

AGRICULTURAL LANDS TRANSFORMATION AND THEIR USE IN LAND PLANNING PROJECTS IN UKRAINE

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Abstract

Aspects and factors of agricultural land transformation are analyzed in the work. Taking into account the world experience of land transformation, directions for improving the development and control system of land management projects implementation in Ukraine are offered. The compliance issue by land users with established types of agricultural land according to the data of state registers is highlighted. Nowadays, land management projects that provide ecological and economic substantiation of crop rotation and land management make it possible to develop environmentally safe and economically feasible land use projects. In production, the above-mentioned projects are sometimes used to transfer ecologically stabilizing lands (pastures and hayfields) to arable land. This is controversial to all recommendations, conventions and programs that emphasize the need for reduced plowing of the territory. It is necessary to improve the control mechanisms of crop rotation and agrotechnical environmental protection measures. The introduction of land plots agricultural passports is an important but insufficient measure. The remote sensing data of the earth and the use of modern geoinformation technologies should become part of the state control over compliance with land management projects. There is already experience of using various indices at the state level to decipher agricultural crops. As a result of the research, we came to the conclusion that the use of land remote sensing data and modern geoinformation technologies in land management will make it possible to bring the indicators of plowed areas to a rational level, while not creating artificial restrictions on economic activity. The methodical and regulatory acts for the development of land management projects, which regulate the size of the ecologically safe land area need improvement.

Key words: agricultural lands transformation, land management project, pastures, hayfields, arable land.

Introduction

The purpose of the work is an attempt to analyze the aspects of agricultural land transformation and, taking into account the world experience of land transformation, to offer ways of improving the existing development system of land management projects in Ukraine, to highlight the trends of compliance by land users with the types of agricultural land according to the data of state registers To achieve the set goal, the following tasks were solved:

- to consider the main groups of factors influencing the transformation of land in Ukraine;
- to analyse the land management documentation types and determine the general steps of its development;
- to identify positive and negative characteristics of land transforming;
- to develop measures for increasing the effectiveness of the land management projects development related to the transformation of agricultural lands. In particular, control over compliance with land management projects

The suboptimal structure of agricultural land can have various effects depending on the context and scale, such as plowed territory, agricultural development, anthropogenic load, ecological stabilization effect, etc. Plowing can lead to soil erosion and nutrient runoff, which can reduce soil fertility, reduce yields and degrade soil quality (Keesstra, 2018). Land imbalances can also contribute to water pollution. High agricultural development can lead to a decrease in biodiversity, which means the loss of natural environments and habitats for many species of animals and plants. Land ratio can also affect climate influencing water balance, air circulation and other climate factors (Cowiea, 2018). The way land resources are used affects the energy costs associated with the production and transportation of agricultural products. One of the tools for influencing the balance of lands is transformation (Popov et. al., 2022). In order to legally transfer one type of land to another, it is necessary to develop land management documentation. Groundless transformation of agricultural land is a path to soil degradation and erosion. The problem of land degradation in Ukraine affects more than 20% of arable land (FAO, 2018). From 300 to 600 million tons of soil is lost annually from erosion, and the yield can be reduced by 50%, depending on the level of degradation. In Ukraine, water erosion affects 13.4 million hectares, including 10.6 million hectares of arable land. Erosion can lead to significant economic losses exceeding UAH 20 billion per year. Losses of agricultural products from erosion exceed 9-12 million tons of grain units per year. Due to land degradation from 1990 to 2010, the humus content in the chernozems of Ukraine decreased by 0.22% (Кириченко, 2020). Land use is an important component of sustainable development and ensuring environmental safety. To ensure environmental safety and economic feasibility of land use, it is necessary to take into account a number of factors:

- determination of ecological criteria for land use. For example, it is important to consider the impact of agricultural land structure on biodiversity, water resources, soil, atmosphere and other environmental components (Koshkalda, Panukhnyk et. al., 2022; Koshkalda, Vynohradenko et. al., 2022);
- ensuring the economic feasibility of land use. For example, the land structure should be properly planned and organized taking into account market needs, potential profitability and resource recovery opportunities;
- when determining the structure of agricultural land, it is important to take into account the possibility of providing the vital needs of the population and other social factors.
- use of energy-efficient technologies and organic fertilizers (Gustafson, 2014).

Therefore, in order to ensure the optimal ratio of lands, it is necessary to carefully study all factors and use effective methods and technologies. Modern GIS technologies are a powerful tool for analysing information related to land structure (Sadovyy et. al., 2022; Jouma, 2021). But in addition to the study tool, it is necessary to have a legally established algorithm for land transformation as development of land management projects. In production, the above-mentioned projects are sometimes used to increase arable land and agricultural development. This is contrary to all recommendations, conventions and programs that emphasize the need for reduced plowing of the territory.

Methodology of research and materials

The article uses the dialectical method of scientific knowledge, which considers phenomena (land transformation) and processes in the world (agriculture) as interconnected, existing in a system of interaction and dependence on each other. The method of comparison is used, which consists of comparing phenomena, processes and indicators that characterize them in order to identify common features and differences between them. The actual indicators comparison of land management projects with regulations, standards and norms demonstrates the extent to which land users adhere to the established ecologically safe and economically expedient use of land. The monographic research method made it possible to collect, analyse and interpret information on the transformation of agricultural land, as well as draw conclusions based on this information. The results of the conducted research are demonstrated and illustrated by the graphic method in the form of diagrams and figures. Analysis includes the study of plowing, vegetation and other characteristics of land plots. Induction includes the study of the different types characteristics of agricultural land and the selection of general patterns of influence on ecological and economic indicators. Deduction is the process of deriving specific recommendations for the development of land management projects that use land transformation. In the context of land management, an analogy is a comparison of land plots from different regions or countries in order to study different methods of land management and their effectiveness. Abstraction and generalization are two key steps in land management that help reduce the complexity and size of land management documentation and make it more understandable and accessible to various stakeholders. This made it possible to comprehensively investigate the main factors affecting the transformation of agricultural land, and based on this analysis, recommendations can be developed for more effective creation of land management documentation in Ukraine. The following materials are used in the work: works of scientists, regulatory and legal documents of Ukraine, the European Union, the United Nations Organization regarding the transformation of agricultural lands. The services reg.dar.gov.ua, kadastr.live, e.land.gov.ua were used.

Discussions and results

Regarding land transformation, international programs and conventions call for: reduction of human impact on the environment (UNEP, 2022), conservation and protection of landscapes (States of the Council of Europe, 2000), fight against dehydration and land depletion, conservation of natural resources (United Nations, 1996) and maintaining soil fertility (WOCAT, 1992; Global Soil Partnership, 2018). Similarly, these documents point to a reduction in the rate of plowing and soil erosion, which directly depends on rational actions regarding land transformation.

The transfer of one type of agricultural land to another can be carried out with the help of a corresponding change in land management documentation: land management projects regarding the allocation of land plots, land management projects that provide ecological and economic justification for crop rotation and land management, technical land management documentation regarding land inventory, land management work projects (reclamation, preservation). The general steps of the transformation can be as follows:

- determining the need to change the type of agricultural land: before starting the transformation process, it is necessary to determine what consequences such a change will have;
- preparation of necessary materials, such as economic and ecological indicators, cartographic materials and others;

- impact assessment on the environment, therefore it is necessary to conduct an appropriate assessment of the impact on the ecosystem and ensure the necessary measures to minimize the negative impact;
- decision of the relevant subject of land relations regarding land transformation;
- making changes to the State Land Cadastre.

There are many factors that influence design decisions on changing the type of agricultural land. Some of them may be related to the management level, while others may be external factors depending on the specific situation. Several groups of factors that can influence the transformation of land are listed below (Fig. 1).

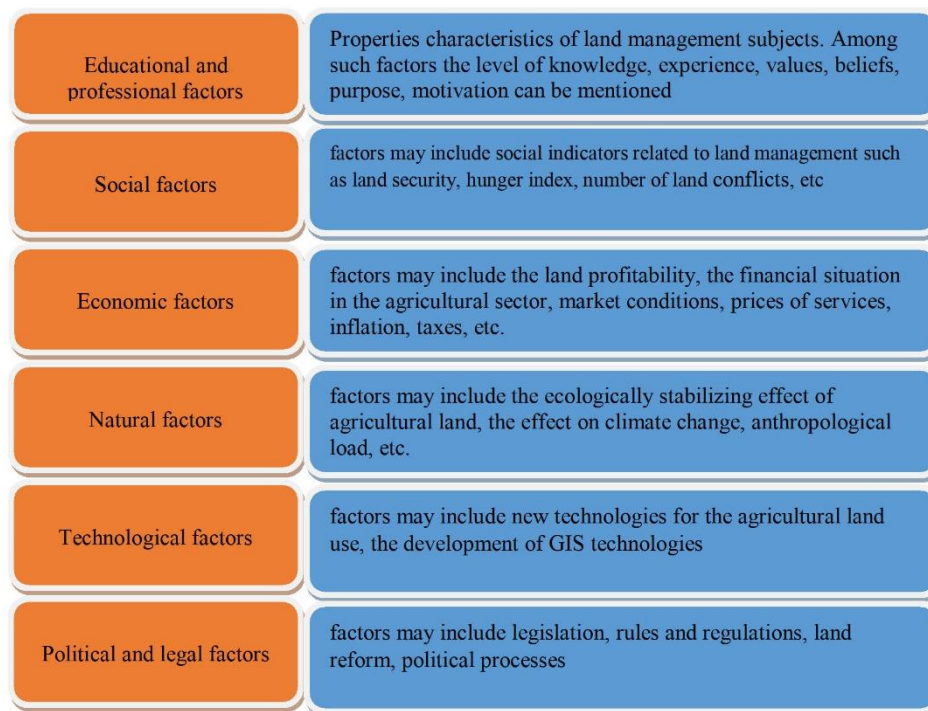


Fig. 1. Groups of factors influencing the transformation of agricultural lands (Source: author's development)

As it is seen from Fig. 1. regulatory and legal acts are among the factors influencing the transformation of lands. It should be noted that there are cases of a non-systematic approach to the development of the regulatory framework for land transformation in Ukraine. For example, amendments were made to the Land Code (Земельний кодекс України, 2001), approved resolutions of the Cabinet of Ministers of Ukraine, and developed methodological recommendations for the development of land management projects that provide ecological and economic justification for crop rotation and land management (Про затвердження Методичних..., 2013). But later, due to the trend of deregulation of economic activity, almost all efforts on this issue were abolished. A negative consequence is that land management projects regarding crop rotation began to be used to transfer ecologically stabilizing lands (hayfields, pastures) to lands that are intensively used (arable land). This leads to negative phenomena that have the environmental and economic consequences listed above.

Looking for a balance between the creation of regulated conditions for rational land use and the removal of artificial restrictions on economic activity, legislative bodies created mechanisms for the development of land management projects that have both positive and ambiguous characteristics. The ability to transform land by drawing up and registering land management documentation may include the following positive effects:

- ensuring environmental safety standards through a scientifically based change in the type of land;
- reduction of costs for farms, which is associated with the optimal structure of land;
- stimulating investments in land use with balanced land types.

However, negative consequences of unjustified land transformation may include:

- decrease in the economic opportunities of obtaining profit by land users (transformation into less productive lands);
- increase expenses for farms, which is connected with the suboptimal structure of land;

- decrease in the market value of land plots (transformation into less productive lands).

Therefore, the transformation of land can have both positive and negative consequences, and it is important to ensure a balance between the need to comply with environmental standards and the preservation of a competitive and efficient market environment.

Land management projects are an important tool for ensuring the rational use of land resources and ensuring a balance between the needs of people and nature. However, like any tool, they have their advantages and disadvantages. Land management projects can help ensure rational use of land, in particular by structuring land according to its natural conditions and the needs of economic entities. Also, land management projects can help ensure environmental security, for example, protecting water resources from pollution.

However, one of the disadvantages of land management projects is the high cost, in particular, when large-scale changes in land use need to be carried out. If the land management project does not have the support of the community, then its implementation may become more difficult. Communities often put profitability above the stability of the ecological system and vote for the de-soldering and transformation of natural fodder lands into arable land. In the case of strict adherence to the crop rotation scheme in land management projects, a situation may arise when business entities will lose profits. In modern conditions, it is necessary to apply "dynamic crop rotations". Currently, land management projects that provide ecological and economic substantiation of crop rotation and land management make it possible to develop environmentally safe and economically feasible land use projects. But there are a number of economic and regulatory issues that require clarification.

International conventions and programs aimed at creating an optimal land structure encourage the improvement of land transformation mechanisms, the creation of a clear monitoring and reporting system that allows timely detection of deviations from land management projects.. A variety of tools and approaches can be used to improve control mechanisms.

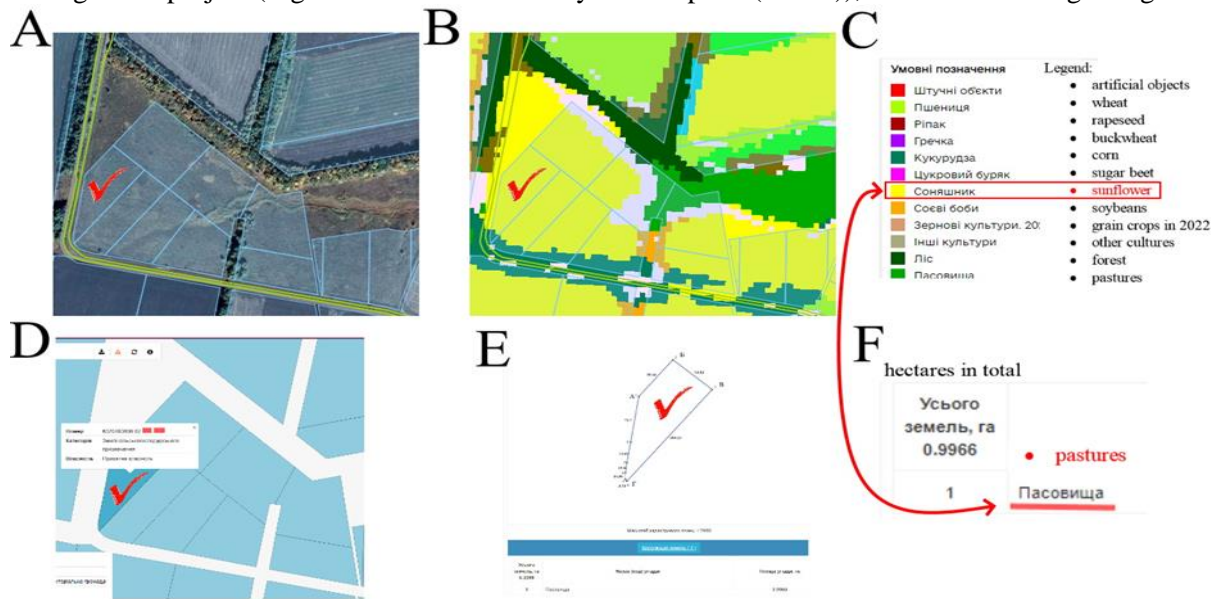
As mentioned above, it is necessary to introduce innovative technologies and software for monitoring the use of agricultural land, which will allow collecting and analysing data on the performance of certain works and tracking their dynamics over time. One of the tools for monitoring the use of agricultural land in Ukraine is the agro technical passport of the land plot. This document contains information about soil characteristics, its resource potential, as well as recommendations for land use and application of various types of fertilizers to achieve high yields. But the characteristics of the land can change over time, which requires regular updating of the agricultural passport. The data of remote sensing of the earth and the use of modern geoinformation technologies should become part of the state control over compliance with land management projects. There is already experience of using various vegetation indices at the state level to decipher agricultural crops. For example, on the Public Cadastral Map of Ukraine, the layer "Classification of crops 2019 (Spring) and (Winter) was added". But this layer was only informative and was not updated afterwards. In contrast to the State Agrarian Register, where, in accordance with the best European practices and experience, the latest satellite map information about the sowing of the winter and spring crops of 2022 and the possibility of entering the effective date of the land use contract have been added to the functionality (Fig. 2).



Fig. 2. An example of information from satellite maps about the sowing of winter and spring crops in 2022. (Source: State Agrarian Register data).

The possibility of using state GIS services to determine land plots that require the development or clarification of land management documentation was investigated. The investigated land plot itself is marked with a red tick (Fig. 3). According to satellite data, it was established that in 2022, sunflowers were grown on the experimental land plot (Fig. 3, C), and according to the state cadastre data, the land plot has

pastures (Fig. 3, F). In order to legally grow sunflowers on this plot of land, it is necessary to transform the land on the basis of land management projects or use a plot of land according to a pre-prepared land management project (organization of the territory of land plots (shares)), i.e. for livestock grazing.



LEGEND

The investigated area is marked with a red tick.

A – layer "cadastral division" reg.dar.gov.ua,

B – layer "spring crops 2022" reg.dar.gov.ua,

C – legend for the layer "spring crops 2022",

D – layer "geometry of plots" kadastr.live,

E – section "information about the land plot" cadastral plan e.land.gov.ua,

F – enlarged fragment of the Lands Explication.

Fig. 3. Conformity of registered land plots to the regime of actual use. (Source: author's development).

It was established that the state authorities have the technology, database and legislative authority to identify land plots, the use of which does not correspond to previously prepared land management projects. It is necessary to develop a system of incentives for compliance with land use requirements according to statistical reporting, compliance with crop rotation and agro technical environmental protection measures. This can be implemented with the help of significantly increasing fines for non-compliance, or involving participation in programs (grants) that contribute to the preservation of natural resources. Providing an independent (public) examination of compliance with land management projects will increase trust in the control system and reduce the possibility of data falsification. It is important to raise the level of land users' awareness regarding the harmfulness of unjustified land transformation.

Conclusions and proposals

The imbalance of agricultural land leads to erosion and degradation of land plots. This brings environmental and economic damage. Transformation can bring both positive and negative effects. World experience reflected in UN and EU conventions and programs emphasizes the importance of land balance. To ensure rational land use, it is necessary to: consider the main groups of land transformation factors, determine the characteristics of land transformation, increase the effectiveness of the land management project's development.

Many types of land management documentation and projects use land transformation as a tool for creating rational land use. The common features of such projects are: determination of land changes expediency, preparation of necessary materials, assessment of the impact on the environment and making changes to the registers.

The introduction of agricultural field passports is an important, but not the only, method of influencing the balance of land. Modern GIS technologies are a powerful tool for developing land management projects for land transformation. Information support for decision-making regarding transformation can be based on data from remote sensing of the earth, satellite images and calculation of vegetation indices.

It was established and verified on individual land plots that the data of the State Register of Ukraine can be used to identify land uses that do not comply with land management projects. For example, according to

the state cadastre, livestock should be grazed on the investigated land plot, but in fact, an agricultural crop is grown there - sunflower. In particular, according to the land management project, there should be pasture, and in fact, agricultural land should be the arable land. Correction of violations is possible through the land transformation, or through a return to compliance with the previous land management project. The fact that landowners sometimes do not comply with land management projects indicates the need to improve methodological and legal acts regarding the development of land management projects related to land transformation.

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