Methodology for Determining the Costs of Environmental Protection Measures in Land Management

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Abstract: *In this article considered the methodical of definition expenses for nature protection actions at land management.*

Key words: *capital an investment, wind and water erosion of soils, volumes of a household waste, a net profit.*

Introduction

Rational use of land resources requires the necessary organizational and territorial conditions, which are created through the development and development of schemes, projects for the organization of the use of land and water resources, contributing to the rational organization of all branches of production, systematic improvement of the quality of the environment and natural resources used in production, social and living conditions of people. The solution of this problem requires a constant study of the interrelationships of society and nature, the laws of the development of anthropogenic ecological systems and the development of the economy, identifying its effectiveness taking into account environmental factors will answer the question of the role and place of the economy in the system of environmental management measures, organizations, planning the use of land, water and other natural, material and labor resources, determine the content and develop methods of environmentally safe and rational organization of the use of these resources [1].

Nature-related measures with the given land management is one of the main directions envisaged in the conditions of irrigated agriculture. Therefore, the development of a methodology for determining the costs of such measures and their implementation in the preparation of land

management projects has a certain practical significance in the Republic of Uzbekistan at the present stage.

Research of the methodology. The problem of organizing the rational use of land resources has been in the focus of economic science and practice for many years. Among the most significant are the works of classical economists: D. Ricardo, A. Smith, I. Von Thunene, K. Marx. Further, it is important to note the names of Russian scientists of the early 20th century Bulgakov S., Ermolov A., Chayanov A., as well as modern well-known economists of the Commonwealth Countries who made a significant contribution to the development of the scientific concept of land relations in the agricultural sphere: L. I. Abdildin, S. Avezbaev, N. N. Agapov, R. Autov, Zh.B.Balapanov, V. F. Bashmachnikov, V. R. Belenky, K. M. Belgibaev, I. N. Buzdalov, I. N. Burobkin, V. I. Vidyapin, S. N..Volkova, V. V. Grigoruk, S. I. Gryadova, O. K. Eskaraeva, G. A. Kalieva, N. V. Komova, A.V. Kolosova, E. N. Krylatykh, V. I. Kudryashova, Yu.I.Linina, P. F. Loiko, V. V. Miloserdova, A. I. Nikiforova, A. A. Nikonov, V. A. Tikhonov, A.V. Petrikov, V. A. Rylsky, N. I. Sindyashkin, M. V. Stepanov, K. S. Sydykov, A.V. Shevchuk, G. I. Shmelev, V. Ya.Uzun, E. P. Ushakov and others - Tizenhusen V., Prosterman R., Porru P., Kilkenny M. and others.

However, despite the results obtained in the study of this problem for different regions of the country and its practical implementation, they do not sufficiently study all sides of the issue under study for the conditions of environmental disaster areas. This applies primarily to the theoretical and methodological foundations, the essence, criteria and indicators of a comprehensive assessment, the methodology for justifying the decisions made for the environmentally safe organization of the rational use of land and water resources in the conditions of an environmental disaster. The lack of knowledge of the economic foundations and technologies for choosing initial measures and reconstruction objects in the conditions of an aggravation of the environmental situation, combined with the urgent need for an economic justification of the prospects for the development of irrigated agriculture in the rice-growing zone, which determines the relevance of the research. This determined the choice of the topic, the formulation of the purpose and objectives of this research.

The costs caused by the impact of the polluted environment in the region include: capital and annual costs of medical care, the cost of lost net income due to a decrease in labor productivity, absenteeism; the cost of quantitative and qualitative losses of products due to a decrease in the productivity of land resources and farm animals, as well as the withdrawal from agricultural turnover of land due to their pollution; the liquidation value and the lost products due to capital investments that could have been invested in other sectors of the national economy. The paper recommends a method for determining the above-mentioned costs by type and total economic damage from environmental violations, which is used not only for the economic justification of land use organization projects, but also for a comprehensive assessment of the impact of the polluted environment on various industries in agricultural enterprises.

During the agrarian reform, farms have acquired full economic independence, however, their opportunities in increasing labor productivity, organizing highly efficient production of agricultural products remain unrealized due to a number of unresolved problems. The acute lack of financial resources, the untimely calculation of the state for products, strict credit and tax pressure are the main reasons that many farmers, not seeing a way out of the current situation, lose interest in independent farming and curtail their activities. The process of forming farms has slowed down dramatically. Thus, over the past three years, the number of peasant farms has increased from year to year by only 2-3%, while in the period 1992-1993, the number of farmers increased 6 times. Currently, every fifth farm does not have tractors, more than half-trucks. Farmers are even worse provided with trailed machines and technological equipment. For this reason, most of them cannot perform the entire complex of works in a timely manner, make mineral and organic fertilizers in

abundance. Half of the farms do not have access roads, a third is not electrified, and the vast majority do not have water supply. These facts indicate that the principle of an equal attitude of the state to all forms of economic management is not implemented in practice. The are most affected economic interests of farmers.

The costs of environmental protection measures in the area of ecological disaster of the irrigated zone are determined by the amount of expenses necessary to prevent the use of polluted water and for irrigation and municipal needs, wind and water erosion of soils, secondary salinization, the cost of creating sanitary protection zones, air purification systems, as well as the costs of disposal and disposal of industrial waste, including losses of agricultural products due to the allocation of land for the construction of these facilities and for the organization of waste storage and disposal sites. The costs of environmental protection measures provided for in land management schemes and projects are determined by the amount of current expenses (annual) and capital investments in the implementation of environmental protection measures, reduced to an annual dimension taking into account the time factor.

Capital investments in the implementation of environmental protection measures in land management schemes and projects are determined by aggregated indicators or by the estimated cost of environmental protection facilities.

Currently, in land management projects, the collector-drainage network is not classified as environmental measures, which is not true, since in our opinion, it only performs an environmental role (prevention of salinization and waterlogging). Therefore, it is necessary to include it in the composition of environmental protection facilities, and the costs associated with its construction in the capital costs of environmental protection measures.

The number and composition of nature protection objects are determined based on the assessment of the existing and forecast for the future of the ecological situation on the land-developed territories. At the same time, there is a need to determine the volume of harmful substances (emissions) generated on the territory. They consist of air emissions, soil pollution, and water sources on the territory.

Let's consider the methodology for determining the volumes of the main types of harmful substances formed in agricultural enterprises, as well as determining the capital costs for their reduction or complete destruction.

We propose to determine the emissions of gas, lead and other harmful substances from motor vehicles, agricultural machinery and heating systems into the atmosphere using the formula:

$$V_{ai} = \sum_{i=1}^{n} \sum_{j=1}^{`m} \omega_j \beta_{ij} \qquad (1)$$

here V_{ai} - the volume of emissions into the atmosphere, i-th type of pollutant, ton;

ω_j - the need for the j-th type of fuel or the it used amount, ton;

β_{ij} - the volume of the i-th type of emissions generated from the combustion of the j-th type of fuel, ton.

Dust and other harmful emissions into the atmosphere are determined for each object separately, based on the technological features and the volume of production of each of them, and then are summed up over the entire land mass.

The volumes of household waste and sewage sewage of settlements can be determined by the formulas:

$$V_c = \frac{H \cdot q}{1000}; \qquad (2)$$

$$V_0 = \frac{H \cdot m}{1000}; \qquad (3)$$

here V_c, V_0 - volumes of waste and waste water per day, respectively, ton/ day, m/ day;

H- the project (existing) number of population, people ,is the estimated rate of household waste generation per inhabitant per day, kg/day;

m- the rate of water disposal per inhabitant per day, l/day.

The volumes of industrial waste and wastewater are determined taking into account the characteristics of production facilities separately for each of them and then summed up throughout the territory,

Waste from animal husbandry is determined based on the design (existing) number of agricultural animals, according to the formula:

$$V_ж = \sum_{i=1}^{n} \frac{N_i \cdot n_i}{1000} \qquad (4)$$

here $V_ж$- total daily volume of animal husbandry waste, t/day;

N_i- the project (existing) livestock of agricultural animals of the i-th type, heads;

n_j- the rate of experimental output from one structural head of animals of the i-th type per day, kg/day.

The volume of pollutants coming from irrigation water depends on the qualitative composition of the water and is determined separately for each harmful substances contained in it according to the following formula:

$$V_в = \sum_{i=1}^{n} \sum_{j=1}^{m} \frac{P_i M_i \alpha_i}{1000} \qquad (5)$$

here $V_в$- the total volume of harmful substances coming from irrigation water, ton;

P_i- acreage of the j-th crop, hectares;

M_i- irrigation rate, i-th crop, m/hectares;

α_i - the content of the j-th type of harmful substances in 1 m^3 of irrigation water, kg/m^3.

Capital costs for environmental protection measures in land management schemes and projects are determined by the formula:

$$K = \sum_{i=1}^{n} K_i \qquad (6)$$

here K- the cost of construction of the i-th environmental object, thousand soums.

The amount of capital costs for water treatment facilities and installations, waste storage and disposal facilities is determined by their estimated cost.

In agricultural enterprises of the irrigated zone, the main part of capital expenditures on environmental protection measures is the cost of creating protective forest strips and the construction of a collector and drainage network.

The capital costs for the creation of protective forest strips (Кл) can be determined by the formula:

$$К_Л = Р_Л С_Л \qquad (7)$$

here $Р_Л$ - the area of protective forest strips, hectares;

$С_Л$- the cost of laying one hectare of forest belts, sum.

The capital costs for the construction of a collector and drainage network ($К_{КД}$) are determined by the formulas:

a) for farms in the zones of new development and irrigation

$$К_{КД} = \sum_{i=1}^{n} P_i \frac{N_{Hi}}{1000} \cdot S, \qquad (8)$$

here P – the land area of the i-th massif (depending on the mechanical composition of the soil, salinity and depth of groundwater, etc.) different massifs require different specific extent of $К_{ЛО}$, hectares;

N_{Hi}- normative (rational) length of $К_{ДО}$ per 1 ha for the i-th array, m/hectares,

S- consolidated costs for the construction of 1 km of collector and drainage network, sum.

b) for farms of the old-irrigated zone

here Nci- the existing length of the collector-drainage network of the i-th array, m/hectares.

Current costs include operating costs for the maintenance and maintenance of environmental facilities, depreciation charges and losses associated with the withdrawal of agricultural land for the construction of environmental facilities and are determined by the formula:

$$C = \sum_{i=1}^{n} \sum_{j=1}^{m} C_{ij} \qquad (9)$$

here C_{ij} - current costs;   i- th environmental object;   j- th type.

Operating costs and depreciation charges in land management projects and schemes are determined by aggregated indicators in the established percentages of deductions from capital investments for environmental protection measures.

Losses associated with the allocation of land for the construction of environmental protection facilities (C) are determined by the amount of net income lost from the area occupied by environmental protection facilities:

$$C_0 = Р Э Д \qquad (10)$$

here P- the area of land occupied by environmental objects (taking into account the areas allocated for the organization of waste storage and disposal sites, as well as lands occupied by artificial water receivers in low places of the farm territory, where collector-drainage and other waste water is discharged), hectare,

Д- the average amount of net income per household per 1 hectare.

The area of land occupied by environmental objects (P) is defined as the sum of the areas of various environmental objects: (Pj):

$$P_j = \sum_{i=1}^{n} P_i \qquad (11)$$

The size of capital investments in water treatment and air treatment facilities and installations, waste storage and disposal facilities, etc., are determined by their estimated cost.

When developing schemes and land management projects, there is a need to choose the most environmentally effective design solutions. When comparing options that provide the same level of environmental quality, the indicator of environmental efficiency is the minimum of total annual expenses and capital investments, reduced to an annual dimension according to the well-known formula:

$$C_j + E_H K \rightarrow min \qquad (12)$$

From the content of the above-mentioned measures for nature protection and improving the use of land resources, it can be concluded that many of them are directly or indirectly related to the organization of the territory not only on large land masses , but also within the boundaries of individual farms. At the same time, it is not excluded, but it is assumed that there will be a need for a number of other measures, both legal, organizational, technological and other, related to the creation of the most favorable conditions for work, life and recreation of the population both in the city and in rural areas. Therefore, in our opinion, at this stage of land management development, the development of measures to protect nature and improve land resources should be an integral part of all land management projects. The detail and depth of solving these issues should be determined by the specific conditions and tasks set.

Conclusion. Based on the above studies, it can be concluded that nature protection measures in land management projects. The purpose of the study is to develop theoretical and methodological foundations for the rational use of land and water resources in areas of environmental disaster, which is specified in the following tasks:

➢ theoretically substantiate the concept of rational use of land and water resources in the crisis conditions of irrigated agriculture;

➢ to analyze and establish the main causes and general patterns of the development of the ecological crisis situation in the region

➢ to develop a system and methods for assessing the environmental consequences of measures for the use of land resources;

➢ to improve the organization of land tenure and land use systems, to justify the situation, the structure of sown areas, to organize crop rotations and their territories in order to conduct environmentally safe production in the studied region;

➢ to identify the prerequisites and features of the formation and development of farms in the transition economy of the country and to develop proposals for improving the credit, financial and tax policy in relation to these farms;

➢ to develop a methodology of applied solutions for the economic justification of investments in rice irrigation systems that contribute to increasing rice yield and environmental and economic efficiency of the industry;

➢ to develop a system of indicators and a methodology for economic, environmental and social justification of projects for the organization of land use in ecologically crisis areas of irrigated agriculture;

➢ to develop scientific and methodological recommendations on accounting and determining the size of environmental costs in land use organization projects;

➢ to establish the regularities of the development of anthropogenic ecological systems, to find ways to increase their stability and environmental safety.

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