

THE ENVIRONMENTAL EFFICIENCY IN RA AGRARIAN SECTOR: DYNAMICS AND PROSPECTS

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Introduction. On the way to the Green economy, choosing the right options for transitioning to sustainable development is very important. For the evaluation of different projects and directions, certain criteria should be used, which will allow finding the preferable option. The most important measure of the goodness of projects is their economic efficiency. In the conditions of the technogenic type of economic development, importance was given only to the increase of economic efficiency (that is, the minimization of inputs and the maximization of the outputs) without considering the environmental factor. Currently, in the concept of sustainable development and the idea of the Green economy, the issue of effective natural use and environmental protection is taking central place. Global inclusion of this issue determines the relevance of this article. Also, there are no up to date and thorough studies in regards of the environmental efficiency assessment in RA agrarian sector, which further reinforces the relevance of this study. The main goal of the article is to study the dynamics of the environmental efficiency of the agrarian sector of Armenia, highlighting the trends and perspectives. Within the framework of the article, the following tasks were set:

- To study the methodological approaches to the assessment of the environmental efficiency of.
- Based on the conducted research, assess the environmental efficiency of the agrarian sector for the past decade.
- Perform the comparative analysis between the obtained results, distinguishing the observed trends and outlining the perspectives of environmental efficiency.

Literature review. Environmental efficiency and the efficiency of nature use have become one of the global issues of the 21st century. States are directing their development strategies towards improving the economy and quality of life, circular economy, increasing energy efficiency, etc. In the case of the efficiency of nature use, it is important to minimize the costs that are dangerous for the environment (emissions, consumption of non-renewable resources, etc.). However, research shows that policies for environmental protection and reduction of greenhouse gas emissions have serious gaps, so the evaluation of the efficiency of nature use becomes more important during the development of these policies. In the context of the evaluation of the efficiency of nature use, the assessment of its determinants becomes relevant. There are many reasons for the environmental distortion and the increase in greenhouse gas emissions, but one

thing is for sure the main part of these reasons is anthropogenic¹. Moreover, the situation differs sharply between high-income and low-income countries². One of the main reasons for such differences is the effective policies developed and applied in different groups of countries, which lead to the increase in the efficiency of nature use. For example, the application of environmental taxes in the private sector, the increase of their rates, within such limits that do not lead to a decrease in the competitiveness of that given business. One of the opportunities to increase the efficiency of nature use is the introduction of eco-innovations, increasing the eco-literacy of the population, etc. In other words, in the matter of evaluating and increasing the efficiency of nature use, not only the definition and evaluation of its determinants are important, but also the definition of the right attitude and culture in society³. From the point of view of nature conservation, policy change in the field of tourism is important, because studies document that tourism contributes to the increase of greenhouse gas emissions⁴. The introduction of the circular economy concept contributes to the solution of environmental problems⁵.

Currently, developed countries and international organizations, are attempting to create such methodology for measuring the main economic indicators of a country that takes into account the ecological factor. For example, in 1993, the UN Statistical Division proposed a new, integrated system of ecological and economic accounts, which is aimed at incorporating the ecological factor in national statistics. A new account named "Green Account" has been added to the system of national accounts⁶, which is based on the value assessment of two quantities: consumed natural resources and ecological and economic damage caused by pollution. As a result, the ecologically adjusted Net Domestic Product (NDP) indicator is calculated:

$$\text{NDP}_{\text{adjusted}} = \text{NDP} - \text{consumed natural resources} - \text{the monetary value of ecological damage}$$

The assessment of the efficiency of nature use is currently carried out using empiric economic models along with traditional methods. For example, in the research

¹ Maskell, K. (1995). The Basic Science of Anthropogenic Climate Change. *Medicine and War*, 11(4), 148–167. <http://www.jstor.org/stable/45354787>

² Li, M., & Wang, Q. (2014). International environmental efficiency differences and their determinants. *Energy*, 78, 411–420. doi:10.1016/j.energy.2014.10.026

³ Miller, L. B., Rice, R. E., Gustafson, A., & Goldberg, M. H. (2022). Relationships Among Environmental Attitudes, Environmental Efficacy, and Pro-Environmental Behaviors Across and Within 11 Countries. *Environment and Behavior*, 54(7–8), 1063–1096. <https://doi.org/10.1177/00139165221131002>

⁴ Cheng, Y.; Zhu, K.; Zhou, Q.; El Archi, Y.; Kabil, M.; Remenyik, B.; Dávid, L.D. Tourism Ecological Efficiency and Sustainable Development in the Hanjiang River Basin: A Super-Efficiency Slacks-Based Measure Model Study. *Sustainability* 2023, 15, 6159. <https://doi.org/10.3390/su15076159>

⁵ Figge, F., and Thorpe, A. S. (2023). Circular economy, operational ecoefficiency, and sufficiency. An integrated view. *Ecol. Econ.* 204(Part B), 107692. doi: 10.1016/j.ecolecon.2022.107692

⁶Source:<https://unstats.un.org/unsd/envaccounting/ceea/archive/Framework/GreenNationalAccountsPolicyUsesExperienceHamiltonLutz96.PDF>, last accessed 05/02/2024.

conducted on the basis of the EU countries' data, their environmental efficiency was assessed using the DEA (Data Envelopment Analysis) method of economic modeling¹. The essence of this assessment method lies in the fact that, based on the input and output variables set by the researcher, a rating list is formed from a sample of studied units (in this case EU countries), where the units are classified according to their efficiency score. The efficiency score is in the range of 0-1. The advantage of the method lies in the fact that the efficiency criteria in the model are not defined by the researcher, instead, the efficiency score is derived from the performance comparison of all the units of the sample². For the environmental efficiency study of EU countries, the input and output variables were chosen from 4 directions: tourism, circular economy, quality of life, and resource use. As a result, it became clear that a concept of sustainable development in the tourism sector should be developed and implemented in the EU countries because the constant growth in tourism numbers has a negative impact on environmental efficiency. A high level of environmental efficiency was recorded in Germany, Ireland, the Netherlands, Cyprus, Luxembourg, and Italy³.

Methodology. To achieve the research goal proposed within the framework of the article, it is necessary to specify how to measure or evaluate the environmental efficiency of the agrarian sector. For this purpose, several indicators were identified, the systematic calculation, the joint analysis, and the summary of which will allow us to form an idea about the state of natural use of the sector and make the necessary conclusions. "Nature capacity" is one of the important indicators characterizing the efficiency of the use of the environment (nature, natural resources, and conditions). "Nature capacity" (hereafter NC) reflects the level and type of economic development of a given economic activity, and is expressed by two indicators:

- The costs of natural resources per unit of final output (final products, services, etc.) In this case, the value of NC depends on the efficiency of using natural resources in each link of the production chain.
- The amount of emission per unit of the final output. This indicator is determined by the level of use of "waste-free" technologies during production stages, the efficiency of the use of cleaning devices, etc.

The NC indicators can be calculated both at the macro level and in terms of the entire economy and sectors. At the macro level, the following NC indicators are calculated:

¹ Lacko, R., Hajduová, Z. & Markovič, P. Socioeconomic determinants of environmental efficiency: the case of the European Union. *Environ Sci Pollut Res* 30, 31320–31331 (2023). <https://doi.org/10.1007/s11356-022-24435-1>

² Cooper WW, Seiford LM, Tone K (2007) Data envelopment analysis: a comprehensive text with models, applications, references and DEA-Solver Software, 2nd edn. Springer, US, New York, US

³ Lacko, R., Hajduová, Z. & Markovič, P. Socioeconomic determinants of environmental efficiency: the case of the European Union. *Environ Sci Pollut Res* 30, 31320–31331 (2023). <https://doi.org/10.1007/s11356-022-24435-1>

- costs of natural resources (NR) or volumes of emissions (E) per unit of GDP`

$$NC=NR/GDP$$

$$NC=E/GDP$$
- costs of natural resources (NR) and volumes of emissions (E) per unit of national income (NI)`

$$NC=NR/NI$$

$$NC=E/NI$$

The situation is simpler in the case of sector NC indicators: energy capacity, land capacity, etc. These indicators represent the physical capacity of a specific production or industry. The following NC indicators are calculated for the sectoral level:

- Expenditure of natural resources per unit of final output.

$$NC_{\text{sectoral}}=NR/\text{Final output}$$

For example, in agriculture, NC will show the area of land needed to produce 1 ton of potatoes, or the forest area needed to produce 1 ton of paper. The lower the value of this indicator the higher the environmental and economic efficiency.

- The inverse indicator of "the Natural Capacity" is "the Resource Return", which is also widely used. "The Resource Return" indicates the final output per unit of spent natural resources. One of the vivid examples of this indicator is the average yield indicator in agriculture. The higher the value of this indicator the higher the environmental and economic efficiency.

Within the framework of the article, the first version of the NC indicator was calculated from 2011 to 2022. Land resources, irrigation water expenditure, and labor employed in the agrarian sector were considered as input resource indicators, and the value of the gross agricultural product (AMD) was taken as the output indicator characterizing the agrarian sector. Within the framework of the research, greenhouse gas emissions were used as the emission indicator. The data necessary for the calculations were obtained from the respective statistical publications of the RA Statistical Committee.

Analysis. The following indicators were used for NC calculations:

- The gross agriculture product (AMD): as an indicator characterizing the total final output of the agrarian sector. To ensure the compatibility between indicators, as well as to obtain results that accurately reflect reality, the time series of the gross product indicator was adjusted by the Consumer Price Index (CPI).
- For the indicators characterizing the use of different resources, the following were taken:
 - the area of cultivated land was used as an indicator characterizing the "expenditure" of land resources in a given year,
 - the consumption of irrigation water was used as an indicator characterizing the usage of water resources in the agrarian sector,

- the number of employed in the agrarian sector served as the basis for an indicator characterizing labor expenditure in the sector.
- Greenhouse gas emissions from the sector served as an indicator of emission and pollution.

The time series of the discussed indicators are presented in Table 1.

Table 1

The dynamics of the main indicators used for the assessment of environmental efficiency in 2011-2022¹

	Gross product, Billion AMD	Labor resources, Thousand people	CPI	Greenhouse gas emissions, Million tons	Irrigation water, Million m ³	Cultivated land area, Thousand ha
2022	1021,7	250,1	108,3	-	1612.7	-
2021	934,4	237,4	107,7	-	1561.9	-
2020	833,3	229,6	103,7	1,73	1305.6	744.0
2019	853,3	235,9	100,7	1,72	1069.5	735.7
2018	892,9	272,2	101,8	1,75	1064.6	729.3
2017	908,6	317,1	102,6	1,87	1236.6	692.9
2016	878,5	338,1	98,9	2,33	1522.3	677.6
2015	945,4	379,0	99,9	1,78	1519.1	664.0
2014	993,5	394,8	104,6	1,66	1051.7	659.9
2013	919,1	422,1	105,6	1,69	1044.5	653.9
2012	841,5	437,2	103,2	1,55	-	-
2011	795,0	457,4	-	1,36	-	-

Before proceeding to the analysis of NC indicators, let's analyze the dynamics of the indicators presented in Table 1. The data in Table 1 prove that in the past decade, the gross agrarian product increased steadily (recorded a slight decline starting around 2015, and then started to increase again). The picture is different regarding labor resources: the number of employed people in the agrarian sector has steadily decreased (in 2022, compared to 2011, the indicator has almost halved). It turns out that in the past decade, the use of labor resources was reduced, instead the output increased, which indicates that the labor productivity in the sector has increased. The situation can be conditioned by several factors, starting from the increase in the level of mechanization in the sector to the decrease in the number of economically active population in rural areas. It is a mistake to characterize this as a "positive" situation because the increase in labor productivity does not yet speak of an increase in environmental efficiency and nature use.

¹ The data of columns 2, 3, 4, 5, and 6 were retrieved from the publications of the RA Statistical Committee, available from <https://armstat.am/am/?nid=81>, last accessed on 02/02/2024. The data of column 5 were retrieved from <https://ourworldindata.org/grapher/ghg-emissions-by-sector?time=2011&country=~ARM>, last accessed on 05/02/2024.

In terms of land resources, the dynamic is positive: the area of cultivated land has increased. When we look at the land as a just resource (like the other resource types), the increase in the use of the land takes on a negative connotation. However, in the case of our country, the increase in cultivated land is a positive phenomenon and directly contributes to the increase in the efficiency of land use in the country. Regarding water use, it should be noted that the consumption of irrigation water in the agrarian sector has increased.

Greenhouse gas emissions from the agrarian sector have also increased, which may be conditioned by the increase of livestock in animal husbandry, and the increase in the mechanization of the sector. The increase in the use of machinery and equipment implies an increase in fuel consumption, which will contribute to the increase in greenhouse gas emissions.

To assess the environmental efficiency the following NC indicators were calculated:

- The consumption/expenditure of natural resources and volumes of emissions (E) per unit of Gross product (GP) in the agrarian sector:

$$NC_{land} = \text{Cultivated Land Area} / GP$$

$$NC_{water} = \text{Water resources} / GP$$

$$NC_{labor} = \text{Labor resources} / GP$$

$$NC_{emissions} = E / GP$$

The NC indicator values for the period of 2011-2022 are presented in Table 2, and the graphs of their dynamics are highlighted in Figure 1.

Table 2

The NC indicators of the RA agrarian sector¹

	NC _{water}	NC _{land}	NC _{labor}	NC _{emissions}
2022	1.71	-	0.27	-
2021	1.80	-	0.27	-
2020	1.62	0.93	0.29	2.15
2019	1.26	0.87	0.28	2.03
2018	1.21	0.83	0.31	2.00
2017	1.40	0.78	0.28	2.11
2016	1.71	0.76	0.38	2.62
2015	1.61	0.70	0.40	1.88
2014	1.11	0.69	0.42	1.75
2013	1.20	0.75	0.49	1.94
2012	-	-	0.54	1.90
2011	-	-	0.58	1.71

¹ Authors' calculations.

The analysis of NC indicators according to individual resources is the following:

- In terms of water resources, the NC indicator has increased, which speaks of inefficient water use. The increase in the gross agrarian product was achieved at the expense of extensive use of water resources. Of course, the consumption of water resources in individual years can be largely determined by drought and lack of precipitation, but the ten-year dynamics of the NC indicator prove that there is an inefficient use of water resources.
- In terms of land resources, the NC indicator has increased, which speaks about the fact that over time the efficiency of land use in the RA agrarian sector has declined. Earlier we mentioned that the expansion of cultivated land area is a positive phenomenon, but the NC indicator proves that the use of land was carried out inefficiently. It turns out that the rate of growth of land resource use exceeds the rate of gross product growth, and the sector is facing the problem of inefficient management.
- In terms of labor resources, the state of resource use has improved. It is noteworthy that, as we mentioned earlier, the labor productivity in the RA agrarian sector has increased, therefore the NC indicator in terms of labor resources has decreased. In this regard, the dynamics of resource efficiency are positive.
- The last indicator of NC is the gross agrarian product per unit of greenhouse gas emissions from the sector. Among the calculated indicators, this one immediately expresses the relation between the output and the pollution of the sector. This indicator has registered a steady increase in the past decade, which indicates that the greenhouse gas emissions growth rate exceeds the growth rate of sector output thus reducing environmental efficiency

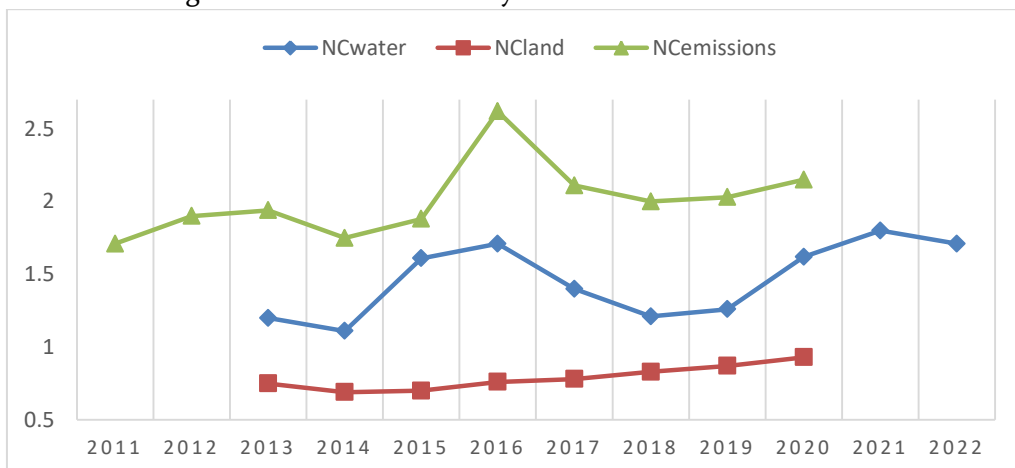


Figure 1. The NC indicators of the RA agrarian sector from 2011-2022¹

¹ The figure is composed by authors with the basis of the data in Table 2.

The calculation of NC indicators showed that the dynamics of the environmental efficiency in the RA agrarian sector is negative: the growth rates of pollution, and resource consumption exceed the growth rate of the output. The NC indicators of irrigation water and land (which are the two most important resource groups in the agrarian sector) have an increasing trend, and along with this, the volume of emissions per unit of agrarian output has also increased (Figure 1). This is an issue that contradicts the modern vision of the sustainable development agenda adopted by the United Nations¹.

In this situation, the role of state policy is irreplaceable: After all, the greening of the agrarian sector and the increase in environmental efficiency must all come from a unified state concept. As of January 2024, the RA Government is implementing 14 state support programs in the agrarian sector², in which there are no support programs aimed at environmental protection. Some programs can partially contribute to more efficient use of resources. In particular, the programs aimed at land reforms, as well as the programs for establishing orchards and vineyards with modern irrigation technologies, can contribute to increasing the efficiency of land and irrigation water use. Unfortunately, in terms of emissions, waste, and environment protection, significant steps are missing.

Scientific novelty. In the 21st century, the imperative of effective use of the environment, natural resources, and conditions is an objective reality, and on the way to achieve that, it is very important to evaluate the efficiency of the economy's natural use, both at the level of the whole economy, as well as the sectoral level and the micro level. **The scientific novelty** of the article lies in the fact that the indicators characterizing the environmental efficiency in the RA agrarian sector were calculated and their dynamics were studied to outline the prospects.

Conclusion. In the conditions of current global developments (the ever-growing population of the Earth, the issue of poverty and food security, and global warming) the effective use of natural resources is gaining momentum and is imperative. The issue of environmental efficiency is manifested in the RA agrarian sector, also, considering the food security issues that our country faces, it is necessary to ensure the increase in food production through effective nature use. Taking into account the mentioned circumstances, the effectiveness of the natural resources' use of the RA agrarian sector was assessed. The study of environmental efficiency in the agrarian sector provided the following main findings:

- The analysis of the dynamics of the use of the main agricultural resources (land, irrigation water, and labor resources) proves that, except for labor resources, the use

¹Source: https://sdgs.un.org/sites/default/files/202009/SDG%20Resource%20Document_Targets%20Overview.pdf. Last accessed 31/01/2024.

² Source: <https://mineconomy.am/page/1338>. Last accessed 31/01/2024.

of the resources increased. It is noteworthy that the gross product of the sector has also increased.

- The volumes of greenhouse gas emissions from the agrarian sector have increased, which is due to the increase in the number of livestock in the animal husbandry sub-sector and the increase in the level of mechanization in the horticulture sub-sector.
- The analysis of the NC indicators (calculated for evaluating the environmental efficiency) proves that the efficiency of natural use in the RA agrarian sector decreased in the past decade. The agrarian sector is currently consuming more resources per unit of output, and at the same time, more greenhouse gases are being emitted per unit of output. It turns out that currently there is a problem in the agrarian sector both in terms of decreasing the efficiency of resource use and increasing emissions.
- The analysis of the state policy concerning this issue showed that there are no measures aimed at reducing emissions in the sector, and there are no concrete approaches to efficient and economical use of resources. The study of the scope of activities of the Ministry of Environment also proves that there are no concrete, effective structures regarding this issue¹.

In summary, it was concluded that in the medium term, increasing the efficiency of nature use in the agrarian sector requires significant state policy regulations in the form of specific programs and measures. In particular, in our assessment, emphasis should be placed on the introduction and implementation of such measures that combine the increase of agrarian production, and large-scale investment of alternative energy sources in the production processes (where possible), at the same time reducing emissions and pollution from the agrarian sector.

References

1. Cheng, Y.; Zhu, K.; Zhou, Q.; El Archi, Y.; Kabil, M.; Remenyik, B.; Dávid, L.D. Tourism Ecological Efficiency and Sustainable Development in the Hanjiang River Basin: A Super-Efficiency Slacks-Based Measure Model Study. *Sustainability* **2023**, *15*, 6159. <https://doi.org/10.3390/su15076159>
2. Cooper WW, Seiford LM, Tone K (2007) Data envelopment analysis: a comprehensive text with models, applications, references and DEA-Solver Software, 2nd edn. Springer, US, New York, US
3. Figge, F., and Thorpe, A. S. (2023). Circular economy, operational ecoefficiency, and sufficiency. An integrated view. *Ecol. Econ.* 204(Part B), 107692. doi: 10.1016/j.ecolecon.2022.107692

¹ Source: <http://www.mnp.am/naxararutyun/strategy>. Last accessed 31/01/2024.

4. Lacko, R., Hajduová, Z. & Markovič, P. Socioeconomic determinants of environmental efficiency: the case of the European Union. *Environ Sci Pollut Res* 30, 31320–31331 (2023). <https://doi.org/10.1007/s11356-022-24435-1>
5. Li, M., & Wang, Q. (2014). International environmental efficiency differences and their determinants. *Energy*, 78, 411–420. doi:10.1016/j.energy.2014.10.026
6. MASKELL, K. (1995). The Basic Science of Anthropogenic Climate Change. *Medicine and War*, 11(4), 148–167. <http://www.jstor.org/stable/45354787>
7. Miller, L. B., Rice, R. E., Gustafson, A., & Goldberg, M. H. (2022). Relationships Among Environmental Attitudes, Environmental Efficacy, and Pro-Environmental Behaviors Across and Within 11 Countries. *Environment and Behavior*, 54(7-8), 1063-1096. <https://doi.org/10.1177/00139165221131002>
8. <https://armstat.am/am/?nid=81>
9. <https://mineconomy.am/page/1338>
10. <http://www.mnp.am/naxararutyun/strategy>
11. <https://ourworldindata.org/grapher/ghg-emissions-by-sector?time=2011&country=~ARM>
12. <https://unstats.un.org/unsd/envaccounting/ceea/archive/Framework/GreenNationalAccountsPolicyUsesExperienceHamiltonLutz96.PDF>
13. https://sdgs.un.org/sites/default/files/2020-09/SDG%20Resource%20Document_Targets%20Overview.pdf

ԲՆՕԳՏԱԳՈՐԾՄԱՆ ԱՐԴՅՈՒՆԱՎԵՏՈՒԹՅՈՒՆԸ ՀՀ ԱԳՐԱՐԱՅԻՆ ՈԼՈՐՏՈՒՄ. ԴԻՆԱՄԻԿԱՆ ԵՎ ՀԵՌԱՆԿԱՐՆԵՐԸ

Հովհաննես Սիմոնի Ասատրյան Արսեն Սլավիկի Ընդոյան

Համառոտագիր: Ներկայիս գլոբալ զարգացումների ֆոնին (մոլորակի անընդհատ աճող բնակչությունը, աղքատության հիմնախնդիրը, պարենապահովման հարցը, գլոբալ տաքացումը) առանձնահատուկ կարևորություն է ստանում արդյունավետ բնօգտագործումը: Այս հիմնախնդիրը վաղ արտահայտված է ՀՀ տնտեսության ագրարային ոլորտում, հետևաբար հաշվի առնելով մեր երկրի առջև ծառացած պարենապահովման հիմնահարցերը, պետք է ապահովել պարենի արտադրության ավելացումը՝ արդյունավետ բնօգտագործման ճանապարհով: Հոդվածի հիմնական նպատակն է ուսումնասիրել բնօգտագործման արդյունավետության դինամիկան ՀՀ ագրարային ոլորտում, և այդ շրջանակներում առաջադրվել են հետևյալ հիմնական խնդիրները.

- Ուսումնասիրել բնօգտագործման արդյունավետության գնահատման մեթոդաբանական մոտեցումները,

- Կատարված ուսումնասիրության հիման վրա իրականացնել ՀՀ ագրարային ոլորտում բնօգտագործման արդյունավետության գնահատում՝ առանձին տարիների կտրվածքով,
- Կատարել համեմատական վերլուծություն ստացված արդյունքների միջև՝ առանձնացնելով նկատվող տենդենցները և նախանշել բնօգտագործման հեռանկարները:

Բնատարողության ցուցանիշների հաշվարկը ցույց տվեց, որ ՀՀ ագրարային ոլորտում բնօգտագործման արդյունավետության դինամիկան բացասական է, այսինքն՝ շրջակա միջավայրի աղտոտման, ռեսուրսների ծախսի ցուցանիշների հավելաճի տեմպերը գերազանցում են վերջնական արդյունքի հավելաճի տեմպերին: Հոդվածի գիտական նորույթը կայանում է նրանում, որ հաշվարկվել են ՀՀ ագրարային ոլորտի բնօգտագործման արդյունավետությունը բնութագրող ցուցանիշները և ուսումնասիրվել է դրանց դինամիկան՝ հեռանկարների նախանշման նպատակով:

Ամփոփելով ստացված արդյունքները գալիս ենք այն եզրահանգման, որ միջնաժամկետ հեռանկարում ՀՀ ագրարային ոլորտում բնօգտագործման արդյունավետության բարձրացումը պահանջում է պետական քաղաքականության հստակ կարգավորումներ՝ կոնկրետ ծրագրերի ու միջոցառումների տեսքով:

Բանալի բառեր. բնօգտագործման արդյունավետություն, շրջակա միջավայր, արտանետումներ, բնական ռեսուրսներ, ագրարային ոլորտ, բնատարողություն, հողային ռեսուրսներ, ջրային ռեսուրսներ:

ЭФФЕКТИВНОСТЬ ПРИРОДОПОЛЬЗОВАНИЯ В АГРАРНОМ СЕКТОРЕ РА: ДИНАМИКА И ПЕРСПЕКТИВЫ

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Аннотация. В условиях современных глобальных событий (постоянно растущее население Земли, проблема бедности и продовольственной безопасности, глобальное потепление) эффективное природопользование набирает обороты и является обязательным. Вопрос экологической эффективности проявляется в аграрном секторе РА, также, учитывая проблемы продовольственной безопасности, стоящие перед нашей страной, необходимо обеспечить увеличение производства продуктов питания за счет эффективного природопользования. Основной целью статьи является исследование динамики эффективности природопользования в аграрном секторе Армении, и в рамках статьи были поставлены следующие задачи:

- Изучить методические подходы к оценке эффективности природопользования.
- На основе проведенных исследований оценить эффективность природопользования аграрного сектора за последнее десятилетие.

- Провести сравнительный анализ полученных результатов, выделив наблюдаемые тенденции и обозначив перспективы эффективности природопользования.

Расчет показателей НК показал, что динамика эффективности природопользования в аграрном секторе РА отрицательна: темпы роста загрязнения и потребления ресурсов превышают темпы роста выпуска продукции. Показатели НК оросительной воды и земли (двух важнейших групп ресурсов в аграрном секторе) имеют тенденцию к увеличению, наряду с этим увеличился и объем выбросов на единицу аграрной продукции. Научная новизна статьи заключается в том, что с целью очертания перспектив были рассчитаны показатели, характеризующие эффективность природопользования в аграрном секторе РА, и изучена их динамика.

Подводя итоги, мы приходим к выводу, что в среднесрочной перспективе повышение эффективности природопользования в аграрном секторе требует существенного регулирования государственной политики в виде конкретных программ и мер поддержки.

Ключевые слова: эффективность природопользования, окружающая среда, выбросы, природные ресурсы, аграрный сектор, земельные ресурсы, водные ресурсы.

THE ENVIRONMENTAL EFFICIENCY IN RA AGRARIAN SECTOR: DYNAMICS AND PROSPECTS

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Abstract. In the conditions of current global developments (the ever-growing population of the Earth, the issue of poverty and food security, and global warming) the effective use of natural resources is gaining momentum and is imperative. The issue of environmental efficiency is manifested in the RA agrarian sector, also, considering the food security issues that our country faces, it is necessary to ensure the increase in food production through the effective use of natural resources and conditions. **The main goal** of the article is to study the dynamics of the environmental efficiency of the agrarian sector of Armenia, and within the framework of the article, **the following tasks** were set:

- To study the methodological approaches to the assessment of the environmental efficiency of.
- Based on the conducted research, assess the environmental efficiency of the agrarian sector for the past decade.
- Perform the comparative analysis between the obtained results, distinguishing the observed trends and outlining the perspectives of environmental efficiency.

The calculation of NC indicators showed that the dynamics of the environmental efficiency in the RA agrarian sector is negative: the growth rates of pollution, and resource consumption exceed the growth rate of the output. The NC indicators of irrigation water and land (which are the two most important resource groups in the agrarian sector) have an increasing trend, and along with this, the volume of emissions per unit of agrarian output has also increased. **The scientific novelty** of the article lies in the fact that the indicators characterizing the environmental efficiency in the RA agrarian sector were calculated and their dynamics were studied to outline the prospects.

In summary, we come to the conclusion that in the medium term, increasing the environmental efficiency in the agrarian sector requires significant state policy regulations in the form of specific support programs and measures.

Keywords: environmental efficiency, environment, emissions, natural resources, agrarian sector, “The Natural Capacity, land resources, water resources.