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EFFECTIVE MANAGEMENT OF LAND RESOURCES TO OPTIMIZE THEIR RATIONAL AND SUSTAINABLE LAND USE FROM DEGRADATION AND ECOLOGICAL AND ECONOMIC ASSESSMENT OF LANDS

Abstract. The article presents data on effective land management for optimization of their rational use from land degradation and This article presents effective land management methods for mitigating land degradation and addressing water and wind erosion. It summarizes theoretical and practical knowledge about the mechanisms of erosion processes and methods for reducing land degradation. Currently, science offers effective technologies and protection of land use from degradation; a new, different view of the mood-ecological state of land use. This means research and analysis of optimal land use methods and methods to reduce land degradation in land use in Kazakhstan, which accounts for about 90 percent. Thus, as Kazakh scientists have proven, land degradation occurs naturally and is largely dependent on human activity. Furthermore, local climatic conditions and anthropogenic impacts in many cases influence soil degradation in Kazakhstan. The main existing factors of soil erosion are rain, snow, wind, and floods, which are very harmful because they degrade the soil quality. In Kazakhstan's main regions, degraded local lands are used for agricultural purposes, as this involves the use of toxic and chemical pollutants that are hazardous to the soil, impairing the life of organisms, and reducing soil adhesion. The country's primary agricultural practices rely exclusively on fertilizers and harmful chemical pesticides, often due to excessive and, apparently, improper use of chemical fertilizers. As a result, beneficial bacteria and other microorganisms that are part of the soil are destroyed. It is necessary to take into account the urgent problem of improving the methods of rational use of lands in conditions of degradation. In these conditions, improving the organizational and economic mechanism for protecting agricultural lands from degradation. This predetermines the choice of the topic, object and main directions of research.

Keywords: land management, management, land resources, optimization, rational use, degradation, irrigation of lands.

Introduction. Land degradation is the reduction, and sometimes complete loss, of the biological and economic efficiency of land use. It is a major problem that often leads to very serious, immediate negative consequences of land use. Land degradation during land use occurs primarily as a result of human activity and is also destroyed by natural processes such as climate change. More than 25% of the world's used land is in a state of degradation. Thus, the development of new technologies and methods to combat land degradation using new improving materials for degraded lands and rational land use methods is an urgent task. To reduce land degradation, it is necessary to introduce new technologies, use soil compactors, and develop optimal agronomic and reclamation measures.

Along with the application of mineral fertilizers, it is necessary to carry out competent anti-erosion measures. There are various forms of land degradation, including the contamination of the soil's fertile composition or its improvement. Salinization, acidification, or salinization, natural flooding, the introduction of large volumes of toxic pollutants into the soil, erosion, and the destruction of soil structure. These factors cause significant soil degradation. Soil conditions remain constant and high. In some regions of the country, severe soil degradation caused by chemical use is having immediate and widespread consequences compared to previous years. This serious problem is leading to global environmental problems for the republic. Soil degradation also occurs naturally. Human impacts are largely dependent on human activity. Climate change, human organization and activities continue to worsen soil degradation every year [1-4].

Therefore, this article discusses effective land management methods to optimize their rational use in the context of land degradation and irrigation, and provides a review of national problems: water and wind erosion, land degradation.

Methods and materials. In Kazakhstan's agriculture, the main factors and direct causes of soil erosion include physical and active factors. These include natural vegetation cover and the structure of the earth's surface. Seasonal rains and heavy rains, as well as floods, are all factors of erosion. Furthermore, wind waves and dangerous landslides pose a significant risk of crustal destruction. Soil quality deteriorates, including under the influence of biological natural factors, depending on its ability. resulting in a decline in soil quality. This significantly impacts the microbial composition due to active biochemical reactions. Thus, upon completion of these reactions, its activity, efficiency and fertility of the layer decrease. We believe that misuse of resources in agriculture can also lead to soil deterioration and a decrease in soil fertility at the expense of plant nutrients. In these cases, the reduction in microbial activity depends mainly on biological factors.

In our country, chemical erosion is primarily caused by the loss of nutrients from the soil – alkalis, acids, etc. This alters the chemical composition of the soil, as well as the nutrients available for land use. This process occurs in such a way that salts accumulate in the soil in large quantities and leach out essential nutrients, causing negative changes in the chemical composition of the soil, leading to a deterioration in its quality. As a result of this exposure, along with hazardous chemical factors, significant losses of nutrients for various plants and a decrease in soil fertility occur in some areas of Kazakhstan. Consequently, the soil turns into a hardened, clay-, iron-, and aluminum-containing soil that hardens like cement [2, 5-8].

Private farmers, unaware of the degradation of their own lands in some regions of Kazakhstan, resort to intensive and targeted use of pesticides and chemical fertilizers. They fail to understand that chemical fertilizers reduce the viability of organisms and weaken the soil's adhesive system.

In Kazakhstan, the use of chemical fertilizers and other beneficial pesticides is common in agriculture. Simply put, this leads to their improper and even very dangerous use in land cultivation. Consequently, after treatment with ethical chemicals, beneficial bacteria and other microorganisms involved in soil formation die.

It is necessary to take into account the urgent problem of improving the methods of rational use of lands in conditions of degradation. In these conditions, improving the organizational and economic mechanism for protecting agricultural lands from degradation. This predetermines the choice of the topic, object and main directions of research.

These include:

1. Reducing deforestation.
2. Land reclamation.
3. Preventing soil salinization.

4. Proper soil cultivation methods are one of the most sustainable ways to prevent deterioration of soil quality [2, 5, 9-12].

Agricultural activity increases the negative impact of erosion processes on soils and causes gradual and steadily continuing land degradation, loss of fertility, and a decrease in the economic and business performance of agricultural production. To justify measures to restore soil fertility and soil conservation land management projects, an analysis of the economic consequences of degradation and an economic assessment of the organization of anti-erosion protection are required. The paper assesses the degree of degradation of agricultural lands in Kazakhstan based on the magnitude of economic losses due to water and wind erosion of soil with differentiation by administrative and land assessment regions, and develops maps of the distribution of regions with varying degrees of erosion. The values of the coefficient of productivity reduction and economic losses under the influence of erosion processes are calculated, the regions are ranked according to the potential efficiency of land restoration. The main directions of internal land management are outlined depending on the landscape features and the nature of damage.

In the Republic of Kazakhstan, there are four types of land degradation: the first type is biological, the second is chemical, the third is physical, and the fourth is mechanical. Our scientists conducted a thorough analysis of soil degradation processes in several regions of Kazakhstan and found that the deterioration in soil quality is primarily due to human activity. It turns out that the destruction of soil and vegetation under human influence is primarily caused by anthropogenic factors. They also found that soil degradation sometimes occurs across the entire latitude, while other times it occurs only in isolated areas due to the destruction of vegetation. Economic activity plays a particularly important role in the republic. This includes mineral extraction, road construction, various industrial facilities that generate profits for the country's economy, and the maintenance of oil and gas pipelines – all of which represent a global problem of agricultural land degradation [12, 13-19].

As is well known, soil erosion is the destruction of the deforming layer of the earth's upper vegetation cover under the influence of water and wind, and it is a dangerous phenomenon. Soil erosion is divided into five main groups based on factors or types: the first is the influence of climate, the second is topographic features, the third is the impact on the soil, the fourth is biological and genetic factors, and finally, the fifth is anthropogenic, that is, human-induced.

According to research, the intensity of erosion directly depends on key factors:

- climate intensity (rain and snow), air pressure, and the speed and direction of temporary wind forces;
- terrain topography – extent, steepness, slope, and terrain type;
- soil permeability, erosion resistance, and soil characteristics;
- biological genetic factors and the formation of the soil network. Invertebrates and the protection of green vegetation from wind and temperature fluctuations.

The republic's economic activity counteracts the impact of soil erosion factors and accelerates soil vitality. Research has shown that physical destruction completely destroys soil compared to natural objects [16, 20, 21].

Our scientists studied this issue in more detail, revealing that chemical soil degradation is caused by various soil properties, as well as natural and anthropogenic factors.

The factors, or, so to speak, the consequences of chemical degradation, are divided into the following categories:

- in agriculture, processes occur that result in the loss of minerals in humic substances and the acidification of fertilizers, forming acids and oxidizing sulfides;
- factories and their waste products cause soil pollution with chemical waste, acid rain from pesticides, and waste and methane from the oil industry.

Accumulated organic compounds are poorly suited for agricultural planning at research institutes to achieve high yields. Furthermore, research has shown that the composition of a high-quality humus mixture directly changes depending on the soil layer treatment. We have demonstrated that these changes are directly proportional to the volume of greenery grown. This is because they depend on the quantity and quality of chemical treatments applied to agricultural crops during land reclamation [16, 17-22].

In scientific studies, foreign and domestic scientists use gypsum and soil liming to regulate soil composition. However, the positive effect is achieved through precise rate control. Research shows that

undesirable components penetrate the soil, the threshold migration of components increases, and the harmfulness of chemicals to the soil increases. Furthermore, alkalis and acids from rainfall affect soil vegetation, as nitrogen oxides, sulfur ions, chlorine, fluorine, and harmful dust emissions from factories accumulate in the atmosphere. The challenge facing scientists is combating harmful industrial emissions of acids and sediments that impact the earth's surface and the soil profile of vegetation. As scientists have proven, these acidic deposits increase the content of acidic compounds and hinder soil degradation by destroying the topsoil [8, 22, 23].

The country's main economic driver is the extraction and processing of minerals, which have a harmful impact when using technologies with various chemical compounds, releasing various hazardous wastes and gases into the atmosphere.

Results. In the republic, the inspection body and the land destruction control agency conduct land use monitoring every five years, which has a positive impact on farmers' land use. This allows for the identification of errors and assessment of land use processes, as well as the prevention of negative land use impacts. Soil and vegetation pollution near cities and industrial facilities is monitored against the backdrop of greenery.

As shown in the works, agricultural lands (fields), forests, recreation areas (parks, sanatoriums, holiday homes) and coastal zones are considered as objects of the nature protection network and soil pollution monitoring.

Pastures and arable lands pose environmental challenges and impact land use efficiency. Intensive agricultural development in Kazakhstan has led to land and landscape degradation. A significant portion of the country is susceptible to desertification and declining livestock and crop productivity as a result of four human activities: soil depletion; increased livestock numbers, which destroy vegetation; deforestation; and inadequate irrigation and drainage.

First and foremost, the land resources of the Republic of Kazakhstan are constantly changing, which determines the dynamics of various land types. The goal of rational use of natural resources and the legal and economic foundations for environmental protection for present and future generations is essential. To achieve this goal, it is necessary to structurally and restructurally protect various areas, implement resource-saving technical policies, and utilize zero-waste and low-waste technologies.

Scientific research has shown that the consequences of anthropogenic impacts lead to soil degradation and reduced productivity of agricultural crops and landscapes. Landowners are obligated to properly manage their land to improve its fertility and effectively implement a range of organizational, economic, agronomic, reforestation, and hydraulic engineering measures. They must prevent and combat salinization, land pollution, and soil degradation.

Scientists and local mayors are proposing measures to reclaim and protect land from forestation, as well as to combat soil erosion and other measures for efficient land use within the framework of state environmental development plans.

Our research has shown that when creating a mobile system of state, municipal and private land use, oriented towards the agricultural market, cooperation in the supply, marketing and processing of raw materials, agricultural services and the principles of territorial organization must be supplemented as follows (table) [2, 5, 20-24]:

1. Land management ensures the intended use of agricultural land and real estate intended for agricultural production.

Justification for the content of the project for developing land use for agricultural enterprises

Basic Rules and Conditions Labor Process	Natural Resources	Resources Production	Labor Resources
Purpose of the Production Process	Improving Soil Fertility	Continuous production of capital goods	Continuous Production of Production (Land) Relations
The Role of Land in Social Production	Soil is a universal condition of production, a product of nature, a natural resource	Land is the primary means of production	Land is the object of socio- economic (land) relations
Types of Land Use Efficiency	Ecological	Economy	Social

2. Ensure access by owners and users of agricultural land to territorial production and social infrastructure facilities.

3. Voluntary selection of the organizational and legal form of agricultural enterprise and participation of producers in land use planning.

4. Consideration of the national and historical characteristics of the land use area.

The State Decree on Production Intensification, Land Protection, and Rational and Efficient Use provides for laws and measures [2, 24]:

- reduce industrial land use and the construction of large numbers of buildings during design;
- combat environmental pollution from industrial enterprises; - Reclaim areas disturbed by mining operations.

Discussion. Erosion studies abroad and in Kazakhstan show that it is a process caused by human activity and man-made natural disasters, as well as the negative impact of vegetation destruction on land and in the subsurface. Accelerated erosion, even normal erosion, leads to soil destruction, which is classified as soil degradation. Anthropogenic impacts resulting from human activity sometimes lead to changes in soil properties:

The first characteristic is the determination of the degree of soil and disturbed land degradation using remote sensing methods for land restoration and reclamation; the second characteristic definition is the complete and partial destruction of the surface, requiring reclamation and restoration of the disturbed lands with the formation of a disturbed soil cover [13].

In several regions of Kazakhstan, we scientifically determined the physical properties of organic soil horizon degradation and changes in specific physical properties, as well as mechanical disturbance of the soil layer. Active soil destruction processes involving the impact of foreign abiotic deposits on soil vegetation were also identified. These processes are known to impair the productivity and plant function of soil composition [1, 20].

The physical and mechanical destruction of soil composition and the physical destruction of the soil profile due to human activity, i.e., anthropogenic impacts on the soil, were studied [1, 20].

Two types of degradation have been identified, indicating the dangers of soil erosion:

- the accumulation of existing and degrading processes that have reached a critical point over many years.

- changes in the soil will lead to disaster and the depletion of natural resources and the topsoil.

Conclusions. In conclusion of this scientific article, we would like to note that a comprehensive ecological and economic assessment of urban lands for sustainable land use, including the example of the Almaty agglomeration, shows that any soil degradation inevitably occurs with any normal agricultural use.

Protection of land resources and their rational use is one of the most responsible and urgent problems. Over the past years of exploitation of ploughed lands, several thousand tons of humus have been lost as a result of wind and water erosion. Measures are being taken in the republic to correct the situation, but their implementation is hampered by the high capital intensity of the work.

An ecological approach to landscape directly influences the topography, soil and vegetation cover, as well as the economic impact of natural resource production and the territory. Thus, to improve agricultural lands, methods of soil protection from agricultural erosion systems are proposed, which are largely aimed at combating water and wind erosion.

Rational use of land resources is of great importance in the land management system. Accounting and assessment of the state of land resources is of great importance, since land is the basis of agricultural production.

In recent years, the growth of arable land has ceased, convenient and suitable lands have been developed, and inconvenient solonetz, solonchaks and sands remain. The allocation of agricultural land for non-agricultural needs continues: for the construction of roads, industrial enterprises, housing and other facilities.

Land management projects within agricultural enterprises include projects for organizing the territories of gardening associations or projects for organizing territories under the jurisdiction of local administrations. The third group includes land reclamation projects, erosion control projects within crop rotation systems, and others.

As mentioned earlier, in land use practice such concepts as one-stage and two-stage design, draft and technical designs are used; finally, the content of the projects depends significantly on the natural and economic conditions of the territory being developed [5, 7, 8-15]:

The diversity of land management project types requires a clear classification. This allows us to address the following issues:

- defining the types of land management projects and differentiating their content;
- substantiating project development methods and technologies;
- identifying missing links in the overall land management planning system.

Given the diversity of land management projects, their different focus, subject matter, nature, and content, projects can be grouped according to various classification criteria, namely:

- type of land management;
- design stages;
- project readiness;
- type of land management activities;
- regional land management characteristics.

The land resources available to the Republic of Kazakhstan, if used rationally and improved, are capable of ensuring the production of a variety of agricultural products in quantities that satisfy domestic and export needs. The presence of agricultural lands prone to soil deflation in their composition requires careful use of such lands, constant concern for their protection and increasing their productivity.

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ЖЕР РЕСУРСТАРЫН ТИІМДІ БАСҚАРУ ЖЕРДІ ТОЗУҒАН ЖӘНЕ ЖЕРДІ ЭКОЛОГИЯЛЫҚ-ЭКОНОМИКАЛЫҚ БАҒА БЕРУ ҮШІН ОЛАРДЫ ҰТЫМДЫ ЖӘНЕ ОРНЫҚТЫ ПАЙДАЛАНУДЫ ОҢТАЙЛАНДЫРУ

Аннотация. Мақалада жердің тозуынан және суарудан тиімді пайдалану үшін тиімді жер ресурстарын басқару бойынша деректер берілген және жел эрозиясы, жердің тозу проблемалары, сондай-ақ олардың эрозия процестерінің механизмін және жердің тозуының алдын алу жолдарын зерттеуге арналған теориялық-әдістемелік және ғылыми-практикалық ұсыныстар берілген. Қазіргі ғылым жерді тозудан қорғаудың тиімді әдістері мен әдістерін әзірледі; мысалы, соңғы жылдары жерге орналастыру мәселелеріне ландшафтық-экологиялық көзқарасқа негізделген жерге орналастырудың жаңа бағыты әзірленді. Сондықтан, зерттеудің мақсаты – материалдарды пайдалана отырып, жерді ұтымды пайдалану әдістерін зерделеу және талдау, сонымен қатар біздің елімізде жердің тозуы 90 пайызды құрайтынын ескере отырып, жерді тиімді пайдалану әдістерін жетілдіру бойынша ұсыныстар әзірлеу, қателеспеймін. Топырақтың деградациясы табиғи жолмен жүруі мүмкін болғанымен, оған адам әрекеті де қатты әсер етеді. Сонымен қатар, климаттың өзгеруі мен адам әрекеті топырақтың деградациясын тездетеді. Топырақ эрозиясының факторлары мен себептері: жаңбыр, ағын су, су тасқыны, жел эрозиясы – мұның бәрі топырақтың сапасын нашарлатады.

Түйін сөздер: жерге орналастыру, басқару, жер ресурстары, оңтайландыру, тиімді пайдалану, деградация, жер суару.

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ЭФФЕКТИВНОЕ УПРАВЛЕНИЕ ЗЕМЕЛЬНЫМИ РЕСУРСАМИ ДЛЯ ОПТИМИЗАЦИИ ИХ РАЦИОНАЛЬНОГО И УСТОЙЧИВОГО ИСПОЛЬЗОВАНИЯ ОТ ДЕГРАДАЦИИ И ЭКОЛОГО-ЭКОНОМИЧЕСКАЯ ОЦЕНКА ЗЕМЕЛЬ

Аннотация. Приведены данные эффективного управления земельными ресурсами для оптимизация их рационального использования от деградации и орошения земель. Представлены исторический экскурс проблем водной и ветровой эрозии, деградации земель, а также теоретико-методологические и научно-практические рекомендации по изучению механизма развития эрозионных процессов и способов предотвращения деградации земельных угодий. Современная наука выработала эффективные методы и приемы защиты земель от деградации. Так, за последние годы разработано новое направление в обустройстве территории, основанное на ландшафтно-экологическом подходе. Цель исследования – изучение и анализ методов рационального использования земель с применением материалов, а также разработка предложений по совершенствованию методов рационального использования земель, учитывая, что деградация земель в нашей стране составляет 90 %. Хотя деградация почв может происходить естественным образом, на неё также сильное влияние оказывает деятельность человека. Кроме того, изменение климата и деятельность человека ускоряют деградацию почв. Факторы и причины эрозии почв: дожди, стоки, наводнения, ветровая эрозия – все это ухудшает качество почвы.

Ключевые слова: землеустройство, управление, земельные ресурсы, оптимизация, рациональное использование, деградация, орошение земель.