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MONITORING AND PROTECTION OF LAND IN THE CONDITIONS OF DIGITAL TRANSFORMATION

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Abstract. *The article analyzes the prospects for the development of monitoring of land relations, theoretical and legal aspects of its operation and trends in monitoring of relations according to existing data. In current circumstances, it is quite difficult to collect reliable monitoring data, as different areas have large areas and significant spatial and temporal characteristics. All information on land relations is collected and maintained by various departments and local authorities, and other government institutions, public organizations and individuals do not have full access to it. As a result, central authorities are not always able to see a "whole picture" of land relations, both at the district and oblast levels and at the national level, and are not always able to find optimal solutions to improve land relations. There is a need to introduce monitoring of land relations as a constantly updated information system, to ensure the accumulation of information, its analysis and forecasting, and the development of scientifically sound recommendations on this basis for effective management decisions. Proper organization of the use of monitoring information will make it possible to assess the quantitative and qualitative indicators of the state of lands, and to assess and forecast changes. The issue of lack*

of free access to information on land relations, which creates favorable conditions for land use improperly, evasion of compliance with the requirements of land and environmental legislation of Ukraine, the spread of corruption. Today, all information on land relations is collected and maintained by various departments and local authorities, and other government institutions, public organizations and individuals do not have full access to it. As a result, central authorities do not always have the opportunity to see a "holistic picture" of land relations, both at the district and oblast levels, and at the national level, and do not always have the opportunity to find optimal solutions to improve land relations. The need to create a constantly updated database on the state of development of land relations, with open access for monitoring entities as an integrating information network, as well as for forecasting and control of rational land use, and ensuring transparency in land relations management. The creation of such a base will focus on the effectiveness of management decisions and improve the management of land use in general.

Keywords: *digital transformation, land monitoring, land relations monitoring, land resources, land use, land relations.*

Introduction. The basis of any management is the availability of information resources and information systems. The rapid development of information technologies in recent years has significantly affected the prospects of scientific progress and the development of certain industries. The basis of the productive development of information and communication infrastructure in such a field as environmental protection is, of course, to create and ensure the operation of a digital system for providing access to all environmental information, which is built using geo-information technologies for collecting, storing, processing and transmitting information for the purpose of analysis, modeling and forecasting of the state of the natural environment. In our time, we increasingly observe problematic issues related to monitoring processes in soil fertility changes, namely waterlogging processes, loss of humus, of course, salinization, as well as water-physical deterioration and the

development of deflation processes. It is precisely such trends that led to the acceleration of the pace of development of monitoring research, which is due to the rapid development of high technologies. They, in turn, require reorientation, namely: setting up modern digital communication channels, possibly using artificial intelligence to process large data sets, robotization and, of course, automation of current operations. Therefore, please note that monitoring and security activities cannot exist without digital technologies. All searches must be performed using digital purpose-built equipment and the results processed using appropriately designed digital software.

Monitoring plays an important role in the formation of proper information support of the digital system of rational use and protection of natural resources. However, there are problems in this information system that complicate the creation of a unified national environmental monitoring system and its proper functioning.

The need for rational and effective use of all land resources and preservation of their quality, and therefore the quality of agricultural soils, is determined by certain negative trends. More than a third of the land is eroded, and almost half of the land, including black soils, has a moderate or low level of nutrient availability. Overpopulated, polluted and abandoned lands were also surveyed. The urgency of problems arising in the field of land quality protection necessitates their solution. This requires effective tools of influence, mainly of a legal nature. Land monitoring and protection should be considered as one of the ways to prevent land degradation.

The purpose of the article is to analyze the existing system of land monitoring and protection and the prospects of their functioning in the conditions of the transformation of the digital environment.

Materials and Methods of Scientific Research. The research methods used in this work are, firstly, methods of collecting, analyzing and summarizing information, and secondly, survey methods that reflect the current state and prospects for the development of land monitoring and protection. These methods are mainly based on collected data on land monitoring and protection in Ukraine to date. With the help of

specific legislative acts and the analysis of collected library sources, it is possible to carry out a full analysis of the work on a realistic basis and answer all the questions, and most importantly, those who conduct qualitative and thorough research on the issue of monitoring, its development and implementation at all stages of application are searching solutions to the many problems that are likely to be encountered in the future.

Analysis of the latest scientific research and publications.The issue of legal support for land monitoring and protection finds a place in the scientific works of many scientists, such as M. I. Yerofeev, N. R. Malysheva, S. V. Sharapov, N. M. Bavrovska, A. V. Kononyuk, R. A. Kharytonenko, H. V. Rogozenko, B. M. Danylyshyn, M. A. Khvesyk, V. A Golyan, O. S. Dorosh, Y. M. Dorosh, G. D. Hutsulyak, L. Y. Novakovskyi, I. O. Novakovskaya, V. M. Tretyak, L. I. Vorotyntseva, R. V. Panarin and many others. In addition, many aspects of the legislative provisions for the effective and rational implementation of monitoring and land protection measures still require wider scientific demonstrations, observations and research. Therefore, for the purpose of this work, we determined the need for a scientific analysis of the legal aspects of land monitoring and protection in accordance with the new Ukrainian legislation.

Such respected scientists as: V. Andreytsev, N. Tytova, V. Nosik, P. Kulinych, G. Hutsulyak, M. Shulga, D. Dobryak, Yu. Shemshuchenko, N. Mazii dealt with issues of land protection. , A. Sokhnych, A. Tretyak and others. Thanks to the work of these scientists, a methodical system was developed and practical recommendations were provided for solving the problems of modern land management in Ukraine in the system of land resource management and land protection.

Scientific research on the implementation of monitoring and protection of land relations was carried out by scientists: R.M. Panas, T.K. Overkovska, L.M. Petrovych, D.V. Busuyok believes that it is necessary to improve the organizational and legal support for monitoring and protection of land through creation of a

specialized institution that will be responsible for conducting research on land monitoring and work on land protection by institutions such as the Center for Land Monitoring and Protection of Ukraine [9].

According to the honorary land manager of Ukraine D.S. Dobryak today in Ukraine, the level of scientific support lags far behind what is necessary to meet the necessary needs of the state and society, namely in the implementation of the system of monitoring and protection of land relations. He emphasized the expediency of restoring the central administrative body, the task of which is to ensure the formation and implementation of national policy and the improvement of state regulation in the field of land relations, which is currently at the initial stage of land reform in our country.

Foreign researchers in the field of land relations, E. Morgan, LA Melville, consider monitoring - systematic and systematic regarding the protection of agricultural lands as one of the methods of determining the dynamics of land use and assessing trends. They draw attention to the tasks of the state regarding the regulation of land relations in order to ensure the rational use of agricultural land [12].

Statement of the task and relevance. The relevance of monitoring land relations and research on land protection in Ukraine will be carried out constantly, with an updated information system, which is determined by the fact that in our Ukraine, the information provided about land relations is common, since it is collected by relevant bodies and local authorities in the form of departmental information with limited access to by other authorities. For this reason, this information is far from being fully used to solve important economic and social problems.

The cycle of transformation and collection of data into information for the implementation of monitoring studies consists of four stages, namely, data collection, then data processing, of course, data analysis and evaluation, and finally, the use of information. The first two stages include "light digitization" tools, which are usually referred to as OLTP (On Line Transactional Processes) components. In turn, the next

two stages related to the analysis and use of data, as a rule, are formed by the components of "heavy digitization", that is, online analytical processes, which, as a rule, are more complex for direct management and implementation of monitoring information processes in the field of agriculture and land relations [8].

All available data on land relations and resources should be centralized in one authority and interact with each other. Central authorities cannot always make optimal decisions to improve the development of these relations. During the research, the main problems were identified, the first of which is the lack of necessary information, in particular, high-quality planning and cartographic materials about land resources that are owned and used by enterprises and farms. It should be noted that the land cadastre does not contain information regarding court decisions on specific land plots. By automating the monitoring process, we will be able to solve most of these problems both now and in the future. [6].

In accordance with such a future, it is the comparative evaluation of the concepts of monitoring groups of the industry of precision agriculture or smart agriculture that is gaining more and more publicity, where the need to define solutions capable of applying methods in agro-ecological enterprises is discussed. For this purpose, an ontology is proposed, based on obtaining in the process of information monitoring of the territory - a conceptual map obtained as a result of the transformation of data into information, to support the design of a new generation of information systems of farms, for example, farms, capable of meeting the production needs of agro-ecological enterprises. The conceptual map defined by the ontology is primarily useful for planning the composition of the farms, according to a modular approach, perhaps following a strategy that begins to consider the implementation of the necessary modern components, and then gradually moves to more articulated solutions that also include such components and functions associated with it. The conceptual maps created at the end help farms process a wide array of data and observe, for example, land erosion. This draws attention to the main factor that needs monitoring, namely soil erosion, which is positioned within the ecological and

economic crisis of agricultural land use. One of the decisive factors related to water erosion is the depth of the erosion base in this area. This basis is determined by the height difference between the top of the basin and the watercourse [9].

The methodological consequence of damage assessment using such erosion indicators is the loss of the basic quality of the soil due to washing and accelerated erosion, as well as the blowing of the productive layer by the wind, while the upper fertile layer of the soil, which contains humus, nutrients such as nitrogen, phosphorus and potassium, trace elements and other biologically active substances, blown away by the wind and lost [2].

Research results and their discussion. Today, monitoring and proper soil protection is impossible without automation and digital technologies. The resulting technologies have the potential to revolutionize agricultural monitoring research, helping to work more efficiently and sustainably. All insights based on data collected through digital technologies should improve decision-making processes as well as increase environmental efficiency. This will help to make work in the agricultural sector more attractive, primarily for the younger generation. Monitoring in a digital environment can also provide consumers with greater transparency into how exactly the products they need are being produced at businesses. In addition to the field of production, digital technologies for conducting and implementing monitoring and protection of land potential are key attributes to make newly formed communities more attractive and sustainable, but at the same time reduce problems that are specifically related to remoteness, and at the same time, improving access to services . Research and innovation are vital to facilitate and accelerate the digital transformation for the benefit of local residents and businesses who carry out their monitoring, i.e. actively implement their scientific and technical activities, laying the foundation for digitized and already fully researched monitoring of the economy and rural areas using digital data. Such introduced strategic measures should support the implementation of digital technologies in the field of not only monitoring, but also the protection of land potential in order to increase investments in research and

investments for the development of new and more modern digital solutions every year. And first of all, such effective solutions for the effective implementation of land monitoring and protection are precisely the creation of web services necessary for general distribution, which provide monitoring information about the land potential of this or that region, country and the world in general to all those who are interested in researching issues in in the field of development of land relations and geo-informational resources.

1. The digital component of information support for land monitoring and protection

№п/п	The name of the web service	Characteristics of the web service
1	Global Soil Map	a web service that provides information on soil properties worldwide. You can select a country and region to get detailed data on soil chemistry, density, drainage and other parameters
2	SoilWeb	an interactive map of the United States that provides information about soil types and their characteristics. You can enter an address or select a location on the map to get detailed information about the soil in that area
3	European Soil Data Centre	is a web service that provides information about soils in Europe. You can select a country and region to get detailed information about soil properties such as pH, humus content, texture and other parameters.
4	SoilGrids	a web service that provides a global map of soils with detailed data on their characteristics. This service provides information on soil parameters such as acidity, clay content, sand content, organic content and others.

**Developed by the author according to data as of Octobury 01, 2023.*

The main such web services, which are filled with digital information about monitoring processes, are presented in the form of a table and have their own specific characteristics and signs regarding their content and general presentation, through which information support for monitoring and land protection is carried out.

These web services can be useful for researchers, individuals or legal entities who are owners of farms, enterprises, or other specialists who are engaged in agronomy, soil science, geobotany, development of project documentation and other work where the research of the necessary, and most importantly, digital information support in the field of monitoring processes and implementation of land protection. They will help to obtain detailed information about the entire land potential of the studied territory and characteristics that can help in planning the development of, for example, the agrarian sector of land or increasing the harvest for large enterprises and farms.

An in-depth study of the process of monitoring and soil protection with the help of the created and implemented digital transformation in the field of economy indicates certain caveats, that is, attention is drawn to the need for an in-depth understanding of the issue of moral responsibility in relation to digital transformation, the inclusion of this responsibility in a research and innovation approach, as well as the determination and regulation of who is responsible for the determined (positive or negative) impacts of the measures taken. Such a new transformation in the territories should not be carried out by technologies, but by solving problems and, of course, be open to different models of transition. For this reason, the issue of monitoring processes in the digital environment cannot be only a matter of overcoming the digital divide, but rather, the digital transformation of territories should be related to a broader transformation of social and economic development models and a coherent management strategy [9].

Of course, the relevance, as well as the expediency of the process of monitoring and researching the processes of land protection in the field of digital

transformation is not in doubt, but, looking from the standpoint of a scientifically based approach, such a process is a search for a balance between the interaction of various factors that are united in groups. Such factors are: economic, social, environmental, etc. When combining technological advances with socio-cultural and, of course, political changes, agro-food systems can be transformed to solve pressing climate, economic, environmental and social problems [1].

The main function of land monitoring in Ukraine is the need to introduce systematic research and monitoring of the state of land resources by conducting various surveys, measurements and various methods, as well as providing authorities and services with relevant information that is important for the management of land resources in our country. An objective assessment of the ecological state of lands should be carried out by the bodies of the State Agency of Land Resources of Ukraine. [5].

Monitoring and protection of land is a regular study and observation of processes occurring in natural, technical and social processes, the main purpose of which is the assessment, control of the present and forecast for the future. Such areas of research are new. To control the condition of the soil cover, monitoring has been used and developed since the last century, since the problem was already widespread in countries with already developed agricultural production and where land degradation and other disturbances occurred due to excessive chemical and mechanical action that had temporary success. And therefore, in such countries, the latest soil protection systems of agriculture began to develop from the end of the 20th century.

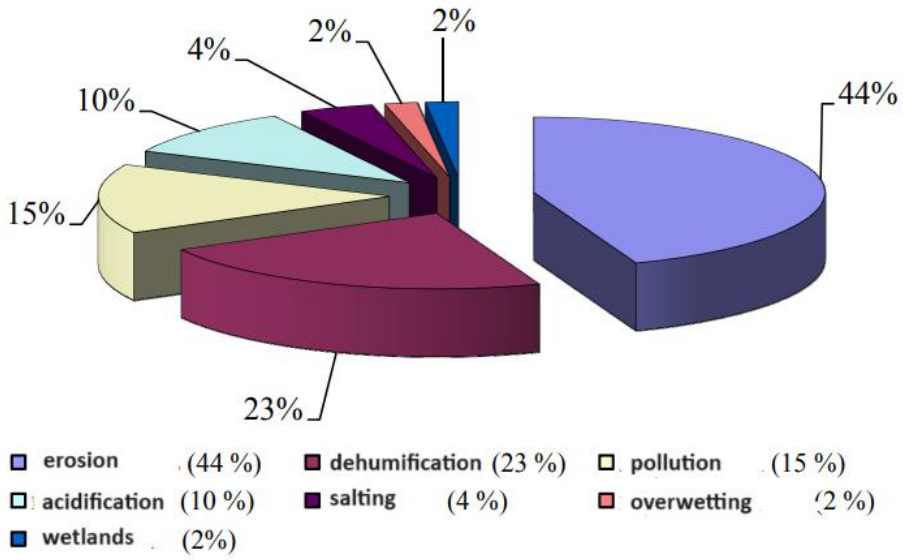

Figure 1 - Specific weight of degradation factors on the lands of Ukraine

**Developed by the author according to data as of Octobury 01, 2023.*

The specific weight of soil degradation factors on the territory of Ukraine can be important for preserving soil fertility and quality. The specific weight of soil degradation factors can vary depending on the region, soil type, climate, and other factors. However, common factors that can lead to soil degradation include: erosion, land misuse, pollution and others. (Fig. 1).

With the adoption of the Land Code in Ukraine in 1990, normative documents on soil monitoring and protection were adopted for the first time. Actually, after adopting the Resolution of the Cabinet of Ministers of Ukraine dated August 20, 1993 No. 661 "Regulations on Monitoring and Protection of Lands", a systematic study and monitoring of the current state and potential development of land resources has already begun in Ukraine. Already later, namely within a certain period of time, the legal regulation of soil monitoring and soil protection began to be clarified.

Article 191 of the Land Code of Ukraine contains the legal definition of soil monitoring and protection, according to which soil monitoring and protection is a necessary established system of research and observation of the state of soils, land potential of the country, respectively, their assessment and prevention and neutralization of the consequences of all negative processes in the studied territory .

Soil monitoring is one of the main components of the state environmental monitoring system. The development of market relations naturally requires radical changes in the content of state administration in the field of land use and protection.

The tasks of soil monitoring and protection include the performance of technical, informational and analytical work, during which, with the help of the necessary technical means, it is possible to control and monitor the quality of the soil. Such means also allow taking important samples and carrying out geobotanical studies of soils, studies, analyses, observations and measurements of the chemical and, accordingly, biological composition of soils and their physical condition. This also includes the assessment and analysis of the state of land plots and, already on this basis, the development of forecasts regarding the occurrence of the most important negative processes on land plots of various categories in the near and distant future. The tasks can also include the identification of cases of non-compliance of land resources with the target purpose, that is, the general ecological situation. When a problem arises in the scientific and industrial sphere, a network of soil condition control is created in the necessary volume, taking into account other components of natural resources and in accordance with the legislative and regulatory acts in force in Ukraine [4].

Improvement of the already created methodology and methods of land monitoring and soil protection remains an urgent problem even today, as it is the basis for justifying management decisions in the field of environmental protection and the implementation of environmental protection measures. Special attention is paid to monitoring the state of land resources. It is important to emphasize that they play almost the most important role in the development of the state, and are also committed to the successful solution of agrarian and economic problems. Such improvement of this system in Ukraine is an undeniable prerequisite for further harmonization of methods and methods of soil research and monitoring to European standards.

Ukraine has all the conditions for high-quality monitoring and land protection, as there are relevant laws and a legal framework has been created for the analysis of monitoring reports, but it faces certain difficulties, which, in turn, affect the quality of the collected data. We are confidently taking steps to change the existing situation, and these decisions involve, first of all, the improvement of the legal framework for economic, efficient and, of course, ecological and safe use of land. In summary, the solution to this problem is the adoption of the Law of Ukraine "On the State Land Cadastre". The cadastre of the country informationally guarantees the ownership of a land plot, documents its value and thus ensures the effective activity of land owners and land users [3].

The study of the condition and quality of soils within the framework of the state monitoring program is based on the Regulation "On the state system of environmental monitoring". According to the Land Code of Ukraine and the Law "On Land Protection", the functioning of soil monitoring and protection in Ukraine must be ensured by the State Agency of Ukraine. In accordance with the laws "On land protection" and "On state control over the use and protection of land", the Central Executive Authority has been granted powers on agrarian policy issues, which include supervision and protection, including agricultural land and soil cover.

In the implementation of an effective and rational system of correct land use, an important role is played by the formation of the optimal dimensions of land use, therefore, the inclusion of new projects in the Laws of Ukraine is currently an urgent problem. Note that the impetus for the formation of a clear and effective land market is the adoption of the Law of Ukraine "On the Land Market". The slow adoption of this law contributed to the extension of the moratorium on the sale of agricultural land, which, in turn, further worsened the situation with ensuring control over the rational use and protection of land [1].

Since there is no agricultural land market in Ukraine, lease conditions are actively developing. The rental price is calculated from the normative monetary assessment. (Fig. 2)

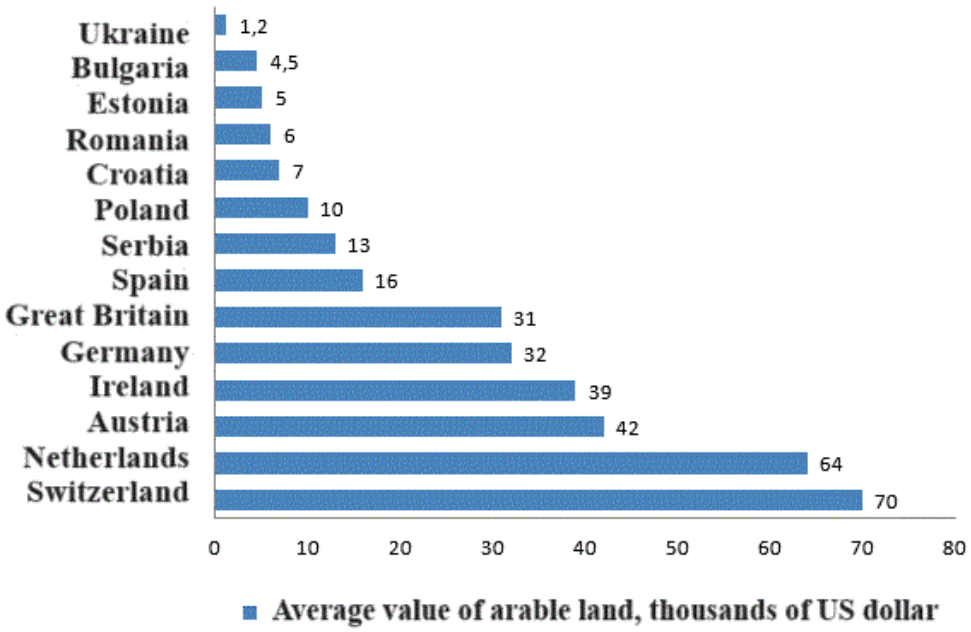

Figure 2 - Cost of agricultural land in different countries

**Developed by the authors according to data as of Octobury 01, 2023.*

Land monitoring and protection solves a number of tasks and must perform tasks related to the timely detection of all land changes due to their irrational use by humans. Assessment of measures to maintain or restore soil fertility, prevent negative impact on soil cover, and eliminate various consequences. An important step in solving this problem was the adoption of the Law of Ukraine "On Monitoring and Land Protection". According to this law, the purpose of carrying out such works on soil monitoring and protection was to provide information on sustainable ecological and economic land tenure and land use. This, in turn, establishes the principles of surveillance: efficiency and legality, continuity and unity [6].

Currently, Ukraine is at the stage of forming the market for ecologically clean products, which, of course, must be produced from clean ecological raw materials, as well as grown on ecologically clean soils. Therefore, we pay great attention to such an important issue as the adoption of the law "On organic production" in Ukraine. This law establishes the legal, economic, social and organizational frameworks necessary for the management of organic agriculture

While studying the work, we discovered the need to develop a mechanism of state economic support for land users and landowners for ecologically safe,

economical and efficient use of agricultural lands. This is stipulated by the Land Code and the Law of Ukraine "On Land Protection". However, it can be noticed that there is no such state support in this direction. The only solution to the existing problem can be the adoption of the Law of Ukraine "On the mechanism of economic stimulation of land use and protection". This law will create conditions for an effective mechanism of efficient, economically and ecologically safe use of land potential [1].

Separately, I would like to pay attention to local regulations - business plans of agricultural companies, which regulate the issue of rational use and protection of land resources. In accordance with the implementation of such work on the preparation of business plans, it is expected to prepare the sections necessary to determine the impact of human economic activity on the surrounding natural environment, the application of necessary environmental protection measures.

The purpose of implementing measures to regulate land relations is to create favorable conditions for the stability and efficiency of the functioning of land supervision and protection systems. In addition, the newly created conditions are aimed at solving the country's food security problems, as well as improving the welfare of citizens and improving rural areas. [4]

The Law of Ukraine "On Protection of the Natural Environment" is aimed at ensuring the collection, processing, storage and analysis of data on the state of the environment during monitoring and creation of land protection measures. Changes have been made and scientifically based recommendations have been developed, which are necessary for making appropriate and effective management decisions in Ukraine, where a high-quality system of state supervision has not yet been created. Control over the state of works is entrusted to specially authorized persons of the central executive bodies in matters of ecology and natural resources, as well as specially authorized state bodies, enterprises, institutions and organizations. All the above-mentioned bodies in this field of activity are obliged to transfer the analytical materials of their comments to other relevant state bodies free of charge. The

procedure for state supervision of environmental protection is determined by the Cabinet of Ministers of Ukraine [5].

Work on ensuring the organization of short- and long-term forecasting of changes in the natural environment is carried out by specially authorized state bodies together with relevant scientific institutions. All of them should be taken into account when developing and implementing programs and measures for the economic and social development of Ukraine and environmental protection. Observation data is the main source of information.

All individuals and legal entities that carry out economic activities and other works that have a negative impact on the natural environment are obliged to ensure the implementation of production monitoring as much as possible. The Cabinet of Ministers of Ukraine establishes the current list of types of economic and other activities that are subject to industrial monitoring of soil conditions. We already know that agricultural lands have become the object of soil surveillance, and these are permanent plantations, arable land, hayfields, fallows, pastures, and temporary conservation lands. This means that in these territories, observations and research are carried out in a timely manner in accordance with national and regional soil monitoring programs, which includes observations and the collection and processing of information on the development of soil erosion, acidification, salinization and changes in the structure of the soil cover, salinization, changes in the state of humus, water and nutrient balance, waterlogging, soil contamination with radionuclides and heavy metals, as well as residues of agrochemicals, pesticides and toxins.

The Ministry of Agrarian Policy and Food of Ukraine in cooperation and close cooperation with other key actors, namely the Ministry of Ecology and Natural Resources of Ukraine, the State Agency of Land Resources of Ukraine, the State Agency of Water Resources of Ukraine and other scientific research institutions of the National Academy of Agrarian Sciences of Ukraine carry out soil monitoring on agricultural lands. The results obtained in the course of scientific research are used in the performance of economic and monetary (normative and expert) evaluation of land

plots, in the regulation of the legal basis of land relations, in the establishment of agricultural production zones for the production of products and in the determination of the amount of payment for the land, planning measures for restoration soil fertility and increasing the productivity of agricultural crops, development of rational recommendations.

High-quality and effective management of land resources should be based on monitoring materials during the study of soils and soil cover. There are cases when during privatization of land or exchange of property rights in the process, for example, purchase and sale, on the basis of monitoring data, the characteristics of the investigated land are established, which must be added to the documentation with land management or to the contract of sale. Having such documentation in the possession of the landowner, it will not only significantly improve the results of his economic activity, but also, of course, contribute to the control of soil protection. [9].

In order to correct the problems of the current state of land management in Ukraine, it is already proposed to create a new Unified Soil and Land Service on the basis of the existing central and regional divisions of ministries and departments, the main purpose of which, of course, is to ensure effective and to develop and implement sustainable land use and in solving the necessary tasks of land monitoring and protection.

Assessment of soil condition is a necessary part of their monitoring. Here, it is advisable to choose indicators that allow you to adequately assess the functioning of the agrosystem and the impact on it of environmental components of both natural and anthropogenic origin. In our opinion, in order to solve such a problem, it is necessary to apply an indicator approach, the effect of which consists in the formation of a system of indicators that most fully and objectively characterize the land potential. [10].

Please note that changes in the quantitative and qualitative characteristics of land plots are being monitored in populated areas. Here we are already talking about taking into account the collected data of the results of studies of the state of the soil,

as well as the pollution of the soil cover, its deterioration, soil disturbance, clogging, assessment and forecast of changes in the state of the country. Therefore, within the settlement, the assessment of the qualitative state of land plots is determined by determining the characteristics using qualitative and quantitative indicators, supplementing these urban planning and other characteristics, as well as all information related to engineering and geological conditions, the ecological state of soil resources and the urban environment, including the degree of land suitability for development, etc. [5].

Assessment of soil quality cannot be carried out without taking into account the specific functional purpose of the territory, since the requirements for development are not the same for territories with different functional purposes. For example, in landscape-recreational and agricultural zones, attention is paid to the requirements for the ecological state of the territories, and in industrial zones - the engineering and construction state of the territories.

Information related to soil quality assessment should also be used when determining the sequence of soil protection measures, as well as when designing ways to prevent negative processes and eliminate their consequences. The process of assessing the quality of land plots within settlements is initiated by the responsible bodies of town planning, nature management and environmental protection of the settlement during the planning of construction and reconstruction of buildings. Project preparation includes assessment of the impact of urban planning objects on the surrounding natural environment and environmental expertise of projects.

The need for land assessment and subsequent monitoring of such measures is determined by its economic functions as one of the types of natural resources. Among them, the most obvious are those that meet all production requirements. They can be reduced to three main groups, that is, the first group - satisfaction of requirements in resources: material, energy, information, communication, reduction; The second group is related to the formation of conditions for the reproduction of the physiological abilities of a person as a labor resource, and the last third - with the

formation of conditions for the reproduction of the personal abilities of a person as a labor resource. [7].

The importance of land monitoring can be clearly seen with the onset of the Russian-Ukrainian war. As a result of hostilities, the land cover of agricultural lands is destroyed and its heterogeneity increases. The explosions of shells and aerial bombs, which create large craters on the terrain, lead to the disturbance of the relief, soil profile, which requires the study, development and application of measures for the reclamation of these soils [13]. The military actions led to changes in the legislation and simplification of the procedure for obtaining land rights, as well as to the closure of the land cadastre. Problems of demining large territories of Ukraine, deciding the future fate of territories that cannot be promptly controlled and demined, as well as the need to check the quality of the soil of agricultural lands in areas of active hostilities, since the impact of missiles and shells on fields clearly deteriorates their quality, pollutes them and can have a negative impact on the quality, safety and quantity of crops grown in these contaminated areas. Even during the post-war development of territories, land categories should be taken into account in order to prevent the development of water resources, plowing of floodplains, etc. Even after the war, a balanced model of land use should be implemented, which takes into account the goals of the European Green Course and Ukraine's obligations under international agreements to preserve biodiversity [14].

Making changes to the state cadastre in order to reflect in it the qualitative characteristics of land plots, land and soil protection measures, as well as restrictions on the use of land plots is in modern conditions the only possible measure of systematization of the information base on the special protection of land as the most important national property, monitoring lands and soils, ensuring the sustainable development of land use in conditions of global climate change [15]. This will make it possible to create a unified, automated, public and reliable system of monitoring land resources on a scientific basis. Ensuring the publication and availability of

information became not only a prerequisite for the formation of effective and ecologically clean ownership, use and disposal of land [16].

Conclusions and proposals. Land monitoring and protection is one of the most important legal measures of land information. The information obtained during the work, which contains information about the state of land plots and their use, is stored and supplemented in the relevant databases and archives of the automated information system. This is the basis for the further preparation of operational summaries and scientific forecasts and recommendations, which must be provided to local self-government bodies, city executive authorities of the country and other state bodies, which will take the necessary measures to prevent and eliminate the consequences of negative processes in the future. In addition, the tasks of soil monitoring and protection include information support for the development and implementation of the state land cadastre, as well as the implementation of state control over the use and protection of soil plots and optimal use of land, soil management and the creation of such a database of objective information that is used for assessment state of land resources. And therefore it is one of the main tasks of land monitoring and protection.

Carrying out actions in the field of monitoring and protection of land relations as an uninterrupted management function will have a powerful positive value precisely in the implementation of land reform, as it will provide relevant bodies with special information and analytical materials, which will later serve to develop a management strategy, and this, in turn, will give the ability to control the work of these responsible bodies. Summarizing, it can be said with confidence that the monitoring and protection of lands nowadays requires a complete improvement of the methodology of its implementation. It is necessary to create an effective national system for monitoring the quality of land and soils. This is due to the fact that the obtained data make it possible to constantly adjust both the quantitative norms and standards that are subject to control, and to improve the organizational and legal

support for land monitoring and protection by creating a special body that will monitor and protect land in its work, namely the Center for Monitoring and Land Protection of Ukraine.

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МОНІТОРИНГ ТА ОХОРОНА ЗЕМЕЛЬ В УМОВАХ ЦИФРОВОЇ ТРАНСФОРМАЦІЇ

Анотація: *У статті проаналізовано перспективи розвитку моніторингу земельних відносин, теоретико-правові аспекти його функціонування та тенденції моніторингу земельних відносин за наявними даними. У сучасних умовах зібрати достовірні дані моніторингу досить складно, оскільки різні території характеризуються великими площами та значними просторово-часовими характеристиками. Належна організація використання інформації моніторингу дозволить оцінювати кількісні та якісні показники стану землі, а також оцінювати та прогнозувати зміни. Звернуто увагу на проблему відсутності вільного доступу до інформації про земельні відносини, що створює сприятливі умови для нецільового використання землі, невиконання вимог законодавства України про охорону землі та природи, поширення корупції. Наголошено на необхідності створення постійно оновлюваної бази даних про стан просторового розвитку, відкритої для суб'єктів моніторингу, як інтегруючої інформаційної мережі, а також прогнозування та контролю раціонального використання земель та забезпечення прозорості в управлінні земельними відносинами. Створення такої бази даних призведе до концентрації зусиль на ефективності управлінських рішень та загальному вдосконаленні системи землеустрою, яка буде особливо актуальною в період після воєнного відновлення України.*

Ключові слова: *цифрова трансформація, моніторинг території; моніторинг земельних відносин; земельні ресурси; землекористування; земельні відносини.*