

It is established that imperfection in the field of land use and protection management and the lease model of agricultural land use have deprived the economic motivation to introduce soil protection technologies in production, due to which most of the soil cover is in pre-crisis condition. A stable negative balance of humus, nitrogen, phosphorus, and potassium has been formed in the agroecosystems.

That was recognized as an urgent comprehensive program to neutralize challenges and threats in the environmental sphere, the National Security and Defense Council adopted a decision on this issue in March 2021. The paper focuses on the reference to state control of land use, supports the idea of improving the content of land monitoring and the procedure for its conduct, suggests ways to increase the role of state bodies in improving the land management system

Key words: *land use management, land protection, land relations, land management, land monitoring, soil fertility.*

Analysis of recent research and publications.

Over the last decade, the topic has widened and the relevance of research in the field of agri-food complex and nature management in Ukraine has increased. The scientific activity of many scientists in the field of land relations

Scientific basis for sustainable development of urban land use

was highly appreciated in October 2020 by the scientific community of the National Academy of Agrarian Sciences of Ukraine (NAAS). Corresponding members of NAAS V.Velychko and Sh.Ibatullin was elected a full member (academician) of NAAS in the specialty “agrosoil science and soil cartography”, “economics of nature”, respectively. Corresponding members of NAAS at the same time were J.Dorosh - in the specialty “land management and cadastre”; A.Martin - in the specialty “public administration and administration (innovative development of land relations)”; I.Novakovskaya - in the specialty “public administration and administration (land use)”.

The publication in 2015 of the fourth edition (revised and supplemented) of the Handbook of Land Management edited by Academician of NAAS L.Novakovsky circulation of 2.5 thousand copies [1]. The directory is designed for employees of executive authorities and local governments, employees of land and environmental services, specialists of land management organizations and business structures in the field of land management, scientists, teachers and students of higher education. The previous Handbook of Land Management (third edition) was published in 1989, 32 years ago.

Three editions have a monographic study of scientists D.Dobryak, A.Kanasha, D.Babmindry, I.Rozumny “Classification of agricultural lands as a scientific prerequisite for their ecological use” (K, Harvest. - 474 p.). Monographs and textbooks on the problems of land use economics, land management, land use management. protection and monitoring of lands published by domestic scientists S.Balyuk, V.Velychko, J.Dorosh, O.Dorosh, A.Martin, W.Medvedev, I.Novakovskaya, O.Tarariko, A.Tretyak, M.Khvesyk and others. [2,3,4,5, 6,7, 8] The number of scientific publications in domestic and foreign journals has increased, including those included in the international scientometric databases Scopus and WoS.

However, the issues of improving the land management system in Ukraine, the scientific formation of the status of protection of national wealth and ways to support it require additional research and discussions, discussions in scientific and public circles. strengthening the influence of the state and its bodies on the implementation of the constitutional provision on special protection of lands.

Research results and their discussion.

In the system of normative legal acts of Ukraine, as an independent state, the Land Code (as amended by the Law of Ukraine № 2196-12 of March 13, 1992) has become basic in the field of land legislation since 1992, which clearly defines the competence of rural, urban, urban, district, regional councils, the Republic of Crimea, Ukraine in the field of regulation of land relations. State administration in the field of land use and protection under this Code was carried out by the Cabinet of Ministers of Ukraine, the Government of the Republic of Crimea, local councils and local state administrations, the State Committee of Ukraine for Land Resources, the Ministry of Environmental Protection of Ukraine and other specially authorized state bodies. [9]

According to the Regulations, the State Committee of Ukraine for Land Resources (Derzhkomzem) has become the central executive body subordinated to the Cabinet of Ministers of Ukraine, which implements the state policy in the field of land relations and carries out land reform. Its main tasks were: coordination of land reform; implementation of state control over the use and protection of land resources; maintaining the state land cadastre, land monitoring, land management; development and implementation of state programs related to the regulation of land relations, rational use and protection of land, restoration of soil fertility. [10]

On January 1, 2002, the new Land Code of Ukraine entered into force, which was adopted on October 25, 2001. “The powers of the central executive body for land resources in the field of land relations under this Code included: ensuring its implementation; coordination of land reform works; participation in the development and implementation of national, regional land use and protection programs; maintaining the state land cadastre, including state registration of land plots; implementation of land management, land monitoring and state control over land use and protection. [11]

Thus, there were no significant differences between the powers under the Law and the main tasks of the central body for land resources under the Regulations, although the State Geocadastre was transformed into the State Land Agency in August 2000. The exception, when the State Land Agency was again transformed into the State Geocadastre with the direct subordination of the Cabinet of Ministers of Ukraine, is April 2008 - April 2011.

Scientific basis for sustainable development of urban land use

According to the Regulations on the State Geocadastre, approved with changes in December 2021, its main tasks are state control over the use and protection of lands of all categories and forms of ownership, soil fertility.[12] Thus, the implementation of public policy by type is ranked as follows: in the first place - the national infrastructure of geospatial data, in the second - topographic and geodetic activities, in the third - cartographic activities, the fourth is the field of land relations. The fifth type is land management, the sixth is the State Land Cadastre, and the seventh is state control over land use and protection and soil fertility. Thus, the implementation of state policy in the field of land relations has become a secondary task, and the functions of land protection and soil fertility have moved to last place.

Land relations and activities (geodetic, cartographic), as we know - are different concepts. Land relations are social relations represented by a separate branch of law - land. According to the fundamental norms of law, land law refers to its profiling branches (special, concretizing), which exist in direct connection with the basic (fundamental) branches that regulate the primary social relations. In this regard, Chapters 3 and 4 of the Land Code of Ukraine, which establish the powers of the Verkhovna Rada of Ukraine, local governments, executive authorities, namely in the field of land relations. Only two articles - 15 and 15 'of Chapter 3 concern the powers of the Ministry of Agrarian Policy of Ukraine and the State Geocadastre of Ukraine in the field of land relations. Thus, Chapter 3 of the Code, given its title, should regulate the powers of all executive bodies in the field of land relations, but for two out of nine this regulation applies to the field of land relations. However, since the entry into force of the Code (January 1, 2002), the powers of the executive in the field of land relations have not existed at all. For the Ministry of Agrarian Policy and the State Land Agency, they appeared only in 2012 according to the Law № 5462-VI of 16.10.2012 on changing their activities, while 7 articles of this chapter of the Code continue to regulate land relations, including the Cabinet of Ministers Of Ukraine, Ministry of Environment of Ukraine.

Analysis of changes in the main tasks of the State Land Committee (1996); According to their Regulations, the State Geocadastre (2015, 2021) testifies to the additional implementation of the state policy in the field of national geospatial data infrastructure in 2021, topographic, geodetic and

Scientific basis for sustainable development of urban land use

cartographic activities in 2015. Probably because of this, the central executive body that implements the state policy in the field of land relations by law was named in 2014 the State Service of Ukraine for Geodesy, Cartography and Cadastre. However, it is difficult to explain why the powers of the State Geocadastre in the field of land relations under Article 15 of the current Land Code of Ukraine (as amended on 01.01.2022) do not implement state policy in the field of topographic, geodetic and cartographic activities, land management. Participation in the formation and implementation of state policy in the field of national geospatial data infrastructure is one of his penultimate powers. As is known, topographic, geodetic and cartographic activities and the sphere of national infrastructure of geospatial data do not belong to land relations, and the implementation of land management, of course, is part of the field of land relations.

The transformation of the specially authorized body for land resources covers the period from 2000 to 2021. The central body of executive power, which implements the state policy in the field of land relations, was established in 1992 to implement the resolution of the Verkhovna Rada of December 18, 1990 “On Land Reform”. Until August 2000, this body was called “Derzhkomzem Ukrainy” and was directly subordinated to the Cabinet of Ministers of Ukraine, in 2000 it was transformed into the State Agency of Land Resources, which in April 2008 was transformed into Derzhkomzem. again by the Agency. In September 2014, the State Land Agency was reorganized into the State Service of Ukraine for Geodesy, Cartography and Cadastre.

The activities of this central executive body since 2000 have been directed and coordinated by the heads of the Ministry of Environmental Protection, the Ministry of Agrarian Policy and Food, the Ministry of Regional Development, Construction and Housing, and the Ministry of Economic Development, Trade and Agriculture.

In 2021, the State Geocadastre of Ukraine returned to the Ministry of Agrarian Policy of Ukraine. So, for almost 17 years, its activities have been directed by five ministries. During this period, the Agency and the Service were managed by 16 specialists.

The role of land management in the state in the post-reform period has declined significantly. This is especially true of land protection, land use

Scientific basis for sustainable development of urban land use

consolidation, land conservation. The network of research and design institutes of the State Geocadaastre has shrunk. The Central Institute and seven regional institutes are under reorganization. The research and design potential of institutions is lost, which will not allow to conduct at the appropriate level of land use forecasting, development of comprehensive design and estimate documentation on the land of territorial communities in the context of global climate change. [13]

As the central executive body implementing state policy in the field of land relations, the State Geocadaastre of Ukraine since its inception (2014) has lost state land resources, as the first and second place among the main tasks shifted the implementation of this policy in the field of topography, geodetic and cartographic activities. The implementation of state policy in the field of land relations was the third in a row, and the direction and coordination of the State Geocadaastre began to be carried out by the Ministry of Regional Development of Ukraine. The very name of the body - the State Service for Geodesy, Cartography and Cadastre does not contain land, land relations or the name of the cadastre, although in addition to the land cadastre, we have 14 cadastres of other natural resources. Thus, land, as an indispensable natural resource and the main national wealth of the state according to the Constitution of Ukraine, does not have a central executive body for land management, unlike bodies that operate for water and forest resources management. This had an extremely negative impact on land protection, soil fertility restoration, protection against anthropogenic impact and unjustified seizures.

Many officials have repeatedly stressed that the State Geocadaastre in our country has become a service that provides services to the population and information on land use. And who then will ensure the implementation of state policy in the field of land relations, land protection, preservation of soil fertility, land use regulation to the conditions of climate change? A rhetorical question that has been answered. Ukraine's main national wealth, its land, cannot be left defenseless in the future.

At the initiative of the Presidium of the National Academy of Agrarian Sciences of Ukraine in October 2017, an All-Ukrainian round table was held on the topic: "Monitoring and protection of land: areas of revival". He testified to the exceptional importance of improving public administration in the field of

Scientific basis for sustainable development of urban land use

land use and protection to ensure economic growth of the country, maintaining the optimal state of the environment, development of the Ukrainian countryside. Given the scale of the negative phenomena and their threat to food, environmental and economic security of the state, scientists have proposed to concentrate the Department of Land Use and Protection in the Ministry of Agrarian Policy and Food of Ukraine. It is advisable to establish an appropriate Department or Directorate, to develop and adopt a National Program of Land Use and Protection, to take measures to implement the National Action Plan to combat land degradation and desertification, to establish an innovative fund for land protection. Academicians S.A. Balyuk, A.S. Danylenko, OI Furdychko On October 27, 2017, they sent an appeal to the leadership of the state to overcome the crisis situation in the field of land protection. [7] Unfortunately, no concrete measures on this issue were taken by the Government during 2018-2020.

Soil resources are the basis for the development of the agricultural sector of the country's economy and ensuring a favorable environment for human health. Therefore, the protection and rational use of land is an important component of national security, especially in connection with recent climate change. In terms of the quality of soil resources, Ukraine still occupies one of the leading places in the world, and the concept of "Ukrainian chernozem" remains our image feature. After all, the land fund of our country consists of almost 2/3 of chernozems and meadow-chernozem soils, which are characterized by a deep humus layer, agronomically valuable grain structure, almost ideal structure density, significant supply of nutrients, which determines their high potential fertility. [14]

Ukrainian chernozems make up 8.3% of the area of these soils in the world and 28.5% in Europe. Chernozems are the predominant part of the main national wealth - land. However, shortcomings in land management and the leasing model of agricultural land use, in which agribusiness has been deprived of economic motivation in recent decades to implement soil protection and resource-saving technologies in agricultural production, have led to the fact that most soils are already in crisis before the crisis. condition with a tendency to deteriorate. [15] Due to global climate change, the consequences of the crisis in the soil have become even more tangible and threatening, as evidenced by the results of management in the southern regions of Ukraine in 2020.

Scientific basis for sustainable development of urban land use

The main problem is soil degradation, the intensification of which reflects the contradiction between the national interests of preserving the quality of the country's soil resources and the private interests of obtaining a quick profit from economic activity. In particular, due to excessive plowing of lands (54% of the entire territory of Ukraine against 35% in European countries), the area of eroded arable land has now increased to 10.6 million hectares. Up to 500 million tons of topsoil are washed away from arable land annually, which loses 24 million tons of humus. In terms of acidity, salinity, salinity, compaction and pollution, some lands are also in a pre-crisis state. Only 0.22-0.28 tons of manure are applied per hectare of arable land instead of 6.2 tons of fertilizers applied in 1990. Due to this, a stable negative balance of humus, nitrogen, phosphorus and potassium was formed in agroecosystems. At the same time, Ukraine, as an exporter of agricultural products, actually exports a significant amount of nutrients to the country every year, which is not fully compensated by their receipt in the soil.

However, since 2004 the State Program of Land Use and Protection, the development of which was envisaged by the Law of Ukraine "On Land Protection" (2003), has been postponed and has not yet been adopted. In fact, the financing of works on land protection and preservation of soil fertility at the expense of the State budget has been stopped. Land monitoring has been neglected due to the lack of information in the State Land Cadastre on the quality of land and soils due to the late conduct of large-scale soil surveys in Ukraine. [16] With the introduction of the land market, the attention of the executive authorities is focused on the organization of purchase and sale of land, holding auctions for land redistribution, and so on. Issues of protection of land resources, preservation of soil fertility have become secondary in the activities of public authorities and local governments.

At the same time, the problems of overcoming hunger, achieving food security, improving nutrition and promoting sustainable agricultural development have become much more complicated, and among the 17 Sustainable Development Goals set by the UN Summit in September 2015, they are in second place.

By the decision of the National Security and Defense Council, enacted by the Decree of the President of Ukraine of March 23, 2021 № 111/2021 "On

Scientific basis for sustainable development of urban land use

challenges and threats to national security of Ukraine in the environmental sphere and priority measures to neutralize them” develop and approve the National Action Plan for Environmental Protection for 2021 - 2025; to submit to the Verkhovna Rada of Ukraine a draft law on soil conservation and protection of their fertility; develop and approve within six months the concept of the state program of land use and protection. It is envisaged to ensure that measures are taken within six months to: conduct continuous soil surveys of the lands of Ukraine; settlement of land allocation issues for removal of degraded and erosively dangerous lands from arable land, their afforestation and bequests; restoration of peatlands, wetlands, meadows, steppes and other valuable natural ecosystems; achieving a neutral level of land degradation in the following areas: maintaining the content of organic matter (humus) in soils, restoration and sustainable use of peatlands, as well as restoration of irrigation and improvement of ecological and reclamation of irrigated lands.

Local executive bodies are instructed to take measures to carry out work on conservation of degraded, man-made and unproductive lands, reclamation of disturbed lands.

The decision of the National Security and Defense Council to neutralize challenges and threats can be considered an extremely relevant comprehensive program for the next decade, the implementation of which is impossible without proper state control and adoption of relevant legal documents. First of all, it concerns the organization of the system of management and control of land use and protection, monitoring of soils and land resources. The essence of land use control must be changed, as land protection is under special protection of the state and must be carried out by a single state body. Supervision and control of agricultural land use should provide for compliance with land protection standards and preservation of soil fertility by analogy with the system of economic incentives operating in the European Union under the common agricultural policy. [6]

Since 1993, by the decision of the Government, land monitoring has been introduced in Ukraine, which was entrusted to the State Committee of Ukraine for Land Resources. [18] According to the Law on Land Protection in 2003, the Ministry of Agrarian Policy was instructed to monitor soils and agrochemical survey of agricultural lands. [19] In 2017, it was decided to monitor land

Scientific basis for sustainable development of urban land use

relations in Ukraine. Similar monitoring is not carried out in the countries of the European Union. On December 9, 2021, according to the resolution of the Cabinet of Ministers of Ukraine, it was decided to monitor the land market.

So now we have four types of monitoring related to land use and protection. Conducting three of them - monitoring of land, land relations, land market should provide State Geocadastr, and one - soil monitoring; their fertility - instructed to lead the Ministry of Agrarian Policy. However, the monitoring system in Ukraine is not actually functioning. There are many reasons for this. First of all, it is unsatisfactory quantitative accounting of land. With the introduction of an automated system of state land cadastre, we hoped that the number of lands will be easy to determine as the sum of land areas, land tenure and land use of administrative-territorial units and abolished the forms of quantitative accounting of 2-land and 6-land. had relevant information. Currently, there is comprehensive information only as of January 1, 2016. The occupancy of the land cadastral system as of January 1, 2022 reached 70%. That is, 30% of the country's territory does not have data on quantitative land accounting. It remains to be seen when the land cadastral system will be 100% full or start keeping records on the new forms of 11-lands, 12-lands, 15-lands, 16-lands, which were approved by the Ministry of Regional Development on December 13, 2015. According to them, accounting should have started on July 1, 2016. As for the accounting of the quality of land, it is associated with the completion in 1961 of the all-Ukrainian continuous large-scale survey of soils and the correction of these materials. From 1961, by law, we should conduct at least three rounds of soil surveys (15-20 years each). However, this was not done due to the lack of necessary budget funds and huge amounts of work. Decisions repeatedly made by the Government on this issue have not been implemented. It should be acknowledged that there is currently no necessary information support for real-time monitoring of lands and soils. [20]

Introduced in early 2019 by the World Bank satellite monitoring of agricultural land use in Ukraine in the presence of many positives is not able to ensure the receipt of quantitative indicators necessary for the introduction of economic levers.

In this regard, the proposals of the NAAS Institute of Land Use to introduce a modern model of monitoring using the latest geographic

Scientific basis for sustainable development of urban land use

information technologies, remote sensing methods, artificial intelligence algorithms, considered by the NAAS Branch Meeting on December 15, 2021, should be considered particularly relevant. For research, it could be considered as an object of monitoring of agricultural land (according to the classification of land categories); agricultural land (according to the land accounting system existing in the countries of the European Union); agricultural land (according to national classifiers). However, the authors have chosen agricultural land use as a whole, ie the land use system, and we support this proposal.

The term “land use” as a type of nature use is interpreted as a set of measures taken by society in the study, distribution and protection of land as the main national wealth in order to accommodate productive forces, develop the economic complex, provide favorable living conditions. [21]

The introduced monitoring system will cover the whole complex in different sections: administrative division, agricultural zoning, functional zoning, economic and agri-environmental zoning, the dynamics of land rights. the effect of restrictions on land use, etc.

The novelty is the developed algorithms for automated recognition of crops, boundaries and areas by satellite images and the ability to identify types of land, crop status, varieties, area configuration, and other aspects of land use. The analysis of land market transactions, which has been conducted since July 1, 2021, is also noteworthy.

Thus, the system of monitoring agricultural land use could unite the existing four types of monitoring (land, land relations, soil, land market). A similar system could then be applied to the monitoring of non-agricultural land use. Increased monitoring of land use (or land monitoring) at the national and regional levels could ensure timely detection of changes, their assessment, as well as prevention and elimination of the consequences of negative processes. This is especially important for the activities of territorial communities, which own large areas of land. [22.23]

It is necessary to return land management functions due to its socio-economic and environmental nature, and focus on land management to create a favorable environmental environment and the development of productive forces of Ukraine, abandoning land surveying. Substantiation of the status of special protection of lands in Ukraine with the development of the relevant legal

Scientific basis for sustainable development of urban land use

framework remains an extremely important scientific problem. The state executive body, which ensures the implementation of state policy in the field of land relations, also performs tasks related to the functioning of the national infrastructure of geospatial data, topographic, geodetic and cartographic activities, which involve many ministries and departments. As a spatial basis, land combines other natural resources, and therefore the state land body cannot be coordinated by different ministries, but must be directly subordinated to the Cabinet of Ministers of Ukraine. This practice has previously taken place (1992-2000, 2008-2011). It should also have the appropriate name of this state body, for example, the National Land Service or the State Land Service.

Conclusions and prospects.

1. Taking into account the experience of other countries, it would be justified to reorganize the State Geocadastre into a central executive body that would ensure the formation and implementation of state policy in land relations, land use and protection, soil fertility, state land cadastre, land, and soil monitoring. within the framework of the national infrastructure of geospatial data, provided land management, topographic, geodetic, and cartographic works.

2. In accordance with the National Target Program for Land Use and Protection, the concept of which was approved by the Cabinet of Ministers of Ukraine on January 19, 2022, it is necessary to ensure the development of regional programs in each region and land management schemes and feasibility studies. units.

3. The status of special protection of lands according to the Constitution of Ukraine must be established by normative legal acts. It may include an appropriate scientific interpretation of the term, based on land protection and soil fertility standards, land use restrictions and economic incentives, and economic levers to protect and restore soil fertility.

4. It is expedient to establish the State Fund for Land Protection, as part of the State Budget of Ukraine, in order to finance measures related to the rational use and conservation of land resources, land management and monitoring of land and soil. This fund could be formed by paying landowners, and land users for violating norms, standards, regulations on land protection,

Scientific basis for sustainable development of urban land use

and compensation for losses of agricultural production associated with the seizure of land.

References.

1. Handbook of land management (2015) ed. L.A. Novakovsky. 4 species. rework. P. 492
2. Dorosh J.M., Dorosh O.S. (2017) Formation of restrictions and burdens in land use. textbook. P. 650
3. Medvedev V.V. (2012) Monitoring of soils of Ukraine. P. 536
4. Novakovska I.O. (2018) Economics of land use. textbook.. P. 400
5. O.H. Tarariko, T.V. Iliencko, T.L. Kuchma, I.O. Novakovska. Satellite agroecological monitoring within the system of sustainable environmental management archive of Agricultural Science and Practice Journal issues/ Agric. sci. pract. 2019; 6(1): 18-27. (DOI: <https://doi.org/10.15407/agrisp.6.01.018>)
6. Velichko V.A., Martin A.G., Novakovska I.O. (2020) Soil monitoring of Ukraine - problems of land management, soil science and scientific support. Bulletin of Agricultural Science. 7/808. 5-16 p.p. (DOI: <https://doi.org/10.31073/agrovisnyk202007-01>)
7. Balyuk S.A., Danilenko A.S., Furdichko O.I. (2017) Appeal to the state leadership to overcome the crisis in the field of land protection. Bulletin of Agricultural Science. №11. 5-8 p.p.
8. I.P. Kovalchuk, T.O. Evsyukov, I.A. Openko, R.V. Tykhenko, O.B. Shevchenko, (2019) Conceptual principles of creating a register of especially valuable lands in Ukraine: [monograph]. P. 480
9. Land Code of Ukraine: the Law of Ukraine (1992). Land legislation of Ukraine. In 2 books. Book 1st - K.: Harvest, 2002.- 102-150 p.p.
10. On approval of the Regulations on the State Committee of Ukraine for Land Resources: Decree of the President of Ukraine (1996) Available at: <https://zakon.rada.gov.ua/laws/show/340/96#Text>
11. Land Code of Ukraine (2001). Available at: <https://zakon.rada.gov.ua/laws/show/2768-14#Text>
12. On the State Service of Ukraine for Geodesy, Cartography and Cadastre: Resolution of the Cabinet of Ministers of Ukraine (2015) Available at: <https://zakon.rada.gov.ua/laws/show/15-2015-%D0%BF#Text>
13. Dorosh J.M., Martin A.G., Novakovska I.O. (2021) Development of land management science in Ukraine: history, modernity, prospects. Bulletin of agrarian science №.4. (99). 67-76 p.p. (DOI: <https://doi.org/10.31073/agrovisnyk202104-09>)

14. Iryna Novakovska, Volodimir Bulgakov, Semjons Ivanov, Imars Dukulis. Formation of sustainable land-use systems in erosion dangerous landscapes. 17 International Scientific Conference “Engineering for rural development”, Volume 17, May 23-25, 2018/ Latvia University of Life Sciences and Technologies Faculty of Engineering, p. 378 – 386 (DOI: 10.22616/ERDev2018.17N486)
15. Dobryak D.S., Shkuratov O.I., Evsyukov T.O., Sklyar Yu.L. (2018) Scientific bases of ecological and economic study of land resources. Balanced nature management. № 3. 106-112 p.p.
16. Novakovska I.O. (2016) Monitoring of agricultural land use. Bulletin of Agrarian Science. №4 63- 69 p.p.
17. On the decision of the National Security and Defense Council of Ukraine “On challenges and threats to national security of Ukraine in the environmental sphere and priority measures to neutralize them”: Decree of the President of Ukraine (2021) Available at: <https://zakon.rada.gov.ua/laws/show/111/2021#Text>
18. On approval of the Regulations on land monitoring: Resolution of the Cabinet (1993) Available at: <https://zakon.rada.gov.ua/laws/show/661-93-%D0%BF#Text>
19. On land protection: Law of Ukraine (2003) Available at: <https://zakon.rada.gov.ua/laws/show/962-15#Text>
20. T. Ievsiukov (2018) Legitimation of “Special Value” as a Tool of Legal Protection of Lands: the Case of Ukraine . Baltic Surveying, 2. Volume 9. – P. 24-29
21. Novakovskaya I.O. (2016) Management of urban land use: [monograph] 304 p.
22. L.Ya. Novakovskiy, I. O. Novakovska, O. O. Bredikhin, M. P. Stetsiuk, L. R. Skrypnyk. Municipalization of land management under conditions of power decentralization in Ukraine (2019) Укр. геогр. журн. 2019, 2(106) pp 13-21 (DOI: <https://doi.org/10.15407/ugz2019.02.023>)
23. L. Ya. Novakovskiy, I. O. Novakovska, O. O. Bredikhin, M. P. Stetsiuk, L. R. Skrypnyk Risks and problems of forming united territorial communities in Ukraine/ Agric. sci. pract. 2019. – 2. 66-75 p. <https://doi.org/10.15407/agrisp6.02.066>

Kulinich P.F., Novakovska I.O. (2022). Osoblyva okhorona zemel' Ukrayiny yak osnovnoho natsional'noho bahat-stva: teoretyko-pravovi aspekty. [Special protection of lands of Ukraine as the main national wealth: theoretical and legal aspects]. Zemleustriy, kadastr i monitorynh zemel' No. 2 pp. 97-106 DOI: <http://dx.doi.org/10.31548/zemleustriy2022.02.09>

SPECIAL PROTECTION OF THE UKRAINIAN LANDS AS THE MAIN NATIONAL WEALTH: THEORETICAL AND LEGAL ASPECTS

P. Kulinich, Doctor of Legal Sciences, Professor, Corresponding Member National Academy of Sciences of Ukraine, Institute of State and Law named after V.M. Koretsky National Academy of Sciences of Ukraine

I. Novakovska, Doctor of Economic Sciences, Associate Professor, Corresponding member of NAAS, National University bioresources and nature management of Ukraine

Relevance. Protection and rational use of land are recognized as one of the main tasks of society, since overcoming hunger and achieving food security are in second place among the 17 Sustainable Development Goals set by the United Nations. [1] The amount of food due to the use of land reaches 98%. At the end of 2021, Ukraine provided almost 10% of world wheat exports, 16% of corn and 55% of trade in sunflower oil.

Ukraine, having a land fund consisting of almost 2/3 of black soil and meadow-black soils, so far, occupies one of the leading places in the world in terms of the qualities of soil resources, and the concept of "Ukrainian black soil" remains our image brand. It is black soil that is an overwhelming part of the main national wealth, which characterizes the deep humus layer, also agronomically valuable structure, a significant supply of nutrients that determine their high potential fertility. [2]

In accordance with the concept of the national target program for the use and protection of land, which was approved by the Cabinet of Ministers of Ukraine the current state of the lands of the vast part of Ukraine is characterized as tense and sometimes crisis, with a tendency to worsen. The main reason for this situation is due to the irrational use of land, deterioration of their quality in

the absence of a unified state system of land protection. [3]

In connection with the armed Russian aggression against Ukraine, a significant part of the territory needs demining, cleaning of fortifications, including restoration of the surface layer of the soil.

The Constitution of Ukraine [4] as a legal act of the highest legal force in the state established that "land is the main national wealth, that is protected by the State" (Article 14). In this regard, there is a question about the legal content that the legislator has entered into this legal order, and how it should be reflected in the legislation, which is accepted and acts on its implementation.

Analysis of recent publications. The problem of legal support for the protection of land as the main national wealth of Ukraine was investigated by domestic soil scientists and economists S. Balyuk, L. Novakovs'kyy, O. Tarariko, as well as legal scholars V. Andreytsev, V. Yermolenko, T. Kovalenko, A. Miroshnychenko, V. Nosik, A. Ripenko, V. Sydor, M. Shul'ha. At the same time, their works are devoted to the analysis of only certain aspects of this problem.

The purpose of the article is to determine the content of the constitutional provision on land as the main national wealth, which is especially protected by the state, as well as the main directions of ensuring the implementation of this constitutional provision in the adopted The basic law of the country of legislative acts.

The results of the study

A characteristic feature of our Constitution, which distinguishes it from the constitutions of other states, is the granting of a special constitutional status to the country's land resources. It contains the social importance of the land for the Ukrainian people and the principle of its special protection, which are designed to ensure the rational use of land, reproduction and increase of soil fertility, proper regulation of land relations.

As an object of the law of the Ukrainian people, property obliges (Article 13). The use of property cannot harm the rights, freedoms and dignity of citizens, the interests of society, environmental situation and natural qualities of the land (Article 41).

In the system of laws as sources of land law of Ukraine, which determine the legal content of the concept of "land is the main national wealth", under

special protection of the state", the leading place is occupied by the Land Code of Ukraine [5] and the Law of Ukraine "On Land Protection" [6]. The Land Code is an integrating and cementing basis for the formation and development of land legislation, details and develops the provisions of the Constitution of Ukraine on the regulation of the regime of use and special protection of land as the national wealth of the country. The Law of Ukraine "On Land Protection" is a normative legal act in which legal norms regarding to protection of the country's land fund are most developed and detailed. The duty of the state to ensure special protection of land, that is enshrined in article 14 of the Basic Law of the country, is actually a public law norm, which may be an integral part of the field of public or public-private law. That is why land law as a public-private right of our legal system is designed to ensure the implementation of the constitutional provision that the land is the main national wealth, which is under the special protection of the state.

As for the Civil Code of Ukraine [7], which contains a separate chapter 27 "Ownership of land (land)", it is not a source of land law by direct indication of Article 9 of the Civil Code of Ukraine. It states that the provisions of this Code apply to the regulation of land relations (relations of nature management) only in the case of, when such relations are not governed by special legislation. Land legislation and is special in relation to civil in terms of regulation of land relations. Since the relations of land ownership are quite fully regulated by the Land Code of Ukraine, the provisions of Chapter 27 of the Civil Code of Ukraine do not apply to the regulation of land relations.

However, some norms of the Civil Code of Ukraine, which are not in the Land Code of Ukraine and other acts of land legislation, may apply to the regulation of land relations. For example, such norms include civil law provisions on combating illegal development of land plots and the implementation of unauthorized construction on them.

The relationship between land and civil law as a special and general branches of law in terms of regulation of land relations is due to the need ensuring the implementation of the constitutional provision that land is the main national wealth, which is under special protection of the state. Since the legal mechanism for its implementation is public law, and not private law, it cannot be formed through the norms of the private law industry, what is the civil law of

Ukraine.

The content of articles of the Constitution of Ukraine (Article 14), the Land Code of Ukraine (Article 1), the Civil Code of Ukraine (Article 373) indicate that they have one and the same constitutional version, namely "The earth is the main national wealth under the special protection of the state". At the same time, in the Law of Ukraine "On Land Protection", the provisions on the protection of land as national wealth do not fully comply with the content of the Constitution of Ukraine (Part 2, Article 14). First of all, instead of national wealth as an object of special protection, all lands within the territory of Ukraine are considered to be the object of this protection. Secondly, in the title of Article 2 of the Law "On Land Protection", land is recognized as an object of non-special protection, and the object of simply protection (ordinary protection), although further in the text of this article the land is recognized as an object of special protection.

Land as the main national wealth is associated by individual authors, only with agricultural lands that have fertility and are used for the production of agricultural products. Both in the Land Code of Ukraine and in the Law of Ukraine "On Land Protection", the terms "land protection" have the same wording. The term "soil protection" is defined in the Law "On Land Protection", but it does not apply in the text of the Law itself. As for the concept of "special protection of land", then for the object "all lands within the territory of Ukraine" and for lands as the main national wealth. There is no official interpretation

At the same time, we believe that the term "under special protection" used in relation to land as the main national wealth in Article 14 of the Constitution of Ukraine is not a political provision, but a legal order, ignoring which in the land legislation of Ukraine seems unacceptable. In our opinion, under the special protection of land as the main national wealth of Ukraine should be understood the right and obligation of the state to establish such a legal land regime, which is most in the interests of the Ukrainian people. It is the state, as an expression of the interests of the Ukrainian people represented by the Verkhovna Rada of Ukraine, that should implement such a legal mechanism of use in the legislation and protection of land resources, which ensures the most efficient use of land under the dominant condition of their

preservation as a means of production, operational basis and natural resource of current and future generations of the Ukrainian people.

In the Land Code of Ukraine and the Law of Ukraine "On Land Protection" the constitutional provision on land as the main national wealth, under special protection of the state, is detailed in the legal norms that determine the basic requirements for the protection of land resources of Ukraine.

First of all, this constitutional provision is manifested in the principles of land legislation (Article 5 of the Land Code of Ukraine), as well as in Section II of the "Land of Ukraine" regarding the categories of land that have a special legal regime; Section III – Right to Land; Section VI – Land protection; Article 150 " Especially valuable land and the procedure for termination of rights to them".

Therefore, the land is the main national wealth, which is under special protection of the law, the "red line" passes through the entire Code. In our opinion, the content of this article should be understood in such a way that the land acts as the main national wealth, which is especially protected by the state, in any land legal relations, including as legal relations the use and protection of land dominated by public law norms, and legal relations regarding the acquisition and implementation of land rights, in which private law norms play an important role. So, this means that the peculiarity of land law as an area of the legal system of Ukraine is its public-private nature. As rightly stated in the literature, land as the basis of national wealth is primarily the sphere of public-legal relations [8]. Moreover, public-legal and private law norms of land law are not divided sectorally – in exclusively public-legal or private law institutions and sub-institutions – and are integrated present in the vast majority of them. That is why the implementation of Article 14 of the Constitution of Ukraine regarding the recognition of land as the main national wealth, which is under the protection of the state, might be carried out with the help of the entire set of norms of land law of Ukraine, since environmental law ensures the protection of land as a natural resource, and civil law recognizes land as immovable property and ensures the realization of only property rights to land.

In this regard, we believe that the new codification of land legislation should not lead to the division of land legal norms into civil law and

environmental law, with their subsequent inclusion in accordance with the Civil Code of Ukraine or the environmental law. The experience of legal regulation of land relations proved the validity of the doctrinal provision about the expediency of preservation in the 21st century independence of land law as a separate branch of the legal system of Ukraine.

Thus, at present, the dynamics of land relations is determined by two factors: the change in the state and increase in types of land as objects of land relations, and the complication of social activities related to the use of land, in particular, the attachment of many land relations to one or more types of land. That is why the dynamics of land relations requires the specialization of legal norms that regulate land relations and the localization of legal regulation of these relations. This determines the expediency of maintaining the institution of land division into categories that have a special legal regime.

At the same time, in recent years, the process of deregulation of land relations has become widespread in land legislation, which is associated with the abolition of not only individual legal norms, but also certain groups and institutions of a public-law nature. Such concept gave some researchers reason to propose the abolition of the institution of land division into categories as a means of ensuring the targeted use of land. Yes, A. Rypenko, justifying the idea formulated by him that the entire territory of the country without exception is the spatial basis for urban planning and arguing for the principle of universality of urban planning, expresses a proposal to cancel the "division of Ukrainian lands into categories" [9]

We suppose that this opinion is based on an incorrect interpretation of the essence of the land legislation of Ukraine. After all, it does not provide for the physical division of the country's lands into land categories, although the corresponding terminology is used in Articles 19–20 of the Land Code of Ukraine. However, the analysis of these and other articles of this Code shows that it does not provide for the division of land into separate categories of land as part of the land fund of the country, but the division of the general legal regime of lands of Ukraine into separate categories of legal regimes of land: the legal regime of agricultural lands, the legal regime of lands water fund, etc. The proposal of A. Ripenka is aimed at destroying the basic principles of land law as a branch of the legal system of Ukraine: after all, it is based on the

Scientific basis for sustainable development of urban land use

localization and specialization of legal regulation of land relations, the objects of which are land of different quality and social purpose. As an argument in favor of this proposal, A. Ripenko calls the need to move away from a rather rigid system of establishing a target purpose for each land plot and replace this system with zoning. He believes that categorization is an outdated legal approach that promotes corruption in land relations, while zoning operates with a much larger number of permitted uses compared to the nine categories of land, which significantly increases the variability of planning.

Undoubtedly, zoning is a better way to ensure the intended use of land than assigning a specific purpose to each plot. But we believe that canceling the division of the legal regime of the lands of Ukraine into separate categories of their legal regimes will make it impossible or significantly reduce the potential of territory zoning as a way to ensure their targeted use. First, the system of assigning a target purpose to each land plot is not one that is determined by the division of land into categories. Secondly, the determination of the legal regime of land plots based only on planning documentation, as suggested by some authors, in the absence of legal norms that determine the specifics of the protection and use of different lands, will lead, in our opinion, to chaotic development, when the development of plots will be carried out at will government officials.

Finally, it should be taken into account that the division of Ukrainian lands into categories is a reflection in the legislation of two factors: the full development of the land territory of Ukraine and the absence of free land for new types of social activities and the need to maintain a ratio that is favorable for the environment, the development of the production base of society and infrastructure different types of land in the country. This function is provided by the categorization of lands, which is the division of the legal regime of the country's lands into separate categories of lands and their varieties. Moreover, it is quite possible that new categories of the legal regime of lands will appear in the land legislation of Ukraine, which will differ from the already existing categories of the legal regime of lands of our state. At the same time, in order to bring the name of categorization in the land law of Ukraine to its essence, we propose to introduce the term "category of land legal regimes" instead of the term "category of land".

Scientific basis for sustainable development of urban land use

At the same time, a number of provisions of the Law "On Land Protection" require improvements. It is appropriate to emphasize that by Article 168 of the Land Code of Ukraine (Soil Protection), soils are also recognized as an object of special protection. But there is no such norm at all in the Law "On Land Protection". In our opinion, the existence of such differences in the constitutional provision on land as the main national wealth does not contribute to the formation of an effective legal mechanism for its implementation in the laws of Ukraine and should be eliminated.

As it turns out, it requires a clearer definition and consolidation in the legislation and legal regime of especially valuable land. As of November 1, 1989, their area as part of agricultural land amounted to 39.6 million hectares or 36.9% of their total area; and the size of arable land reached 14.2 million hectares (44,8 % total area of arable land). [10] These valuable arable land united mainly two types of soils – black soils are not eroded and dark gray ashed. In addition to these types of soils, peatlands with a peat depth of more than one meter belonged to especially valuable lands, as well as lands of the nature reserve fund and other nature conservation purposes, lands of historical and cultural purpose, lands of experimental fields of scientific and research institutions and educational institutions. According to the Law of Ukraine dated June 4, 2009 No. 1442 - VI, especially valuable are the lands granted for permanent use to the National Association "Masandra" and 8 enterprises that were part of it [11].

Particularly valuable soil types were divided into lands of national importance and lands of regional importance By order of the Derzhkomzem of Ukraine dated October 6, 2003 № 245. The total area of valuable land was reduced by 2.5 million hectares of agricultural land and by 3.2 million hectares arable. From the valuable of common values, in particular, removed certain areas on which it was later allowed to carry out the construction of non-agricultural objects. For example, in the province of the Southern coast of Crimea, the entire area (6019 hectares) is classified as regional valuable land, of which 1,508 hectares are arable, which are represented by brown gravel soils.

The measures taken to reduce the area of especially valuable land in the country are largely explained by the fact that the State Land Cadastre the boundaries of agricultural groups of each of the types of especially valuable

Scientific basis for sustainable development of urban land use

soils were not introduced, and their contours were indicated only on soil maps, that is, they were not actualized, since large-scale soil surveys were not conducted in the country at intervals established by law.

The normative monetary assessment of agricultural lands began in 1995, and the classification of soils into especially valuable and ordinary, established based on the materials of soil evaluation and economic evaluation of lands in previous years, cannot be considered sufficiently substantiated. Indeed, against the background of other types of soils, unborn unsalted loam on loess rocks are valuable (the total area of arable land of this type is 11.5 million hectares). However, their true value can be confirmed only by a real monetary valuation of land and land. We have the materials of this assessment and should reflect it as part of the land cadastral documentation.

At the beginning of 2015, a draft law on exclusion from the Code of the category "especially valuable land" was submitted to the Verkhovna Rada of Ukraine. In 2019, this issue was again considered by the Parliament, but was not supported. Only the procedure for approval of the termination of the right to permanent use of valuable lands by the Verkhovna Rada of Ukraine and the specifics of the legal regime for the use of lands under peat bogs by the Cabinet of Ministers of Ukraine have been changed.

The largest is the area of especially valuable land in agricultural land. Protection of them without displaying information about them in the State Land Cadastre is not possible. The law recognizes that lands designated for agricultural purposes must be provided primarily for agricultural production, and the determination of these lands must be carried out on the basis of data from the state land cadastre.

Conclusions and perspectives

Under the special protection of land as the main national wealth of Ukraine should be understood the right and obligation of the state to establish such a legal regime of lands, which is most in line with the interests of the Ukrainian people. It is the state, as an expression of the interests of the Ukrainian people represented by the Verkhovna Rada of Ukraine, that should implement such a legal mechanism of use in the legislation and protection of land resources, which ensures the most efficient use of land under the dominant condition of their preservation as a means of production, operational basis and

Scientific basis for sustainable development of urban land use

natural resource of current and future generations of the Ukrainian people.

An important legal means of ensuring the legal regime of the lands of Ukraine as the main national wealth, under special protection of the state, is the division of the legal regime of land into its separate categories, which ensures the "addressability" of establishing legal requirements for their use, protection, definition of rights and obligations and responsibilities of all subjects of land relations - the state in the form of the system of state authorities, territorial communities, natural and legal entities.

According to Article 14 of the Constitution of Ukraine, land is the main national wealth and is under special protection of the state. That is why all land relations without exception are public-private, albeit with different ratios of signs of publicity and privacy. The implementation of a new codification of land legislation should not lead to the division of land legal norms into civil law and environmental and legal with their subsequent inclusion in accordance with the Civil Code of Ukraine or environmental law. The experience of legal regulation of land relations testified to the validity of the doctrinal provision on the expediency of preservation in the 21st century independence of land law as a separate branch of the legal system of Ukraine – important legal precondition for ensuring the status of land as the main national wealth, which is under special protection of the state.

References.

1. About the Sustainable Development Goals of Ukraine for the period until 2030: Decree of the President of Ukraine (2019). Available at: <https://zakon.rada.gov.ua/laws/show/722/2019#Text>
2. Zvernennya do kerivnytstva derzhavy shchodo podolannya kryzovoyi sytuatsiyi u sferi okhorony zemel' (2017) [Appeal to the state leadership to overcome the crisis in the field of land protection]. Bulletin of Agricultural Science. 11. 5-8.
3. The Verkhovna Rada of Ukraine (2022), The Order of the Cabinet of Ministers of Ukraine "On the approval of the Concept of the National target program of land use and protection". Available at: <https://zakon.rada.gov.ua/laws/show/70-2022-%D1%80#Text4>.
4. Constitution of Ukraine (1996). Information of the Verkhovna Rada of Ukraine. № 30. Art. 141.
5. Land Code of Ukraine 2001, Available at: <https://zakon.rada.gov.ua/laws/show/2768-14#Text7>.
6. On land protection: Law of Ukraine 2003, Available at: <https://zakon.rada.gov.ua/laws/show/962-15#Text>
7. Civil Code of Ukraine 2003, Available at: <https://zakon.rada.gov.ua/laws/show/435-15>
8. Smokovich M. (2020) Derzhava yak nezalezhnyy arbitr u sferi zemel'nykh pravovidnosyn [The state as an independent arbiter in the field of land legal relations]. Law of Ukraine. № 10. 165.
9. Ripenko A. I. (2020) Kontseptual'no-pravovi zasady vykorystannya zemel' dlya mistobudivnykh potreb [Conceptual and legal principles of land use for urban planning needs]. Odesa, 143
10. Novakovsky L. Ya., Oleshchenko M. A. (2009) Sotsial'no-ekonomichni problemy suchasnoho zemlekorystuvannya [Socio-economic problems of modern land use]. Kyiv, Ukraine: Harvest, 276
11. The Verkhovna Rada of Ukraine (2009), The Law of Ukraine "About the structure, powers and peculiarities of the legal and economic regime of the property complex of the National Production and Agrarian Association "Masandra". № 42. Art. 633.
https://link.springer.com/chapter/10.1007/978-3-031-08954-1_67

**APPROACHES TO LAND ZONING ON THE BASIS OF
SUSTAINABLE TERRITORY DEVELOPMENT**

Medynska Nataliia¹, Hunko Liudmyla²

¹*PhD in Economic, Associate Professor of the Department of Land Cadastre, National University of Life and Environmental Sciences of Ukraine, Ukraine, ORCID ID <https://orcid.org/0000-0003-2573-0205>, e-mail: natazv@ukr.net*

²*PhD in Economic, Associate Professor of the Land-Use Planning Department, National University of Life and Environmental Sciences of Ukraine, Ukraine, ORCID ID: <https://orcid.org/0000-0002-9454-744X>, e-mail: liudmyla_g@ukr.net*

ABSTRACT

One of the basic approaches to land use is their differentiated (separate) use, which is implemented through the division of land by main purpose into categories and the introduction of land zoning. Under the purpose of a particular land is proposed to understand the method of its operation (use) for a specific purpose in accordance with the zoning of land, as well as the legal regime of the relevant category of land. Land zoning is a way to ensure the use of land for various social needs, in which the purpose is set not for one land

plot, but for a group of adjacent plots that form a functional zone. The owner of the land has the right to choose its intended use within the list of types of targeted land use established for a specific functional area. The zoning should be based on such classification features as the distribution of land by category, the suitability of land for use in economic sectors, the suitability of agricultural soils for growing crops, the composition of landscape complexes and land, the need for certain land in certain lands, legal status of lands.

Keywords: *land planning; land zoning, sustainable land use, purpose of land, land suitability*

1. INTRODUCTION

The unique importance of land resources in the livelihood of society is determined by their effective management, especially when there is an intensive process of formation of land relations of a new type. The development of various

Scientific basis for sustainable development of urban land use

forms of land ownership, the formation of a ranked economy necessitate the improvement of land management based on land zoning, the essence of which is their differentiated use. In Ukraine, the principle of land zoning is defined by the Land Code of Ukraine, which states that land zoning is carried out within settlements and sets requirements for permissible types of development and other land use within individual zones in accordance with local building regulations [1].

As for lands outside settlements, the problems of their zoning in Ukraine still remain without due attention. Although in many countries of the world land zoning and determining on this basis their long-term use, taking into account a range of environmental, economic, social, historical and other factors has long been widely used in the practice of territorial development management. The experience of European countries shows the prospects and effectiveness of this.

Thus, Larsson Gerhard identified trends in addressing the issues of adaptation of the territory to difficult conditions and finding methods to ensure efficient use of land and other natural resources. During the twentieth century, we have witnessed the very active development of legal instruments for this purpose, aimed at managing spatial planning and implementation of plans in accordance with the chosen goals and policies [2].

Hall Thomas researched the planning process of large cities, the problems that arose during their development, and analyzed the impact of individual design decisions on the development of their development [3].

It is obvious that these studies are acceptable for the conditions of Ukraine.

The issue of land zoning in Ukraine is the subject of scientific works of domestic scientists such as Berladin O., Ibatullin Sh., Loik G., Martyn A., Novakovska I., Perovich L., Tretyak A. etc.

Berladin O. considers land zoning as a necessary condition for creating in Ukraine an effective mechanism for determining the distribution of land by their categories and types of land use within administrative-territorial entities and the implementation of effective state management of land use and protection [4].

Ibatullin Sh. Developed a conceptual model of mechanisms of land relations development in the context of balanced use, protection and reproduction of land resources as a component of spatial socio-economic development, and proved the need for innovative forms of land use management due to environmental constraints on land use [5].

Scientific basis for sustainable development of urban land use

Loik G. substantiated the methodology of functional zoning of territories when updating the master plans of villages in order to increase the efficiency of land use [6].

According to Martyn A., the introduction of organizational and methodological approaches to defining the boundaries of administrative-territorial units in Ukraine and land zoning can be an important prerequisite for streamlining the territorial organization of our state, the proper functioning of the tax system, the introduction of effective maintenance of state land cadastre and register of real property rights [7].

Novakovska I. considers the features of forecasting, planning and design of airports in the context of ecological and efficient land management. Scientists have proposed a detailed plan for zoning aerodromes and substantiated the principles of zoning the area around the aerodrome in combination with the aerodrome and land use [8]. In addition, Novakovskaya proved that satellite data is an important part of the information needed for sustainable use of nature, assessment of the impact of economic activities of ecosystems, identification of risks associated with loss of landscape and biotic diversity [9].

Perovych L. believes that cadastral zoning of lands is one of the important components of creating a cadastral system of Ukraine, which contributes to the creation of an attractive investment climate and identifying priority areas for sustainable economic development of territories. These issues are not fully resolved for lands outside settlements. The cadastral zoning of lands should take into account the requirements of European and international standards for classification and codification of the administrative-territorial structure of the state, types of economic activity [10].

Tretyak A. defined the conceptual basis of land zoning for the management of land resources outside settlements and substantiated the essence of land zoning as a land management process for the formation of the legal regime and land regulation of land use [11].

However, many aspects of the research problem have not been studied both methodologically and practically. Some of them are debatable and require further research and justification. Determining the criteria and methods of allocating territorial zones, their classification and impact on improving the management of land use and protection remains one of the important factors of environmentally

friendly land use.

2. METHODOLOGY

The methodology of research of the problem of land zoning determines that the subject of research is the principles of land zoning through their differentiated use in market land relations. In the process of research the methods of abstract-logical, economic-statistical and monographic are used, with the help of which the zoning of lands for substantiation of ecologically safe land use is substantiated.

3. RESULTS AND DISCUSSION

The implementation of a differentiated approach to land use is carried out through the division of land into categories according to the main purpose and the introduction of land zoning. Given that this activity, according to the requirements of the time, will be significantly adjusted, this approach will be a reliable basis for the introduction of new methods of land use management and protection.

We consider land as the basis on which economic activity takes place on the basis of the right to land, which complies with current legislation. In this regard, we highlight the following features of land use as an object of management:

- land is an integral part of natural resources;
- land is a product of nature, its fertility is determined to a greater extent human activity;
- land is used inseparably from other natural resources;
- rational use of land can be carried out only taking into account natural, political, economic, social and other conditions;
- land plots have qualitative and quantitative individual properties;
- land use should be differentiated, conditioned soil-climatic and territorial conditions;
- land use should be accompanied by an increase in its productive power.

The Land Fund of Ukraine suffers from many negative environmental and economic factors due to the unreasonableness of establishing targeted land use. The issue of improving the mechanism of land management needs to be addressed to increase the efficiency of land use and reproduction in the context of environmentally friendly land use [12].

The solution to the problem of land use optimization is seen in the improvement of methodological approaches to establishing targeted land use and determining the optimized structure of land for the use of zoning tools.

Scientific basis for sustainable development of urban land use

Ecological and economic model of sustainable development in land use of Ukraine in the medium term, which reflects the ratio of different groups and categories of land, in terms of regions are given in table. 1.

Implementation of its main methodological provisions will optimize the structure of Ukraine's land fund and form sustainable land use, which is a prerequisite for rational and productive use of land resources in various sectors of the economy and increase the production of environmentally friendly agricultural products.

As already mentioned, the problems of land zoning outside settlements have long been left without proper attention. Although land zoning (zoning) is a very good alternative to the system of land use. Zoning is a way to ensure the use of land for various social needs, in which the purpose is not set for one plot of land, but for a group of adjacent plots that form a functional area. Each functional zone has a specific generalized purpose, for each of which is established not one purpose, but a certain set of permissible land use. Therefore, the owner of the land has the right to choose its use within the list of types of land use, established for a specific functional area. The principles of land zoning should be the basis for land use in accordance with their intended purpose.

We offer the following basic principles for land zoning [13]:

Table 1. Ecological and economic model of sustainable development in land use of Ukraine in the medium term in terms of regions

No.	Region	Total area, thous. ha	Functional type of environment, thous. ha / %						for construction and location of objects of branches of economy (building)
			agro-landscape		environment stabilizing				
			total	of them	total	of them			
				arable		forests and other forested lands	open wetlands	water	
1	Vinnitsia	2649,2	1925,0 / 72,7	1600,4 / 60,4	569,7/ 21,5	391,6 / 14,8	29,5 / 1,1	43,0 / 1,6	154,5 / 5,8
2.	Volyn	2014,4	952,6 / 47,3	561,9 / 27,9	889,8 / 44,2	727,6 / 27,9	116,8 / 5,8	45,4 / 2,3	172,0 / 8,5
3.	Dnepropetrovsk	3192,3	2427,8 / 76,1	2003,1 / 62,7	485,5 / 15,2	212,8 / 6,7	26,9 / 0,8	155,8 / 4,9	279,0 / 8,7
4.	Donetsk	2651,7	1913,5 / 72,2	1492,7 / 60,1	351,8 / 13,3	234,9 / 8,8	10,3 / 0,4	41,4 / 1,6	386,4 / 14,5
5.	Zhytomyr	2982,7	1535,5 / 51,5	997,5 / 33,4	1241,3 / 41,6	1110,5 / 37,2	82,5 / 2,8	48,3 / 1,6	205,9 / 6,9
6.	Transcarpathian	1275,3	430,0 / 33,7	169,2 / 13,3	742,6 / 58,2	723,3 / 56,7	1,0 / 0,1	18,3 / 1,4	102,7 / 8,1
7.	Zaporozhye	2718,3	1982,9 / 72,9	1588,9 / 58,5	393,6 / 14,5	141,9 / 5,2	6,7 / 0,2	172,0 / 6,3	341,8 / 12,6
8.	Ivano-Frankivsk	1392,7	588,9 / 42,3	323,7 / 23,2	742,1 / 53,3	643,8 / 46,2	2,6 / 0,2	23,7 / 1,7	61,7 / 4,4
9.	Kyiv	2812,1	1582,1 / 56,3	1237,7 / 44,0	963,7/ 34,3	740,5 / 26,3	49,4 / 0,2	173,8 / 6,2	266,3 / 9,4
10.	Kirovograd	2458,8	1955,0 / 79,5	1672,2 / 68,0	343,7/ 14,0	193,9 / 7,9	10,4 / 0,4	75,7 / 3,1	160,1 / 6,5
11.	Luhansk	2668,3	1832,9 / 68,7	1263,1 / 47,3	530,7/ 19,9	393,9 / 14,8	16,4 / 0,6	22,0 / 0,8	304,7 / 11,4
12.	Lviv	2183,1	1156,9 / 53,0	656,0 / 30,0	758,3 / 34,7	706,2 / 32,2	9,5 / 0,4	42,6 / 2,0	267,9 / 12,3
13.	Mykolayiv	2458,5	1935,5 / 78,7	1604,9 / 65,3	351,8 / 14,3	138,3 / 5,6	20,9 / 0,6	127,4 / 5,2	171,2 / 7,0
14.	Odessa	3331,3	2407,2 / 72,3	1825,4 / 54,8	732,3 / 22,0	246,7 / 7,4	72,8 / 2,2	211,5 / 6,3	191,8 / 5,7
15.	Poltava	2875,0	2064,1 / 71,8	1593,9 / 55,4	649,9 / 22,6	295,3 / 10,3	85,8 / 3,0	148,3 / 5,2	161,0 / 5,6
16.	Rivne	2005,1	843,3 / 42,1	503,9 / 25,1	984,2 / 49,1	834,7 / 41,6	107,3 / 5,4	42,2 / 2,1	177,6 / 8,8
17.	Sumy	2383,2	1655,8 / 69,5	1184,9 / 49,7	581,6 / 24,4	462,6 / 19,4	62,0 / 2,6	30,6 / 1,3	145,8 / 6,1
18.	Terнопil	1382,4	975,5 / 70,6	760,0 / 55,0	285,4 / 20,6	208,2 / 15,1	4,9 / 0,4	19,4 / 1,4	121,5 / 8,8
19.	Kharkiv	3141,8	2322,0 / 73,9	1834,4 / 58,4	650,5 / 20,7	439,0 / 14,0	30,6 / 1,0	60,3 / 1,9	169,3 / 5,4
20.	Kherson	2846,1	1842,6 / 64,7	1594,2 / 56,0	794,0 / 27,9	181,9 / 6,4	31,6 / 1,1	433,3 / 15,2	209,5 / 7,4
21.	Khmelnysky	2062,9	1446,5 / 70,1	1102,3 / 53,4	441,1 / 21,4	298,4 / 14,5	21,1 / 1,0	39,8 / 1,9	175,3 / 8,5
22.	Cherkasy	2091,6	1344,0 / 64,3	1124,6 / 53,8	627,5 / 30,0	346,4 / 16,6	28,9 / 1,4	135,9 / 6,5	120,1 / 5,7
23.	Chernivtsi	809,6	401,6 / 49,6	250,2 / 30,9	344,6 / 42,6	261,0 / 32,2	1,2 / 0,1	18,5 / 2,3	63,4 / 7,8
24.	Chernihiv	3190,3	2050,0 / 64,3	1305,3 / 40,9	923,0 / 28,9	736,4 / 23,1	119,1 / 3,7	67,5 / 2,1	217,3 / 6,8
25.	Autonomous Republic of Crimea	2608,1	1693,9 / 64,9	1006,8 / 38,6	680,4 / 26,1	332,7 / 12,8	4,9 / 0,2	216,7 / 8,3	233,8 / 9,0
26.	Kyiv	83,6	5,0 / 6,0	0,5 / 0,6	43,4 / 51,9	36,4 / 43,5	0,3 / 0,4	6,7 / 8,0	35,2 / 42,1
27.	Sevastopol	86,4	26,1 / 30,2	10,3 / 11,9	37,2 / 43,1	36,3 / 42,0	- / -	0,9 / 1,0	23,1 / 26,7
	In general in Ukraine	60354,8	39296,2 / 65,1	29268,0 / 48,5	16139,7 / 26,8	11075,2 / 18,4	953,4 / 1,6	2421,0 / 4,0	4918,9 / 8,1

Scientific basis for sustainable development of urban land use

- zoning should be carried out taking into account the landscape structure of the territory and the qualitative characteristics of the land;
- ensuring environmental priorities of land use;
- taking into account the existing buildings, transport and engineering infrastructure, as well as special elements of the urban structure within the settlement, ensuring its reconstruction and development on the basis of rational nature management and resource conservation .;
- definition for each territorial zone (subzone) of land management regulations, which establish a set of types and conditions of land use, as well as their permissible changes;
- establishment of the legal regime for each territorial zone in the calculation of its application equally to all land plots located within its boundaries;
- linking the boundaries of zones with the boundaries of major land holdings and land uses;
- the amount of territorial units allocated for zoning should correspond to the area of dismembered land in the individual type of zoning or volume in the case of typological zoning;
- the features on which the division of land is carried out (whether territorial units are classified) must be such that each point (territorial unit) falls into only one of the selected categories;
- the classification feature may vary from one degree of zoning to another.

Therefore, the classification features of zoning are important. After all, the correct selection of certain features essentially determines the content and depth of land zoning. The proposed features of land zoning are: distribution of land by category, suitability of land for use in industries, suitability of agricultural land for growing crops, the composition of landscape complexes and land, the need for certain land in a particular land , legal status of lands, etc.

When zoning lands in Ukraine, it is proposed to single out the following system of taxonomic units: zones of the 1st order (groups of lands); zones of the 2nd order (types of lands); zones of the 3rd order (subtypes of lands); zones of the 4th order (types of lands); zones of the 5th order (land plots). In the practical implementation of the principle of land zoning, the proposed name of

Scientific basis for sustainable development of urban land use

"zones of different order" can be clarified. For example, more well-established taxonomic unit names may be suggested: zone, province, county, subdistrict, district, subdistrict, locality, area, and so on.

Land zoning should be carried out in different detail, ie at the national, regional and local levels, with differences in tasks and mechanisms of practical application. Specific land zoning options depend on many factors: the existing land use system, the natural structure of landscapes, historical heritage, social goals, and so on.

In terms of land zoning are graphically indicated:

- boundaries of zones (groups of lands, categories, types of land use, etc.), defined for agricultural and forestry activities, housing and public buildings, nature reserves and environmental activities, recreational, health, historical, cultural and water activities, industry, transport, so-called communications, energy, defense and other purposes;

- boundaries of lands in respect of which restrictions on their use apply;

- boundaries of drinking water sources;

- boundaries of lands for soil dumps, earthworks and extraction of local minerals of local significance;

- land boundaries for measures to protect, preserve and improve the quality of the upper fertile soil layer, environmental protection and landscape;

- boundaries of especially valuable agricultural lands and forest lands.

In accordance with the proposed classification features, we conducted zoning of lands of Kyiv region which are shown in Figure 1.

Zones of the 1st order (groups of lands): agro-landscape, environment-stabilizing and residential (building).

Thus, zoning of lands by types of land use is land management actions on the division of land into types and subtypes of land use depending on the ecological and economic suitability of land, the value of other natural resources - outside settlements and urban and natural resource value of land and other natural resources - within settlements.

Land zoning is most effective when a set of interrelated criteria and approaches is used to allocate zones. Naturally, the fewer zones and the larger the area of each, the better to achieve such a comprehensive and effective zoning.

Scientific basis for sustainable development of urban land use

When assessing the effectiveness of a land zoning system, it is proposed to use four main criteria: functional, environmental, economic, social (according to the interests of different groups). The last two criteria in practice can not always be clearly separated and then they are combined into a single socio-economic criterion.

From the standpoint of environmental efficiency in the same functional area should include areas similar in their environment-forming or environmental function. For example, the territory of one watershed, the habitat of certain, the most valuable in terms of conservation species and communities, etc., which is important for the preservation and implementation of the functions of an ecosystem. Sometimes such areas, which are part of a single ecosystem (for example, a watershed), are partially found outside the zone. These external areas form an area to which the community seeks to extend its influence and where it interacts with local and regional governments. According to the existing legislation, this zone should be granted the status of a protection zone.

In addition, the zoning of land (by their categories) outside the settlements should be understood as land management and legal actions, in addition to the division of land by type and subtype of land use within the ecological and economic suitability of land [14].

As for economic and social efficiency. The value of zoning of lands on which economic activity is carried out (or will be carried out in the future) is to combine different types of nature management and management without conflict (Table 2).

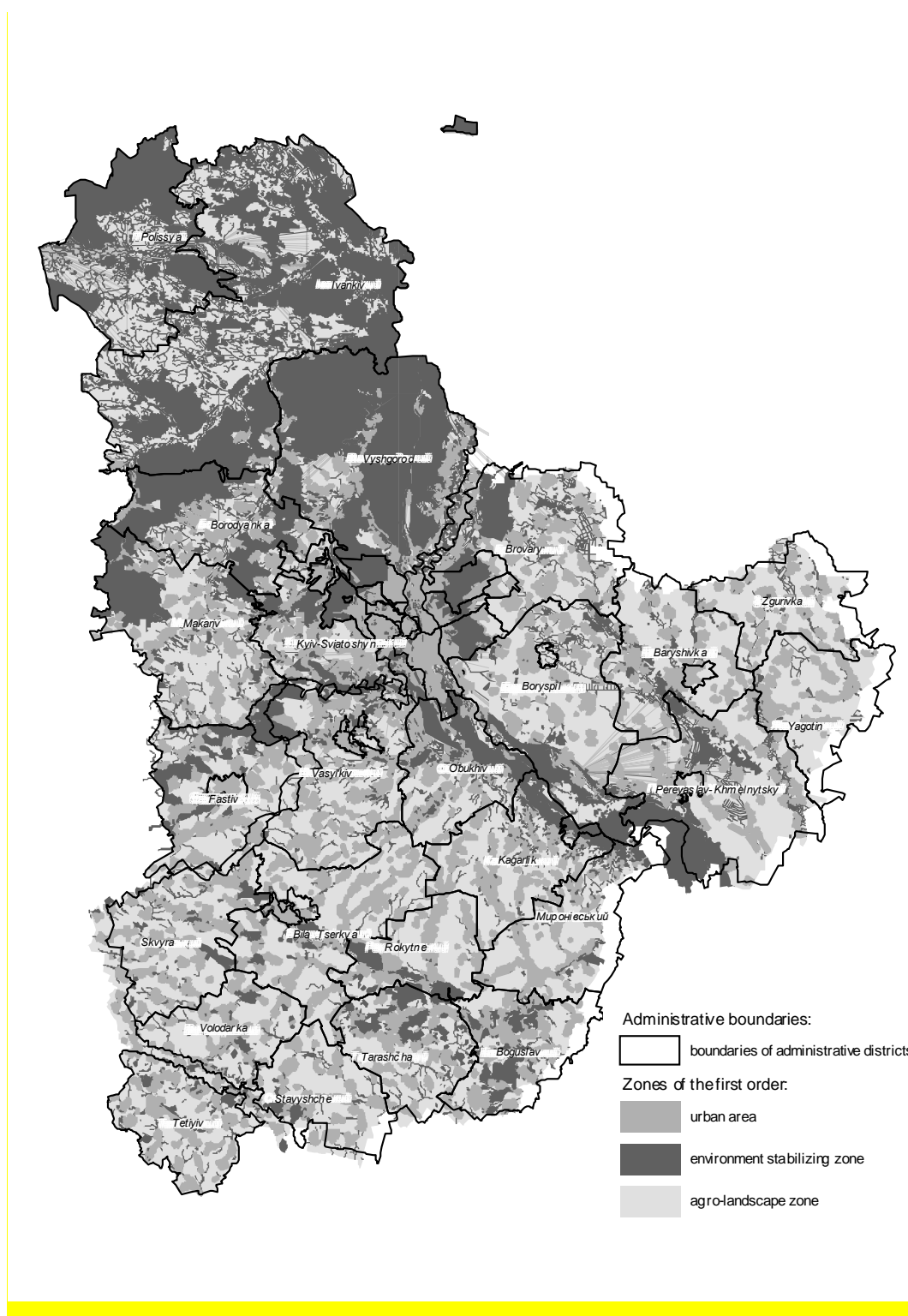


Fig. 1. Geoinformation modeling of zoning of the Kyiv region with the allocation of first-order zone

Scientific basis for sustainable development of urban land use

Table 2. Average annual income from land use by purpose *

Administrative-territorial unit and separate territory	Average annual income from the use of land for its intended purpose, UAH/ha							
	agricultural land	lands of nature reserves and other nature protection purposes	health-improving lands	recreational lands	lands of historical and cultural significance	forestry lands	water fund lands	land for industry, transport, communications, energy, defense and other purposes
1	2	3	4	5	6	7	8	9
Autonomous Republic of Crimea (except for the South, South-East and West coasts)	1070	5371	6171	5143	6243	7034	1246	13714
Southern coast of the Autonomous Republic of Crimea	2048	8057	13029	10857	6243	14069	2491	13714
South-Eastern coast of the Autonomous Republic of Crimea	1275	8057	7714	6429	6514	8441	1868	13714
West coast of the Autonomous Republic of Crimea	898	5371	9257	7714	6243	10551	1868	13714
Vinnitsia region	914	537	1371	1143	3257	4111	753	12000
Volyn region	715	4297	1543	1286	3529	3003	1016	14571
Dnipropetrovsk region	776	806	1029	857	1900	8286	446	16857
Donetsk region (except the Azov coast)	850	806	1200	1000	1357	9320	360	18571
Azov coast of Donetsk region	986	1074	2057	1714	1357	11184	539	18571
Zhytomyr region	560	3223	1714	1429	1900	2968	462	18000
Transcarpathian region	627	9131	51433	4286	3800	1278	1016	13429
Zaporozhye region (except the Azov coast)	818	537	1200	1000	2171	14337	905	16571
Azov coast of Zaporozhye region	825	269	2057	1714	1357	15771	1357	16571
Ivano-Frankivsk region (except mountain and foothills)	689	7520	2400	2000	4071	1399	736	13429
Mountain and foothills of Ivano-Frankivsk region	508	13429	4286	3571	4071	3497	883	13429
Kiev region	831	1343	1714	1429	2171	3629	755	16286
Kirovograd region	777	537	1029	857	1357	9091	723	10571
Luhansk region	607	537	1029	857	1086	6777	360	14857
Lviv region (except mountain and foothills)	615	1611	2400	2000	8414	2999	665	16571
Mountainous and foothill part of Lviv region	392	13429	4286	3571	8414	7498	798	16571
Mykolaiv region (except the Black Sea coast)	658	537	1886	1571	1086	13806	905	13429
Black Sea coast of the Nikolaev area	872	537	2571	2143	1086	15186	1357	13429
Odessa region (except the Black Sea coast)	728	1611	2057	1714	1086	8103	1163	25429
Black Sea coast of	931	1880	2571	2143	1086	12154	1745	25429

Scientific basis for sustainable development of urban land use

Administrative-territorial unit and separate territory	Average annual income from the use of land for its intended purpose, UAH/ha							
	agricultural land	lands of nature reserves and other nature protection purposes	health-improving lands	recreational lands	lands of historical and cultural significance	forestry lands	water fund lands	land for industry, transport, communications, energy, defense and other purposes
1	2	3	4	5	6	7	8	9
Odessa region								
Poltava	853	806	1543	1286	1629	7457	755	13143
Rivne region	746	1074	1714	1429	2171	2816	555	14000
Sumy region	690	537	1543	1286	2171	4013	679	12286
Ternopil region	783	1880	1886	1571	3529	4730	753	11714
Kharkiv region	767	806	1371	1143	1900	5251	562	18000
Kherson region (except the Black Sea and Azov coasts)	882	2149	2057	1714	1629	9560	905	14286
Black Sea and Azov coast of Kherson region	928	5371	2571	2143	1900	11472	1357	14286
Khmelnitsky region	879	537	1371	1143	3257	3981	753	12286
Cherkasy region	1012	537	1886	1571	2443	4297	985	12571
Chernivtsi region (except mountain and foothills)	886	2149	2229	1857	3257	1320	736	17429
Mountain and foothill part of Chernivtsi region	612	5371	4286	3571	3257	3301	883	17429
Chernihiv region	589	3223	2400	2000	3257	3199	616	13429
m. Kyiv	1151	9756	8979	7483	9441	21494	2822	46216
Sevastopol and administrative-territorial units that are part of it	2959	5371	6171	5143	6243	9200	850	19714

*Developed according to the data adopted in accordance with the Methodology for determining the amount of damage caused by unauthorized occupation of land, use of land for other purposes, removal of soil cover (fertile soil layer) without special permission.

In order to make a profit is now used the principle of efficient use of land resources. Thus, the application of the principle of the most efficient use of land is provided - it is physically possible and economically feasible use of land and (or) land improvements in accordance with the law [15].

Constant fluctuations in land prices lead to other changes in land use due to constant pressure on existing land use and contribute to the reconstruction of property, which includes dilapidated buildings or structures. Prices remain highest in the most accessible areas around the city center and transport corridors, and the density in these areas continues to grow. In proportion to the development of the city, there is a tendency to increase land prices throughout the city (Table 3).

Table 3. Average annual income from the use of land for housing and public buildings by purpose according to the group of settlements by population*

Groups of settlements by population, thousand people	Average annual income from the target use of land for housing and public buildings, UAH/ha
to 0,2	4026
from 0,2 to 1	5636
from 1 to 3	7247
from 3 to 10	8052
from 10 to 20	12883
from 20 to 50	20130
from 50 to 100	24156
from 100 to 250	28182
from 250 to 500	32208
from 500 to 1000	40260
from 1000 and more	56364

*Developed according to the data adopted in accordance with the Methodology for determining the amount of damage caused by unauthorized occupation of land, use of land for other purposes, removal of soil cover (fertile soil layer) without special permission.

Therefore, it is important that zoning meets the requirements of efficiency in the load of interests and the nature of land use, ie based on existing boundaries of lands, settlements and administrative and economic entities.

4. CONCLUSION

The main features of land use as an object of management are their belonging to natural resources, determining the effective fertility of human activities, inseparable from other natural resources use, the presence of land qualitative and quantitative individual properties, differentiated nature of use due to soil and climatic and territorial conditions, etc.

To solve the problem of land use optimization, it is necessary to improve methodological approaches to establishing targeted land use using land zoning tools.

The zoning should be based on such classification features as the distribution of land by category, the suitability of land for use in economic sectors, the suitability of agricultural soils for growing crops, the composition of landscape complexes and land, the need for certain land in certain lands, legal status of lands.

REFERENCES

- [1] Zemelnyi kodeks Ukrainy (Land Code of Ukraine). URL : <http://zakon2.rada.gov.ua/laws/show/2768-14>.
- [2] Larsson Gerhard. (2006). Spatial Planning Systems in Western Europe: An Overview. URL : <https://books.google.com.sl/books?id=RV1SyAzOeYkC&printsec=frontcover#v=onepage&q&f=false>
- [3] Thomas, H. (2007). Planning Europe's capital cities: aspects of nineteenth century urban Development (Planning, History and Environment Series). Journal of London: Taylor & Francis. URL : <http://rohcamaintenant.free.fr/USB%20KEY%20Fahriye/E-BOOKS-%20PLANNING%20EUROPE%20CAPITAL%20CITIES.pdf?fbclid=IwAR01VIbDHMPDce2Qqi8zidBKP3Uv6wX83jCbrEGAdiNyDC1pnqF4wkfwOV8>
- [4] Barladin, O.V., Gorodetsky, E.M., Mykolenko, L.I. (2008). The use of remote sensing in information systems of land cadastre. Cartography and higher school: a collection of scientific papers. No. 13. Institute of Advanced Technologies, Kyiv.
- [5] Ibatullin, Sh.I., Stepenko, O.V., Sakal O.V. (2012). Mechanisms of land relations management in the context of sustainable development. Institute of Economics of Nature Management and Sustainable Development of the National Academy of Sciences of Ukraine, p. 52. (in Ukrainian). URL : http://ecos.kiev.ua/share/upload/Mehaizmy_upravlinnya_zemelnymy_vidnosynamy.pdf
- [6] Loik, G.K., Rafalska, L.P. (2012). Improving the efficiency of land use through functional zoning in the development of master plans of villages. Land management, cadastre and land monitoring. No. 1-2, pp. 23-27. (in Ukrainian). URL : http://nbuv.gov.ua/UJRN/Zemleustriy_2012_1-2_6.
- [7] Martin A.G. (2012). Establishing the boundaries of administrative-territorial entities: problems and directions of their solution. Journal of Land Management Bulletin. No. 4. (in Ukrainian). URL : <https://zem.ua/materialy/avtorski-materialy/andrii-martyn/2753-vstanovlennya-mezh-adm-n-strativno-teritor-al-nikh-utvoren-v-ukrajn-problemi-ta-napryami-jikh-vir-shennya>
- [8] I., Novakovska, A., Martyn, L., Novakovskiy, L., Skrypnyk (2020). Peculiarities of Airports Development Strategy in Ukraine in Context of Environmental Friendly Land Management. International Journal of Sustainable Aviation: Turkey. 66-86 (DOI: 10.1504/IJSA.2020.108095)
- [9] O.H., Tarariko, T.V., Iliencko, T.L., Kuchma, I.O., Novakovska (2019).

Satellite agroecological monitoring within the system of sustainable environmental management archive of Agricultural Science and Practice Journal issues/ Agric. sci. pract.; 6(1): 18-27. (DOI: <https://doi.org/10.15407/agrisp> 6.01.018).

[10] Perovych, L., Tkachyk, O. (2011). Cadastral zoning of territories in the zone of influence of energy objects. Modern achievements of geodetic science and production. No. 1(21). pp. 191-195.

[11] Tretyak, A.M., Tretyak, VM., Dorosh, O.S. (2008). Conceptual bases of land zoning for land management outside settlements. Journal of Land Management Bulletin. No. 4. pp. 40-45.

[12] Tretyak, A.M., Hunko, L.A., Medynska, N.V., Hetmanchyk, I.P. (2020). A significance of method of design of land use of local eco-network structural elements. International Journal of Advanced Science and Technology this link is disabled. No. 29(6 Special), pp. 1094–1100.

[13] Isachenko, N.V. (2010). Ecological and economic principles of land zoning as a prerequisite for sustainable development of land use. Economics of nature management and environmental protection. p. 207. (in Ukrainian). URL : https://otherreferats.allbest.ru/agriculture/00574207_0.html

[14] Tretyak, V.M., Tretyak, V.M. (2020). Land Zoning, Legislative Collapse, and Scientific Principles of Planning the Development of Land Use Development of United Territorial Communities. Journal of Agrosvit. No. 23. doi: <http://www.agrosvit.info/?op=1&z=3340&i=0>

[15] Koshkalda, I.V., Anopriienko, T.V. (2018) Improving the model of state regulation of monetary valuation of land. Economics of agro-industrial complex. № 12, pp. 6-15. (in Ukrainian). doi: <https://doi.org/10.32317/2221-1055.201812006>

Scientific basis for sustainable development of urban land use

Novakovska Iryna, Doctor of Economic Sciences, professor., Chlen korespondent NAAN, National University of Life and Environmental Sciences of Ukraine, 03041, Kyiv, Str. Heroyiv Oborony, 15, tel.: [\(044\) 527-82-42](tel:(044)527-82-42), e-mail: novakovska@nubip.edu.ua, <https://orcid.org/0000-0002-1473-7543>

Liudmyla Hunko, Candidate of economic sciences, associate professor, National University of Life and Environmental Sciences of Ukraine, 03041, Kyiv, Str. Heroyiv Oborony, 15, tel.: [\(044\) 259-97-31](tel:(044)259-97-31), e-mail: gunko_l@nubip.edu.ua, <https://orcid.org/0000-0002-9454-744X>

Ivanchenko Vadym, Candidate of Juridical Sciences (Ph. D.), Vice president of the Charitable Foundation Charity Fund "My Hometown" 03189, Kyiv, str. Lomonosova, 52a, off. 147. e-mail: ivanchenko.vadym@kmr.gov.ua, <https://orcid.org/0009-0000-4620-0268>

Bereza Oleksandr, Graduate student of the Department of Land Cadastre, National University of Life and Environmental Sciences of Ukraine, 03041, Kyiv, Str. Heroyiv Oborony, 15, tel.: (044) 527-82-42, e-mail: alex.bereza@gmail.com, <https://orcid.org/0009-0006-9544-6217>

STRATEGIES FOR USE OF TERRITORIAL RESOURCES FOR SUSTAINABLE CITY DEVELOPMENT

Abstract. Urban development management requires precise economic analysis of the needs of various territories and economic sectors. The article highlights important aspects of managing territorial resources in urban areas to achieve sustainable development. The authors carefully analyze modern trends and problems in urban resource management, focusing on the economic aspect of optimizing their use. They propose the use of data analysis, statistical methods, mathematical models, and economic indicators for effective urban development management. They emphasize the importance of economic calculation to ensure optimal use of territories, particularly focusing on population, economic development, infrastructure, and technologies.

The article also emphasizes the importance of functional zoning of the city's territory to ensure efficient use of space and enhance the comfort of residents and visitors. Special attention is paid to housing construction issues, where the authors explore various types of housing construction and emphasize the need for rational use of industrial and communal-storage territories. The article provides data on the low efficiency of using industrial and communal-storage territories for construction. Using this problem as an example, the projected stabilization of job numbers due to trends in production cycle robotization is explored. The paper highlights important aspects of

rational use of urban territories considering the needs of modern life and urban infrastructure development.

In conclusion, the authors point out the importance of a comprehensive approach to managing territorial resources to ensure sustainable urban development in the future. They underscore the need for using analytical methods and economic strategies to optimize resource use and improve the quality of life for residents in urban environments.

Keywords: Territorial resources, utilization strategies, sustainable urban development, urban resource management, city infrastructure, ecological resilience of cities, economic potential of cities, innovative approaches to urban resource management.

Новаковська Ірина Олексіївна, доктор економічних наук, професор, чл.-кор. НААН, професор кафедри земельного кадастру, Національний університет біоресурсів і природокористування України, 03041, м. Київ, вул. Героїв Оборони, 15. (044) 527-82-42, e-mail: novakovska@nubip.edu.ua, <https://orcid.org/0000-0002-1473-7543>

Гунько Людмила Анатоліївна, кандидат економічних наук, доцент, доцент кафедри землевпорядного проектування, Національний університет біоресурсів і природокористування України, 03041, м. Київ, вул. Героїв Оборони, 15. (044) 259-97-31, e-mail: gunko_l@nubip.edu.ua, <https://orcid.org/0000-0002-9454-744X>

Іванченко Вадим Анатолійович, кандидат юридичних наук, віцепрезидент благодійного фонду «Рідне місто моє», 03189, м. Київ, вул. Ломоносова, 52а, оф. 147. (044)2060130 e-mail: ivanchenko.vadym@kmr.gov.ua, <https://orcid.org/0009-0000-4620-0268>

Береза Олександр Васильович, аспірант кафедри земельного кадастру, Національний університет біоресурсів і природокористування України, 03041, м. Київ, вул. Героїв Оборони, 15. (044) 527-82-42, e-mail: alex.bereza@gmail.com, <https://orcid.org/0009-0006-9544-6217>

СТРАТЕГІЇ ВИКОРИСТАННЯ ТЕРИТОРІАЛЬНИХ РЕСУРСІВ ДЛЯ СТАЛОГО РОЗВИТКУ МІСТ

Анотація. Управління міським розвитком вимагає точного економічного аналізу потреб різних територій та галузей економіки. Стаття висвітлює важливі аспекти управління територіальними ресурсами в міських областях з метою досягнення сталого розвитку. Автори ретельно аналізують сучасні тенденції та

проблеми управління міськими ресурсами, зосереджуючись на економічному аспекті оптимізації їх використання, пропонують використання аналізу даних, статистичних методів, математичних моделей та економічних показників для ефективного управління міським розвитком. Вони вказують на важливість економічного розрахунку для забезпечення оптимального використання територій, зокрема, звертаючи увагу на населення, економічний розвиток, інфраструктуру та технології.

Стаття також акцентує увагу щодо важливості функціонального поділу території міста для забезпечення ефективного використання простору та підвищення комфорту мешканців і відвідувачів. Особлива увага приділяється проблемам житлового будівництва, де автори досліджують різні види житлового будівництва і наголошують на необхідності раціонального використання промислових та комунально-складських територій. В статті наведені дані про низьку ефективність використання промислових та комунально-складських територій для будівництва. На прикладі зазначеної проблеми досліджено прогнозовану стабілізацію чисельності робочих місць у зв'язку з тенденціями роботизації виробничих циклів. Робота висвітлює важливі аспекти раціонального використання міських територій з урахуванням потреб сучасного життя та розвитку міських інфраструктур.

У висновку, автори вказують про важливість комплексного підходу до управління територіальними ресурсами для забезпечення сталого розвитку міст у майбутньому. Вони підкреслюють потребу у використанні аналітичних методів та економічних стратегій для оптимізації використання ресурсів та покращення якості життя мешканців у міських середовищах.

Ключові слова. Територіальні ресурси, стратегії використання, стале розвиток міст, управління міськими ресурсами, інфраструктура міст, екологічна стійкість міст, економічний потенціал міст, інноваційні підходи до управління міськими ресурсами

Formulation of the problem. In the context of increasing urban populations, economic, and environmental challenges, the need for developing and implementing strategies for balanced utilization of urban resources to ensure sustainable development becomes evident. Among the primary issues is the inefficient use of territories. Many cities have poorly developed areas or underutilize available resources, leading to unnecessary resource expenditure and environmental threats. Additionally, the growing industrialization and automobile usage in cities often result in air and water pollution, negatively impacting residents' quality of life and the overall ecological condition. In modern urban conditions, it is crucial to ensure the optimal utilization of urban

Scientific basis for sustainable development of urban land use

territorial resources to preserve ecological balance and ensure the city's viability for its inhabitants.

Аналіз останніх досліджень і публікацій.

The research topic has been extensively covered by Ukrainian scholars such as B. Danylyshyn, Yu. Stadnytskyi, P. Zakharchenko, T. Nestorenko, I. Bystryakov, O. Datsiy, T. Danylovych, O. Muzichenko, V. Voytsekhovska, A. Symak, O. Tkachuk, O. Tsvyakh, and others. In the context of Ukrainian reality, scholars and practitioners are actively engaged in adapting global practices of regional development management to the conditions of Ukraine, as well as refining the methodology of strategic planning for territories. Experts like V. Vakulenko, O. Berdanova, N. Baldych, N. Hrynychuk, I. Lepyoshkin, L. Chorniy participate in the development of regional development strategies and urban planning documentation.

Simultaneously, the development of strategies aimed at ensuring sustainable development of cities, which take into account the needs of modern communities and ensure balanced development without harm to future generations, remains a relevant task for researchers.

Presentation of the main research material.

Cities are often hubs of culture, business, education, and entertainment, attracting a large number of people from various social statuses, cultural backgrounds, and ethnic groups. This creates a multilayered and dynamic environment where different ideas, perspectives, and views converge. Additionally, characteristics of urban space include its infrastructure, high population density, numerous buildings, and specific architecture, often reflecting historical development and cultural influence. On the other hand, a distinctive feature of urban space is the presence of available territorial resources for urban development needs, which are extremely limited, and a significant portion of almost all functional zones are used inefficiently. Thus, the experience of the city of Kyiv in searching for territorial resources for the sustainable development of the metropolis can be applied to other cities in the country, especially large, big, and even medium-sized ones. [1]

The structure of the land fund of the capital of Ukraine, according to the State Geocadastre, in 2021 is characterized by the data in Table 1.

Table 1. Structure of the land fund*

Main types of land and land use	in total, thousand ha	% to total area territory
Total area	83,6	100

Scientific basis for sustainable development of urban land use

including:		
1. Agricultural land, including:	4,4	5,3
arable land	0,5	0,6
fallow land	-	-
perennial plantations	3,3	4,0
hayfields	0,6	0,7
pastures	0	0
2. Forests and other wooded areas	35,1	41,7
of them are covered with forest vegetation	34,9	41,7
3. Built-up land	37,0	44,3
4. Open wetlands	0,2	0,2
5. Other land	6,9	8,3
Total land (land)	76,9	92
Areas covered by surface water waters	6,7	8

** Formed according to the data of the State Geocadastr*

Dividing territory by functional purpose, as a process of designating different zones for different purposes or functions, helps efficiently utilize the territory, provide convenience for residents and guests of the city, and improve the quality of life and economic development. However, it is important for this division to be carefully planned and balanced to avoid conflicts between different zones and ensure the sustainable fulfillment of all population needs.

By functional purpose, the territory of the city of Kyiv, taking into account clarifications, is divided into the following land categories: residential and public buildings (16,640.6 hectares or 19.9%, of which 2,670.3 hectares or 3.2% are allocated for construction but remain undeveloped), industrial, scientific-production, and communal-warehousing (6,912.3 hectares or 8.3%), transportation infrastructure and external transport facilities (1,848.8 hectares or 2.2%), greenery and recreational areas (45,449.2 hectares or 54.4%), agricultural enterprises (289.8 hectares or 0.3%), streets and roads (4,341.8 hectares or 5.2%), water surfaces (6,309 hectares or 7.6%), other (1,727.4 hectares or 2.1%). [2,3]

Scientific basis for sustainable development of urban land use

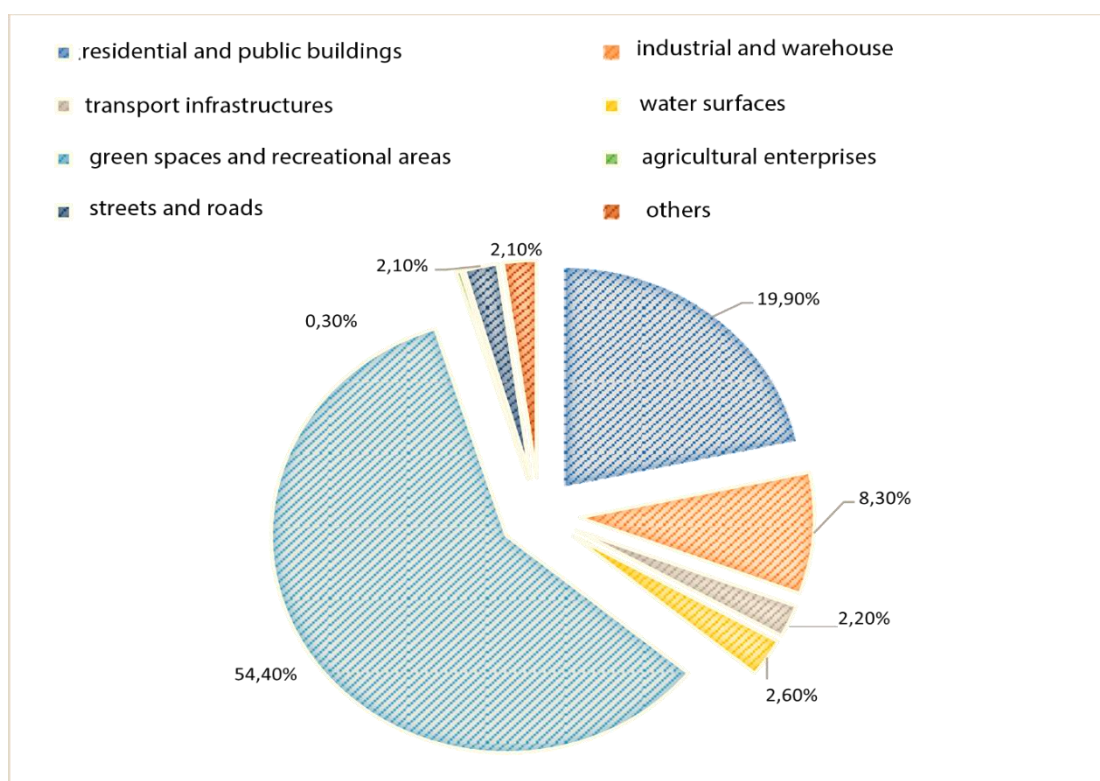


Fig.1. City territory by functional purpose

According to the data provided (Figure 1), almost 86% of the city's territory is occupied by built-up land (37.0 thousand hectares - 44.3%) and forests and other wooded areas (35.1 thousand hectares - 44.7%). Taking into account the specially conducted ecological-urban planning assessment of land cadastre, land management, and architectural-planning documentation, territorial resources can be used for urban planning purposes (Figure 2).

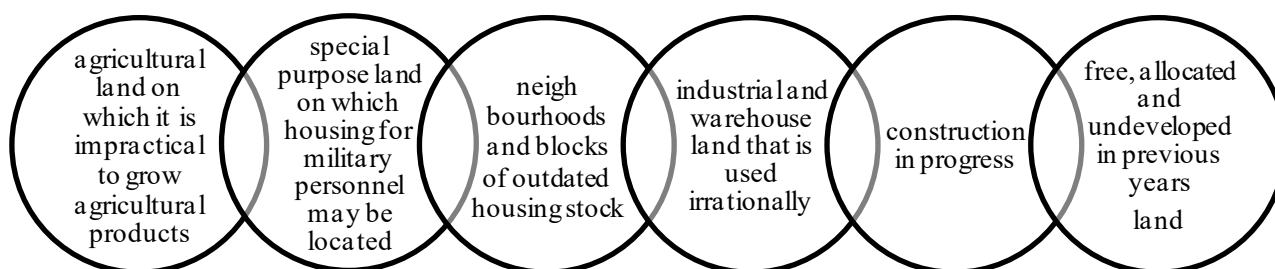


Fig. 2. Composition of territorial resources of the city that can be used

According to Figures 1 and 2, it has been established that there are undeveloped land plots in the suburban areas. In Kyiv, according to the [4], such lands have been allocated for comprehensive residential and public development, with a total area of

Scientific basis for sustainable development of urban land use

880.4 hectares, which will be developed over a period of 20 years (Teremky-3 in the Holiivskyi district, North Osokorky, Central Osokorky, microdistrict 11 of the Pozniaky residential area in the Darnytskyi district). Additionally, there are free territories reserved for prospective comprehensive residential and public development (residential area along Ozerna Street, Pivnichna Street, South Osokorky, and others), with a total area of 273.5 hectares.



Fig. 3. Project plan for the DPT industrial district «Troeshchina» in the area of the street. Pukhovskaya. [5]

For the development of industry and municipal economy in Kyiv, the General Plan indicates areas on Pukhivska Street (industrial area "Troyeshchyna") – 184 hectares, and to the south of Lake Tyahle (industrial zone "Osokorky") – 158 hectares (provided that the areas are annexed to the city limits of Kyiv). (See Figures 3 and Figures 4)



Fig. 4. Project plan for the development of Central Osokorki [6]

An important tool in urban development management is economic assessment of needs across different areas, as it allows for consideration of specific requirements of various population groups and economic sectors to ensure optimal resource utilization. Such assessment is a key stage in planning the resource potential of a city and depends on various factors such as population size, economic development, infrastructure, technological capabilities, and land use.

For effective assessment, data analysis, statistical methods, mathematical models, and economic indicators can be utilized. For example, the calculation of needs in areas of different purposes for a 20-year master plan was carried out based on the prospective permanent population (3.26 million people) with an average residential provision of no less than 29 km² per person, taking into account the corresponding normative indicators of population density per hectare ranging from 300 to 450 people for urban quarters (neighborhoods), and 35 people per hectare for villa areas. [1,4] This confirmed that for the capital megapolis, sustainable development provision with consideration of the prospective population has sufficient territories for all types of functional purposes.

It should be noted that the resource assessment of the territory, conducted based on the database of the state land cadastre, urban planning documentation for the planning of individual territories, and project documentation for the construction of objects considering eco-urban assessment, objectively reflects existing boundaries of spatial growth, as presented in Table 2.

Table 2. Volumes of territorial resources of the city*

Scientific basis for sustainable development of urban land use

№ p/p	Areas for internal development of the city	Area, ha
1	The territorial resource of existing rural areas (free from development, including those already allocated for residential and public construction and classified in the state land cadastre as residential and public land)	1185,6
2	Areas for comprehensive reconstruction of outdated housing stock	388,5
3	Inefficiently used production and storage facilities	1662,0
4	Special purpose	173, 0
5	Land of agricultural enterprises, including land already allocated for residential and public construction and classified in the state land cadastre as residential and public construction land	335,2
6	Territorial reserve for the creation of buffer forest parks of public green spaces at the expense of part of the territories of forestry enterprises	1598,0
7	Other territorial resources	564,1
8	Total	5906,4

** Formed according to the data of the State Geocadastr*

An important element in creating a just and healthy society, where everyone has the opportunity to live in abundance and safety within the context of sustainable development goals, is the construction of social or affordable housing. However, today there is already a shortage of municipally owned undeveloped land for the unhindered implementation of affordable housing and social housing programs. Therefore, rational utilization of urban land resources, modernization of outdated housing stock, restructuring with a change of functions of degraded industrial-warehouse and other areas while preserving and developing revenue-generating enterprises, remain priority directions for the internal development and improvement of Kyiv (See Fig. 5).

To address these tasks, various types of residential construction are utilized, ranging from the use of previously reserved areas in multi-storey residential complexes to proposals for densifying low-rise suburban areas, reconstructing territories of collective gardening associations for residential-civil construction purposes.

Scientific basis for sustainable development of urban land use

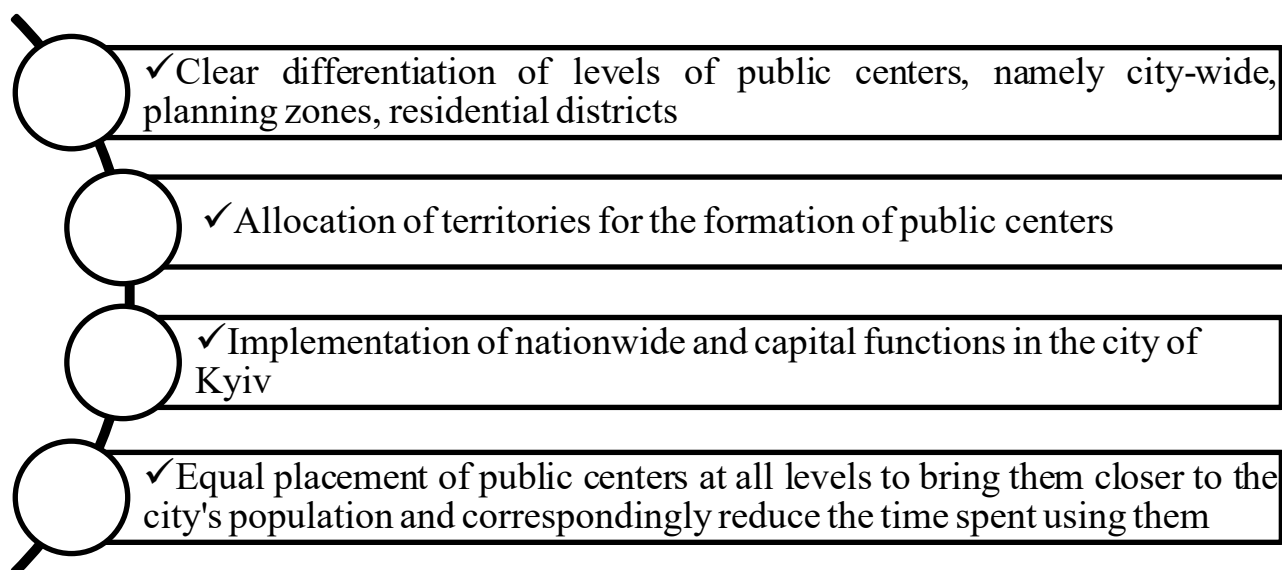


Fig. 5 Main Principles of Public Infrastructure Formation

According to research findings [7], the efficiency of utilizing a number of industrial-production and communal-storage territories, as well as territories of special designation, is extremely low. The area of industrial and communal-storage territories currently amounts to 6.6 thousand hectares. The current employment in industrial enterprises is 129.2 thousand people.

In the future, taking into account the dominant trends of industrial cycle automation, stabilization of employment is expected in manufacturing and municipal-warehousing enterprises in specific production areas at the level of 145-150 thousand jobs (about 11% of their total number in the city), while in scientific-production associations, industrial parks, and technoparks, the number of jobs is expected to reach 370 thousand. [7] Looking ahead in the city model, it is possible to expect the release of up to 60% of their total area or about 3900 hectares of industrial and municipal-warehousing territories. Over a 20-year period, industrial and municipal-warehousing territories totaling up to 706.5 hectares can be re-profiled for residential construction, multifunctional public development, as well as engineering-transport infrastructure and shared green spaces. [7]

In addition to the main issues related to the development of residential and public construction and the placement of housing construction volumes, constant attention should be paid to the issues of reconstruction and improvement of existing residential areas, both high-rise, 5-story buildings, and areas of low-rise residential development of the estate type.

The use and protection of public construction lands should be based on the principles outlined in the General Plan of the city of Kyiv, forming a differentiated system of public centers and separate objects of city-wide cultural, educational, sports,

and service institutions.

Conclusions

Effective urban development management requires a detailed economic analysis of the needs of different territories and economic sectors. Successful territorial planning demands a thorough analysis of population needs, taking into account economic, ecological, and socio-cultural aspects. It is important to ensure a balance between different zones to avoid conflicts and negative consequences for the environment and people. For instance, residents need protection from the negative impact of industrial zones or transportation arteries, while ecologically sensitive areas should be preserved from development.

Ensuring sustainable development and meeting all population needs require constant monitoring and adaptation of territorial planning according to changing conditions and needs. Only such an approach will allow cities to effectively utilize their potential and enhance the quality of life for their residents.

Rational use of urban land resources, modernization of housing stock, and development of social housing are critical aspects for creating a fair and healthy society. Transforming degraded areas into functional spaces for living and development can significantly improve residents' quality of life and ensure their safety and prosperity. It is important to pay attention to preserving and developing revenue-generating enterprises as components of economic growth and sustainable urban development. Such a comprehensive approach will contribute to creating living conditions where every resident has the opportunity for a decent life within the framework of sustainable development goals.

References:

1. Novakovska, I., Gunko, L., Dolynskiy, I. (2023). *Naukovi zasady staloho rozvytku mis'koho zemlekorystuvannya: monohrafiya* [Scientific principles of sustainable development of urban land use: monograph]. Kyiv. 243 [in Ukrainian]
2. Novakovska, I., Bereza, O. (2023). *Stolychne zemlekorystuvannya: problemy ta shlyakhy yikh vyrishennya z'hidno z kontseptsiiyeyu staloho rozvytku* [Metropolitan land use: problems and ways to solve them according to the concept of sustainable development]. *Naukovi innovatsiyi ta peredovi tekhnolohiyi. Seriya «Ekonomika»*. No. 11 (25). 404-414. DOI: [https://doi.org/10.52058/2786-5274-2023-11\(25\)-404-413](https://doi.org/10.52058/2786-5274-2023-11(25)-404-413) [in Ukrainian]
3. *Ekolohichnyy pasport mista Kyyeva, zatverdzhenny Kyyivs'koyu mis'koyu viys'kovoyu administratsiyeyu*. [Ecological passport of the city of Kyiv, approved by

the Kyiv City Military Administration.] (2022). Retrieved from https://ukrlogos.in.ua/documents/paper_ua.pdf [in Ukrainian]

4. General'nyy plan m. Kyieva do 2025 r. (Proekt) [General plan of the city of Kyiv until 2025 (Project)] Retrieved from <https://kievgenplan.grad.gov.ua/wp-content/uploads/2019/12/%D0%BF%D1%80%D0%BE%D0%B5%D0%BA%D1%82.pdf> [in Ukrainian]

5. Proektnyy plan DPT promraynu «Troyeshchyna» v rayoni vul. Pukhivs'kiy. [Project plan of the DPT of industrial district "Troyeshchyna" in the area of St. Puhivska] Retrieved from <https://gdevkievezhithorosh.com/2019/01> [in Ukrainian]

6. Proektnyy plan zabudovy Tsentral'nykh Osokorkiv [Design plan for the development of Central Osokorki] . Retrieved from <https://gdevkievezhithorosh.com/2018/05/> [in Ukrainian]

7. Tsvyakh O. M. (2018) Ekoloho-ekonomichni zasady vykorystannya postindustrial'nykh zemel' v umovakh velykoho mista [Ecological and economic principles of the use of post-industrial lands in the conditions of a large city] : *Candidate's thesis*. Kyiv: NUBiP [in Ukrainian]

Література :

1. Новаковська І.О., Гунько Л.А., Долинський І.М. Наукові засади сталого розвитку міського землекористування: монографія - К.: Видавничий центр НУБіП України, 2023. 243 с.

2. Новаковська І., Береза О. Столичне землекористування: проблеми та шляхи їх вирішення згідно з концепцією сталого розвитку. Наукові інновації та передові технології. Серія «Економіка». № 11 (25). 2023. сс.404-414. DOI: [https://doi.org/10.52058/2786-5274-2023-11\(25\)-404-413](https://doi.org/10.52058/2786-5274-2023-11(25)-404-413)

3. Екологічний паспорт міста Києва, затверджений Київською міською військовою адміністрацією. (2022) URL: https://ukrlogos.in.ua/documents/paper_ua.pdf

4. Генеральний план м. Києва до 2025 р. (Проект) URL: <https://kievgenplan.grad.gov.ua/wp-content/uploads/2019/12/%D0%BF%D1%80%D0%BE%D0%B5%D0%BA%D1%82.pdf>

5. Проектний план ДПТ промрайну «Троєщина» в районі вул. Пухівській. URL: <https://gdevkievezhithorosh.com/2019/01>

6. Проектний план забудови Центральних Осокорків. URL: <https://gdevkievezhithorosh.com/2018/05/>

7. Цвях О. М. Еколого-економічні засади використання постіндустріальних земель в умовах великого міста: дис ... канд. екон. наук: 08.00.06 / НУБіП України. Київ, 2018. 378 с.