

# ECOLOGICAL MANAGEMENT IN AGRICULTURE OF UKRAINE AS A PREREQUISITE FOR SUSTAINABLE DEVELOPMENT

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## Abstract

*Agriculture is one of the priority directions of the Ukrainian economy development due to its strong natural resource potential, presence of fertile soils, traditional ability of the population to work on land, material and technical means, as well as the growing demand for food in Ukraine and in the world. Excessive agricultural development of territories, intensification of production accompanied by an increase in anthropogenic impact on land resources and transformational processes in the agrarian sector have caused negative phenomena in the development of this branch: land degradation, reduction of soil fertility, environmental pollution and decline in land productivity.*

*However, Ukraine has set a course for sustainable development which involves taking into account economic, social and environmental performance. A prerequisite for sustainable development of agriculture is the formation of an effective system of ecological management at enterprises.*

*The article gives analysis and prospects of ecological management development in agricultural enterprises of Ukraine as prerequisites of sustainable development.*

**Keywords:** *ecological management, ecological factors, enterprise, market, nature use*

**JEL classification:** *O13, Q01, Q5*

# 1 Introduction

A peculiarity of the agricultural sector is the close connection between agrarian production and the environment. Agricultural production takes the necessary natural resources and energy from the environment. The result of the intensification of agricultural activity may be negative consequences, in addition to the growth of production. They can have the form of environmental pollution and inappropriate environmental management which can lead to irreversible changes in the climate on the planet, increase of the level of the world ocean, desertification of large areas, loss of soil fertility, acid rain and degradation of ecosystems. The limited opportunities of the natural environment to provide agricultural production with natural resources and fight against its pollution are the basis for the implementation of sustainable development.

The concept of sustainable development implies that an enterprise achieves its goals only if it takes into account relevant environmental, social and economic consequences of its activities. Sustainable development is a general concept of the modern society proclaiming the need for establishing a balance between satisfying current needs and protecting interests of future generations, including their need for the safe and healthy environment.

The sustainability of agricultural production has different characteristics, such as: soil-climatic, biological and environmental factors; production technology; organization of rural territories; mentality of the rural population. Main deterrent factors for the sustainable development of the agrarian production in Ukraine are deterioration of fertility and soil condition, price disproportions in agricultural industrial production, high level of financial indebtedness of agricultural producers, low level of development of innovative processes, etc.

In order to achieve ecological goals of sustainable development in agriculture, it is necessary to introduce an ecological management system that will develop the environmental policy of enterprises, control processes that can affect the environment and rational use of nature, set goals and observe the progress of their implementation and subordination.

The purpose of this article is the analysis and prospects for the development of environmental management in agricultural enterprises in Ukraine as a prerequisite for sustainable development.

## 1.1 Analysis of references

Sustainable development is the most important concept of developing countries that operates in developed countries. For the first time, the issue of sustainable

development was voiced in 1992 at the UN Conference on Environment and Development in Rio de Janeiro where representatives of 179 states adopted a program for the economic and social development of mankind in the coming century and formulated it in the document “Agenda for the 21st Century” (1992). The basis of this program was the concept of sustainable development which included “modification of the biosphere and application of human, financial, living and inanimate resources to meet human needs and improve the quality of life” (1992). Since then, the concept of sustainable development has become dominant in most countries of the world.

The most important goals to be achieved as a result of its implementation are:

- Ecological goal is to stop ecological degradation of the environment and eliminate further threats;
- Economic goal is to provide basic human material needs and economic development, using environmentally friendly methods and technologies;
- Social goal is poverty eradication, life and health protection, education and social management (Perkowski, 2002).

However, as noted by Shevchuk V. (2006, 2016), countries of the world in different ways refer to this concept due to different strategic goals and different levels of development. Some countries that aim at survival do not accept this theory. In some countries, the process of admission has already begun and others only just begin. However, environmental problems relate to global problems of mankind which can only be solved by uniting efforts.

Ukraine has not become an exception: a clear national strategy for sustainable development based on the need for the balance between the environment, society and economy is the key to bringing Ukraine closer to world standards of social ecological and economic progress (Gerasymchuk Z.V., 2017). In 2016, Ukraine had national consultations on adapting goals of sustainable development: the experts conducted their ranking using the 5-point system (Kovaliv Y., 2016). Thus, two goals have received ratings of over 4 of seventeen goals listed above. They are contributing to the progressive, comprehensive and sustainable economic growth, full and productive employment and decent work for all (4.27) and poverty alleviation in all its forms and everywhere (4.17).

Above three points experts gave the following goals: development of sustainable infrastructure, promotion of comprehensive and sustainable industrialization and innovation (3.95); promoting a peaceful and open society for the sake of sustainable development, ensuring access to justice for all and creating effective, accountable and participatory institutions at all levels (3.88); ensuring comprehensive and quality education and encouraging lifelong learning opportunities for

all people (3.76); providing access to affordable, reliable, sustainable and modern energy sources for all people (3.74); ensuring transition to rational consumption and production models (3.68); ensuring availability and rational use of water resources and sanitation for all people (3.55); overcoming hunger, achieving food security, improving nutrition and promoting sustainable agriculture (3.50); protection, restoration of land ecosystems and promotion of their sustainable use, rational forest management, fight against desertification, cessation and return of land degradation processes and the process of halting the loss of biodiversity (3.47); ensuring openness, security, viability and environmental sustainability of cities and settlements (3.44); reduction of inequality within and between countries (3.39); strengthening the means of implementation and revitalization of Global Partnership for Sustainable Development (3.20); taking urgent measures to combat climate change and its consequences (3.14), conservation and management of oceans, seas and marine resources for sustainable development (3.07).

The goal of ensuring gender equality, empowerment of all women and girls has received less than three points in Ukraine (2.96). That is, according to the results of national consultations, it can be concluded that in Ukraine, the society is ready to develop in the direction of sustainable development that will ensure economic growth, social justice and rational nature management.

Particular attention is needed to study problems of sustainable development in the agrarian sector of the economy, since main aspects of sustainable development conflict with each other (Pankov O., 2011; Furdychko O., 2011). Thus, the main task of agriculture is food security. Its provision requires implementation of the latest technologies, intensification of production which can result in pollution of the environment and production. The main task of sustainable development in this case is to provide foodstuffs for the population under the condition of preservation and restoration of the natural environment. At the same time, great attention should be paid to the quality of food, as this is one of main factors influencing health of the population (Shramko I., 2016). An environmentally friendly agricultural practice is considered to be less harmful to the environment than the traditional cultivation. At the same time, consumers' desires include both a large number of cheap end-products of agricultural production and absence of effects on human health and the environment, as well as preservation of resources for future generations. As a result, there is a conflict between economic, social and environmental aspects.

Sustainable development of agricultural production is the ability of a business entity to maintain dynamically proportions in organizing activities oriented towards the innovative development; increase social and economic efficiency; increase constantly the pace of development carrying out expanded reproduction

which purpose is to provide the population with quality food products, food security of the state without harm to the environment (Varchenko O., 2012).

According to domestic scientists, sustainable development in agriculture is possible provided the development of environmental management. So, Kocherga M. (2013) notes that necessity and timeliness of implementation of environmental management as an effective tool for agricultural development is conditioned not only by deterioration of the ecological state but also by growing requirements of the management system connected with regular trends in the development of modern production, new trends of scientific and technological progress, increase of production capacities for new technologies and aggravation of the influence of production both on the local and global levels.

Biliavska Y. (2016) observes that the ecological management studies management relations in organizations that ensure its sustainable development, environmental protection, human life safety, rational use of natural resources and environmental safety aimed at the implementation of environmental and environmental impact programs, as well as forms the knowledge of the environmental strategy of the development of society, management of natural resources and nature protection. The main objective of the ecological management is implementation of legislation, control over compliance with environmental safety requirements, ensuring implementation of effective comprehensive measures for the rational use of natural resources and achievement of coherence of actions of state public bodies in the field of environmental protection. The function of ecological management is a type of activity due to necessity of division of labor and specialization in the field of management in order to solve effectively a complex of environmental problems (Dudnikova I., 2014).

The importance of ecological management at enterprises is also spoken by prominent foreign scientists Dankevych Y., Dankevych, Chaikin O. (2016), Allan C., Stankey G.H. (2009) and others. Consequently, the analysis of references on this issue indicates the relevance of the research topic not only in Ukraine but also abroad.

## **2 Data and Methods**

The theoretical and methodological basis of research is modern economic theory, systematic approach to the study of economic and environmental aspects of agricultural development, scientific works of domestic and foreign scientists on sustainable development of agriculture and ecological management.

In the process of research, general scientific and economic methods were used: monographic method; calculation-constructive method; methods of analysis and

synthesis, induction and deduction for the theoretical deepening of representations about environmental factors of agrarian enterprises. In addition, methods used in this work are historical, analytical methods: tabular and graphical (for presentation of calculations and results), comparative analysis, SWOT-analysis, etc.

Materials of State Statistics Committee of Ukraine and personal studies of the authors became the information base of the research.

### **3 Results and Discussion**

Agriculture is one of priority directions of the Ukrainian economy development due to its strong natural resource potential, presence of fertile soils, the traditional ability of the population to work on land, material and technical means, as well as the growing demand for food in Ukraine and in the world. Thus, according to the official data of State Statistics Service of Ukraine, the share of agricultural production in the structure of GDP increased from 8.4% in 2010 to 13.7% in 2016. By the cost of GDP, agriculture occupies the fourth place among all branches of the national economy. More than 17% of the economically active population is involved in agricultural production and the rural population of Ukraine is 59%.

Excessive agricultural development of territories, intensification of production accompanied by an increase in anthropogenic impact on land resources and transformational processes in the agrarian sector caused negative phenomena in the development of this sector: land degradation, soil fertility reduction, environmental pollution and decline in land productivity.

The lack of sustainable land use in Ukraine has led to excessive-exploitation of lands. In Ukraine, about 72% of land resources are utilized with the allowable norm of 60-65% of the total area and cultivation reaches 58% at the tolerable rate of 40%. For comparison, in the developed European countries, this figure does not exceed 32% (Marushevsky, 2006). According to the National Report on the state of the natural environment in Ukraine (2015), in Ukraine, the area of eroded lands is 11.3 million hectares; the total area of wetlands, swamped, waterlogged, saline and acid lands is 13.4 million hectares, including the area of swamps of 1.17 million hectares; underwater and swamped areas is 3.408 million hectares; waterlogged agricultural lands is 320 thousand hectares; saline and solonetzic soils is 4.0 million ha. About 20% of the Ukrainian lands are in unsatisfactory state as a result of oversaturation of soils by toxic compounds,

Table 1 analyzes ecological destructive effects of agriculture on the environment. All activities, carried out as agricultural production, affect soil, water, air and biodiversity.

**Table 1 Ecological destructive impact of the Ukrainian agriculture on the natural environment**

	Soil	Water	Air	Biodiversity
<b>Excessive use of fertilizers and plant protection products</b>	+	+	+	+
<b>Intensive mechanization</b>	+			+
<b>Monoculture farming in plant growing</b>	+		+	+
<b>Incorrect irrigation and reclamation work</b>	+	+		
<b>Violation of production technologies</b>	+	+		
<b>Improper use of waste</b>	+	+	+	
<b>Excessive tillage, reduction of forest cover</b>	+			+
<b>Underdeveloped technical infrastructure</b>	+	+	+	
<b>Lack of information and knowledge about environmental problems</b>	+	+	+	+

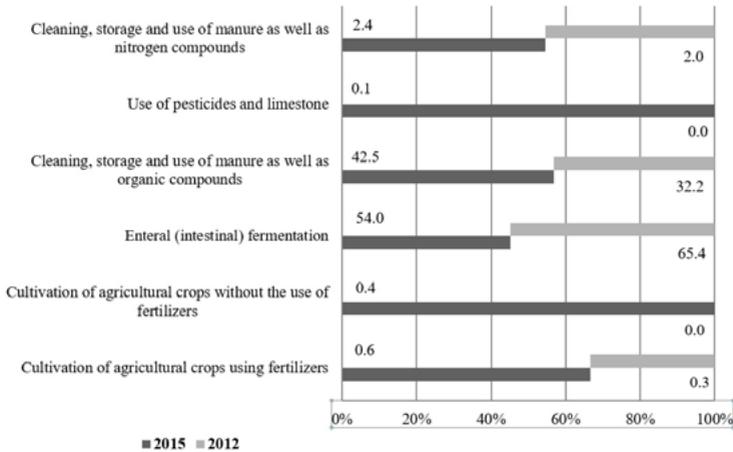
*Source:* Own processing.

The consequence of predatory land use is the tendency to lose humus in the soil. According to Datsko L. (2016), according to the materials of agrochemical certification of agricultural lands conducted by branches of Institute of Soil Conservation of Ukraine, it is determined that every 5 years the Ukrainian soils lose 0.05% of humus on average. In the monetary equivalent of twenty years it amounted to about 450 billion UAH. It is necessary to apply about 8-10 tons of organic fertilizers annually per hectare of sown area to maintain the proper balance of humus in the soil. Every year the soil loses 400-500 kg of organic matter per hectare and, unfortunately, it does not fill up these losses. It is required 100 years to reproduce 1% of humus.

An important component of sustainable agriculture is the transition to a low-carbon production model (Gaiducky I., 2016). Agriculture is a significant source of greenhouse gas emissions. Intensification of the branch and implementation of new technologies contribute to their growth. At the same time, main sources of greenhouse gases are methane (CH<sub>4</sub>) and nitrous oxide (N<sub>2</sub>O), which, respectively, have 21 and 310 times greater potential for global warming than CO<sub>2</sub>

(Norse D., 2011). Figure 1 depicts the structure of pollutant emissions in the context of technological and production processes in agriculture in Ukraine: live-stock production requiring extra costs for its utilization is the main industry that causes carbon dioxide emissions.

Figure 1 **Structure of emissions of pollutants in the context of technological and production processes in agriculture of Ukraine, %**



Source: Own processing, based on data <http://www.ukrstat.gov.ua>.

The above data confirm the thesis of a significant negative impact of the Ukrainian agriculture on the natural environment. To overcome the current situation, according to Prokopenko K (2017), the development of agricultural systems with increased soil protection and moisture-saving qualities, use of resource saving technologies and mechanisms; carrying out measures to preserve the soil fertility, protection from processes of water and wind erosion, salinization, solonization, flooding and other degradation processes; development and implementation of integrated plant protection systems from pests, weeds, frosts, drywall, etc.; development and implementation of energy, water and resource-saving technologies for integrated land reclamation, restoration and expansion of irrigation in accordance with projected climate change, etc. are needed. And this requires the formation of an effective system of ecological management in agricultural enterprises of Ukraine.

It should be noted that in Ukraine the introduction of environmental management in agrarian enterprises is not mandatory. It is arbitrary and is not supported by the state. In economically developed countries, environmental management

is used through the use of international standards ISO 14000 (environmental management systems), ISO 9000 (quality management systems), OHSAS 18001 (occupational safety and health management systems) or through their combination depending on the policy of the enterprise. However, there are also voluntary systems of environmental management which are respected in activities of the enterprise. There is Clean Product Production Program, Net Business Program, Eco-Management and Audit Scheme or EMAS, Product Life Theory and others.

The peculiarity of environmental management is consideration and combination of two contradictions in its activity: providing the enterprise with maximum profit and reducing negative impact on the environment through the rational use of nature and greening production. Environmental management is an integral part of the overall management of the enterprise which includes organizational structure, planning, procedures, processes and resources for implementation and operational management in terms of solving environmental problems. That is, environmental management at the enterprise can be defined as a process of planning, organization, motivation and control which leads to the decrease in the negative impact of the organization on the environment.

Within the framework of environmental management in agricultural enterprises the following activities can be carried out:

- Rational use of natural resources in order to reduce their consumption;
- Reuse of waste;
- Replacement of technologies harmful to the environment on environmentally safe technologies;
- Policy of producing environmentally friendly agricultural products and services;
- Prevention of pollution and harm minimization to the environment;
- Formation of environmental awareness;
- Introduction of pro-environmental education, etc.

Principles of environmental management in agriculture meet ICC principles. The International Chamber of Commerce (ICC) is a non-governmental organization serving world business. Its membership extends to more than 130 countries and includes thousands of business organizations and enterprises with international interests. In response to the World Commission on Environment and Development report, ICC developed a “Business Charter for Sustainable Development” which sets out 16 principles for environmental management (Figure 2).

The Charter covers environmentally relevant aspects of health, safety and product stewardship. Its objective is ‘that the widest range of enterprises commit themselves to improving their environmental performance in accordance with

the principles, to having in place management practices to effect such improvement, to measuring their progress, and to reporting this progress as appropriate, internally and externally’.

**Figure 2 16 principles for environmental management**

1. Corporate priority	16. Compliance and reporting	15. Openness to concerns	14. Contributing to the common effort
2. Integrated management	16 PRINCIPLES FOR ENVIRONMENTAL MANAGEMENT		13. Transfer of technology
3. Process of improvement			12. Emergency preparedness
4. Employee education			11. Contractors and suppliers
5. Prior assessment			10. Precautionary approach
6. Products and services	7. Customer advice	8. Facilities and operations	9. Research

*Source:* Own processing by ICC site data Business Charter for Sustainable Development, <https://www.iisd.org/business/tools/principles>.

Environmental management forms basic principles for solving environmental problems at the enterprise. Leszczyńska A. (2011) distinguishes the following activities for environmental management:

- Determining impact on the environment in separate production processes, as well as analysis of the possibility of their processing;
- Development of an environmental program that describes goals and activities of the enterprise on environmental aspects in the medium term;
- Improvement of operational control over the needs of the environment;
- Taking measures to prevent accidents and minimize their consequences;
- Saving material and energy balances to minimize energy and material consumption;
- Monitoring the influence of produced products on the environment;
- Adhering to the principle of Best Available Techniques in planning of new investments;
- Continuous improvement of employee qualifications and environmental awareness.

Stages and sequence of implementation of measures for the establishment of the environmental management system in Ukraine depend on the degree of maturity

of the legislative-normative and organizational-economic base, as well as the level of development of the ecological outlook of the society. Existing practice outside Ukraine shows that the development of ecological management in its formation passes 3 stages:

1. Implementation of the local tactics of “extinguishing fires” that is, the company’s management mentions environment only in the case of emergency situations that threaten serious economic consequences.
2. Development of the environmental monitoring system at the enterprise in order to comply with generally accepted environmental norms and rules.
3. Development of a general corporate strategy with defining values of environmental factors. At the same time, the company seeks to achieve it at the expense of the advantage over competitors, mainly by exceeding environmental standards and norms.

Based on the above-mentioned strategies, environmental management in Ukraine is only at the first stage of its formation but the output of agriculture from the crisis and further development of enterprises, respectively, will have a positive impact on the development of the environmental management system. Today, the determining factor of the formation and development of the current system of environmental management in Ukraine is the formation of legislative and normative foundations of the balanced environmental policy of the state. All environmental aspects should be included in the overall planning and decision-making process to develop an effective environmental management strategy at the enterprise. Therefore, before the formation of a corporate and functional environmental strategy it is expedient to conduct an analysis of the influence of internal (strengths and weaknesses of the enterprise) and external (political, economic, social and technological) strategic factors. Among various methods of analysis, SWOT analysis is a systematic study and assessment of the potential that an enterprise has to implement its environmental mission and achieve objectives of the given mission (Andreeva, N., Martyniuk, O., 2013). Table 2 presents the results of SWOT analysis of ecologization processes and formation of the environmental policy at agricultural enterprises in Ukraine.

**Table 2 SWOT analysis of ecologization processes in agricultural enterprises of Ukraine**

Strengths	Weaknesses
Food and environmental security of the country; Powerful human capital assets; Favorable climatic conditions for agrarian production; Application of international standards; Presence of environmental policy; Environmental products and technologies; Prestige of the “green image”; Readiness of producers to certain restrictions; Control of resource consumption.	Excessive plowing up; Environmental pollution; Inappropriate use of natural resources; Low productivity of production; Presence of the “image of the polluter”; Development and modification of the environmental management program; Document management of the environmental management system; Evaluating the effectiveness of the environmental management system; Environmental reports and management control.
Opportunities	Threats
Access to new markets (including international ones); Production of environmentally friendly products; Advancement of the latest technologies; Formation of “the green image”; Environmental innovations and investments; Interaction between consumers and suppliers; Environmental audit; Improvement of the ecological state of the environment; Improving public health.	Need for investment due to the strengthening of environmental standards; Environmental activities of competitors; Impossibility of using some technologies; Outflow of skilled workers; Increase in production costs; Rising prices for manufactured products; Changes in legislation; Possibilities of profit reduction in the initial stages.

Source: Own processing.

Thus, the analysis shows that there are significant opportunities for ecologization of agricultural production in Ukraine through the development of the environmental management system. It will promote the development of agriculture on the basis of sustainable development.

## 4 Conclusions

In today’s economic environment, the issue of implementing environmental management in agricultural enterprises in Ukraine is extremely relevant, a requirement of time and a prerequisite for the transition to the concept of

sustainable development. The ill-conceived intensification of agricultural production in Ukraine has led to significant negative environmental impacts on the natural environment. They include excessive plowing of agricultural lands, their degradation and pollution; pollution of water resources and atmosphere; accumulation of waste, etc.

A prerequisite for overcoming environmental problems in agriculture is the development and efficient functioning of the environmental management system. It is a set of measures that include management of resources, production processes and products aimed at reducing negative effects of agricultural production on the environment and increasing the ecological and economic efficiency of its activities.

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