Assessment of the influence of environmental parameters on the economic efficiency of the territorial organization in agricultural enterprises

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SUMMARY

One has conducted a correlation-regression analysis of the impact of environmental (factor) parameters of the organization of the territory on the economic development of the agricultural sector in the structure of agricultural enterprises of Lviv region, reflecting the effective (economic) indicators. According to the results of the study, a close relationship and a direct dependence between gross agricultural output, the level of profitability, normative monetary valuation of agricultural land and environmental indicators, due to the extensiveness of agricultural production. Considering economic and mathematical modeling, one has calculated the predicted value for the studied economic indicators depending on the ecological parameters of the territorial organization in agricultural enterprises of Lviv region for 2019. The results of the study of the relationship between environmental and economic parameters denote the desideratum to preserve agroecosystems, to ensure the reproductive process in agricultural land use, the practical implementation of on-farm land management projects.

Introduction

The results of agricultural activity depend on plenty of factors, the main of which are environmental, which characterize the state of agroecosystems and agro-technological conditions of production. The diversity of these parameters, which has a consequential impact on the economic efficiency of agriculture, indicates the cause and effect connections under the mutual impact of agricultural production on the environment (Kriukova and Nitsenko, 2016, p. 8). N. Herasymchuk (2010), M. Stupen (2019), Yu. Shkurchenko (2016) researched rational and efficient territorial organization for sustainable preservation of agro-resource potential of lands and an increase of their productivity. However, the choice of criteria that characterize the current model of ecological and economic development of land use and the balance of natural and anthropogenic factors is one of the most difficult issues in the organization of agricultural land in the structure of the agro-landscape.

Methods of investigation

The economic and statistical method for data processing during ecological and economic analysis of the current state of the organization of the territory and correlation-regression analysis to assess the impact and determine mathematical dependences to change the efficiency of agricultural production depending on the parameters of agro-landscape organization. In order to express this connection mathematically on the basis of statistical data due to the results of agricultural production of enterprises in Lviv region (2019), one has calculated the value of the function (y), which describes the linear equation: $y = ax + b$, (1) where y – indicators of economic efficiency of agricultural enterprises; x – ecological parameters of the territorial organization; a, b – constants.

Initial and geological data

Considering the arrangement of the territory, it is quite arduous to determine precisely what and to what extent it is obligatory to apply environmental measures to amend the overall ecological condition of the territories and ascertain the stability, sustainability of the land. The available indicators for determining the ecological condition of the territories do not give a complete understanding of the implementation of these measures but assess in general one or another ecological criterion. In this regard, choosing the indispensable measure, one uses indicators that characterize the potential productivity of agricultural agro- landscapes, taking into account the natural conditions and anthropogenic capabilities of the territory (Stupen R. et al., 2019). One has proposed to apply the following environmental parameters in Table 1, which include integrated indicators that most fully reflect the impact of spatial parameters on the territorial organization concerning the economic efficiency of agricultural enterprises in order to achieve objectivity and the analysis procedure facilitation.

***Table 1** Ecological parameters of the territorial organization of agricultural enterprises in Lviv region, 2019*

District	Coefficient of ecological stability of the territory	Agricultural reclamation of the territory, %	Plowing of the territory, %	The share of eroded lands, %
Brody	0.55	58.9	37.3	22.9
Busk	0.49	68.1	43.2	11.9
Horodok	0.40	77.5	51.8	20.5
Drohobych	0.60	53.4	31.3	19.4
Zhydachiv	0.44	69.8	45.6	19.3
Zhovkva	0.48	66.9	44.7	19.4
Zolochiv	0.48	68.6	43.1	14.7
Kamianka-Buzka	0.45	70.0	47.2	9.8
Mykolaiiv	0.53	60.0	33.9	15.6
Mostyska	0.41	73.7	54.1	36.3
Peremyshliany	0.53	63.7	41.9	43.0

District				
Pustomyty	0.40	73.0	51.6	22.9
Radekhiv	0.49	66.0	44.6	25.8
Sambir	0.41	78.6	48.8	17.6
Skole	0.84	24.8	8.8	16.8
Sokal	0.49	68.6	41.6	25.3
Staryi Sambir	0.63	47.1	31.3	32.7
Stryi	0.51	57.8	39.9	5.9
Turka	0.74	37.5	18.3	24.0
Yavoriv	0.60	43.8	23.6	16.0

Gross agricultural output, profit (loss) from sales of agricultural products in agricultural enterprises per 1 hectare of agricultural lands, the level of profitability from the sale of agricultural products, the normative monetary valuation of agricultural lands (Table 2) are indicators that reflect the result depending on the environmental parameters of the territorial organization (Table 1) and characterize the efficiency of agricultural enterprises in Lviv region.

Table 2 *Economic parameters of the territorial organization of agricultural enterprises in Lviv region, 2019*

| District	Gross agricultural output, thousand UAH	Profit (loss), UAH/ha	The level of profitability, %	The normative monetary valuation of agricultural lands, UAH
Brody	187116	1236.0	31.3	17621
Busk	206945	355.4	20.0	17966
Horodok	111654	85.6	9.1	11180
Drohobych	144736	93.0	17.3	6038
Zhydachiv	231239	350.1	4.9	14278
Zhovkva	119536	56.8	6.3	13065
Zolochiv	288049	339.0	17.3	19362
Kamianka-Buzka	234174	1763.6	12.5	14662
Mykolaiiv	158539	205.4	11.1	9290
Mostyska	92111	423.0	18.1	12969
Peremyshliany	75397	394.4	17.3	10225
Pustomyty	191230	1155.1	36.7	16825
Radekhiv	198669	3856.9	30.5	16120
Sambir	236821	0.1	1.4	11669
Skole	105	11.1	1.0	3736
Sokal	336045	478.4	19.7	18153
Staryi Sambir	32807	12.6	16.0	5496
Stryi	385272	5063.6	47.0	8504
Turka	4873	23.0	1.0	3281
Yavoriv	52591	27.5	3.9	6355

Results of investigations

Concerning the analysis of the interaction of environmental parameters on the efficiency of agricultural activities in the program STATISTICA, one has determined the relationship between them using correlation-regression analysis, which allows identifying the interdependence between factor (environmental) and performance (economic) indicators (Figures 1, 2, 3, 4).
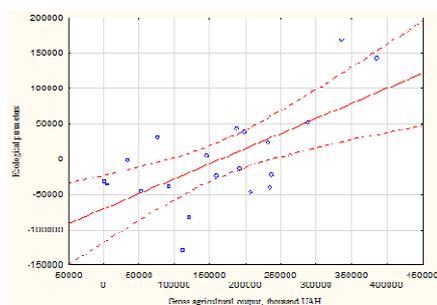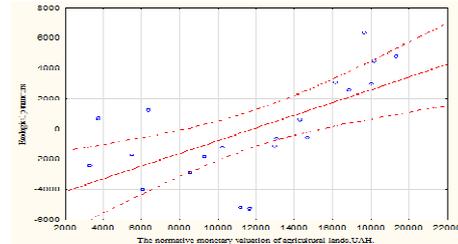

Figure 1 *Correlation between environmental parameters of the territorial organization and gross output in agricultural enterprises of Lviv region, 2019*
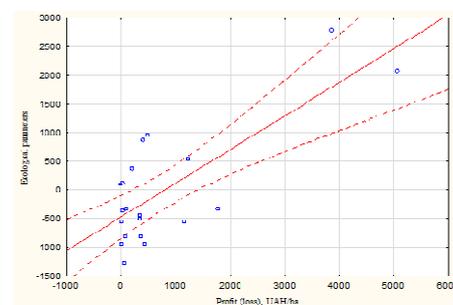
Figure 2 *Correlation between environmental parameters of the territorial organization and profit (loss) in agricultural enterprises of Lviv region, 2019*
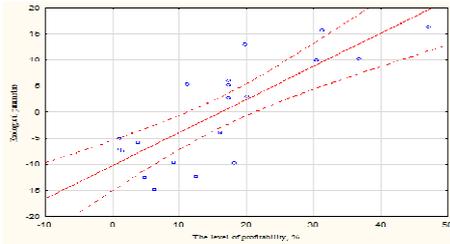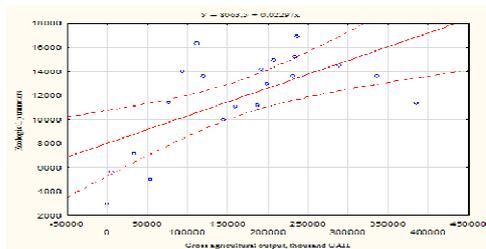
Figure 3 *Correlation between environmental parameters of the territorial organization and the level of profitability in agricultural enterprises of Lviv region, 2019*
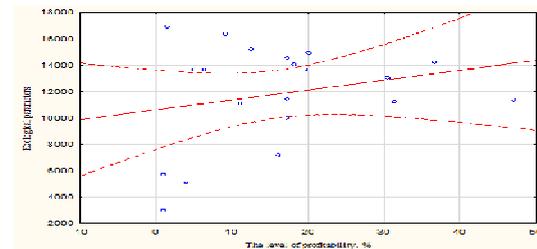

Figure 4 *Correlation between environmental parameters of the territory organization and normative monetary valuation of lands in agricultural enterprises of Lviv region, 2019*

The ranking of correlation coefficients according to the results of the analysis (Figures 1, 2, 3 and 4) shows that the closest connection with the environmental parameters of the territorial organization is reflected in the indicators of normative monetary valuation of agricultural land in the amount of 0.76, gross agricultural output – 0.62 and the level of profitability – 0.60. There is no connection between the relevant indicators and profit (loss) in agricultural enterprises of Lviv region in 2019 at the level of 0.29. High rates of development of means of labor and technologies in agriculture, together with the growth of anthropogenic pressure on the environment, make it difficult to identify an objective correlation between the coefficient of ecological stability of the territory and certain economic indicators (Stupen and Ryzhok, 2018, p. 355). Therefore, considering the correlation-regression analysis in the program STATISTICA in Figures 5, 6, 7 and 8, one has presented the linear trends of the relationship between the studied factor (environmental) and performance (economic) indicators, reflecting their predictive value at the value of the correlation coefficient at level 1.
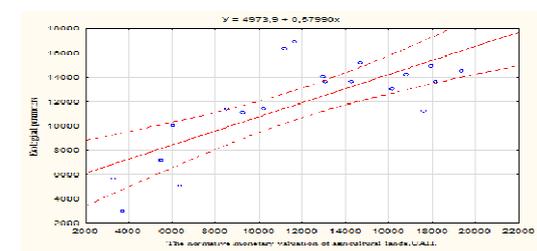

Figure 5 *Predicted value of gross output depending on the environmental parameters of the territorial organization in agricultural enterprises of Lviv region, 2019*

Figure 7 *Predicted value of the level of profitability depending on the ecological parameters of the territorial organization in agricultural enterprises of Lviv region, 2019*
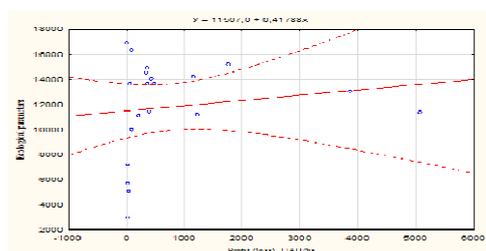
Figure 6 *Predicted value of profit (loss) depending on the environmental parameters of the territorial organization in agricultural enterprises of Lviv region, 2019*

Figure 8 *Predicted value of the normative monetary valuation of lands depending on the ecological parameters of the territorial organization in agricultural enterprises of Lviv region, 2019*

According to the data of economic and mathematical modeling in Figures 5, 6, 7 and 8 the predicted value will be for: 1) gross output: $У = 8063.5 + 0.2297x$ (2); 2) profit (loss): $У = 11507.0 + 0.41788x$ (3); 3) the level of profitability: $У = 106.202 + 0.36709x$ (4); 4) the normative monetary valuation of lands: $У = 4973.9 + 0.57990x$ (5).

Recommendations and conclusions

The calculation of the impact of environmental parameters on the agro-landscape territorial organization on the magnification of economic efficiency of management in agricultural enterprises allows making rational management decisions based on the establishment of a direct connection between the studied factors. This fact determines the dependence of the current ecological state of the environment on the prosperity of environmentalization of agricultural production, the level of compliance with environmental and legal requirements at all stages of management. Taking into account the results of correlation and regression analysis of the environmental impact of the territorial organization on the economic efficiency of agricultural enterprises, one has determined that the development of their sustainable development should be based on environmental requirements of internal land management projects in a single entity.

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