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Poltava State Agrarian University

**SECURITY MANAGEMENT OF THE XXI
CENTURY: NATIONAL AND GEOPOLITICAL
ASPECTS. ISSUE 3**

Collective monograph

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ENVIRONMENTAL SECURITY - A KEY TO SUSTAINABLE ECONOMIC AND ENVIRONMENTAL DEVELOPMENT OF UKRAINE

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One of the major contemporary issues is the preservation of habitat quality under the conditions of high anthropogenic impact on ecological systems. The quality of land depends on the quality of agricultural products

that directly affect human condition and health. Therefore, issues of land use greening and food security in Ukraine are closely connected and need further research and improvement.

The maximum possible satisfaction of consumer needs makes producers look for new technologies in the production and sale of products. However, recently there have been some contradictions as the natural capacities and resource potential of the planet are limited and cannot always be self-restoring. Soil degradation, desertification, ozone depletion, unpredictable climate change, and natural disasters are convincing evidence of the imbalance in the natural system.

Ecological safety is the environmental condition, which secures the prevention of deterioration of the ecological situation and the occurrence of hazard to human health, i.e. ensuring the ecological balance on Earth by implementing a set of appropriate measures.

According to the famous researcher in the field of ecology V. F. Reimers, environmental safety should be based on certain principles [1]. They are as follows: 1) awareness that humanity, as an integral part of nature, is entirely dependent on the environment; 2) recognition of the limitation and exhaustibility of the natural resource (ecological) potential of the land and individual regions, the need for its qualitative and quantitative inventory; 3) the unacceptability of artificial expansion of natural resource (ecological) potential beyond natural systemic constraints; 4) assessment of the admissible maximum of extraction of natural resources and change of ecosystems as a habitat; 5) the need to develop preventive environmental bans in advance of the economic depletion of natural resources or their indirect destruction; 6) the obligation to create a social and economic mechanism of homeostasis in the system of “man – nature”; 7) urgent and mandatory need to regulate the number of people, reduce their pressure on the environment at the local, regional and global levels; 8) acceptability of merely “environmentally friendly” technologies and equipment in all sectors of the economy; 9) the transition to resource-economic technologies and miniaturization of products to the business practices safe for nature and people; 10) recognition of the law of optimality and in management – the principle of reasonable sufficiency in the use of methods of obtaining life benefits in spatial and temporal specific limits (restrictions on environmental, social, and economic risk factors); 11) understanding that without an adequate living environment (ecosystem integrity) it is impossible to preserve and develop living things, including its species (humans, in particular) and natural systems of a lower level of hierarchy.

It is worth noting that in Ukraine there are many non-governmental organizations on environmental protection. Thus, the first NGO, which was established in 1946, is the Ukrainian Society for Nature Protection

(UkrSNP). Until the mid-1960s, UkrSNP was the only voice of the environment in the decision-making projects of public administration; concurrently, UkrSNP sought to introduce a comprehensive environmental and economic approach to economic management and to form the Ministry of Ecology in the structure of the USSR Government. Moreover, in 1967, due to this organization, the Government of the Ukrainian SSR created the State Environmental Committee, as a central authority. This happened three years before the establishment of the US Environmental Protection Agency and 21 years before the establishment of similar government agencies in Moscow. Today the main goals of the Ukrainian Society for Nature Protection are [2] 1) to promote the formation of civil eco-society, the rule of environmental law; to initiate, organize and participate in the implementation of practical environmental actions and measures, promoting the greening of all spheres of life in the context of Ukraine's national security; 2) to provide civil support of Ukraine's environmental policy, assistance in improving the legislative and regulatory framework, to accelerate the process of harmonization of Ukraine's environmental legislation with the requirements of international standards, in particular, with the EU standards; 3) to implement educational activities among the population to promote public environmental awareness, to introduce a system of professional environmental training of civil servants, managers and officials who make responsible decisions at the local, regional, and state levels; 4) to provide public control over the observance of constitutional and legal guarantees of environmental rights of Ukrainian citizens, to assist in preventing ecological offenses, to implement independent civil control, ecological expertise, and audit in the field of environmental protection; 5) to conduct scientific research and promote Ukraine's transition to the principles of sustainable development.

Besides, the All-Ukrainian Ecological League has been operating for 18 years in a row. Its activities are aimed at forming a developed civil society as a major factor in balanced development and a feature of a democratic state. This organization is initiating the creation of the National Platform of "Sustainable Development Goals for Ukraine" to unite the efforts of government officials, local authorities, businesses, scientists, and the public to ensure economic development and social protection taking into account the opportunities and the needs of the natural environment.

In our opinion, the food security of our country depends on the following factors: the level of the agricultural sector development and the production of organic products; environmental protection; rational use of natural resources; ensuring the environmental security of human life and activity; food industry development; the level of export-import operations; the level of purchasing power and culture of the population; opportunities to use

innovative technologies; financial capabilities of enterprises; logistics and investment attractiveness of agricultural enterprises; state support, granting benefits to agribusiness enterprises, and efficient fiscal policy.

One of the main components of food security is economic and physical affordability. The affordability of food is implemented through the purchasing capacity, taking into account the purchasing power, price, and availability in the appropriate quantity and quality.

The indicator of the consumption of basic food products per capita is largely integral. It characterizes at the same time different aspects of food security together: food availability in the domestic market, as well as its economic and physical affordability (Table 1).

Table 1
Dynamics of annual food consumption per capita, kg / year

Indicators	2017	2018	2019	2019 in % to 2017
Meat and meat products	51,7	52,8	53,8	104,1
Milk and dairy products	200,0	197,7	201,7	100,9
Eggs, pcs	273	275	279	102,2
Fish and fish products	10,8	11,8	12,5	115,7
Sugar	30,4	29,8	28,5	93,7
Vegetable oil	11,7	11,9	11,2	95,7
Potatoes	143,4	139,4	135,6	94,5
Vegetables and melons food crops	159,7	163,9	167,5	104,8
Fruits, berries, and grapes	52,8	57,8	59,2	112,1
Bread products	100,8	99,5	97,2	96,4

Source: Compiled by the authors according to [3]

Consumption trends of basic food products per capita in 2017-2019 are as follows: consumption of meat and meat products increased by 4.1%; milk and dairy products by 0.8%; eggs by 2.2 %; fish by 15.7%; vegetables by 4.8%; fruits, berries, and grapes by 12.1%. Consumption of vegetable oil decreased by 4.3%; potatoes by 5.5%; bread products by 3.6%.

Recent research has indicated that there are many low-quality goods in the consumer market. The main reasons for the poor quality of food sold to the population are weak material and technical base and insufficient equipment of many enterprises of the food industry and trade; low level of sanitary and industrial culture; use of low-quality raw materials and components; a sharp decrease in production and industry control due to the dissolution of

economic management bodies in the laboratory service, as well as the desire of manufacturers to reduce the cost of product quality control. Preventive actions to combat substandard products should be applied at the state level, as food and food safety are among the main factors determining the health of the population of Ukraine and the preservation of its gene pool. Such factors include the introduction of modern operational methods of control, NAACP system (Food Safety Management Quality System) at all enterprises; creation of bodies of independent examination to allow the identification of goods whenever the buyer of the goods doubt about its range and quality; strengthening the sanction for food counterfeiting (introduce fines that would exceed the cost of a batch of counterfeit products at least twice); decertification of counterfeiters in case of repeated abuses.

According to the European Regional Office of the World Health Organization, the current state of health of the Ukrainian population is characterized by extremely high morbidity and mortality, low life expectancy. Failure to ensure rational consumption of basic foodstuffs and their unbalanced content of micro and macro elements is the main cause of human mortality. According to the Population Division of the United Nations Department of Economic and Social Affairs, the average life expectancy in the world has increased from 65 years in 1990-1995 to 70 years in 2010-2019 (Table 2).

Table 2

Average life expectancy in some countries, years

Country	The average life expectancy of the population	Including	
		women	men
Ukraine	68,6	74,8	62,8
Russia	66,3	73,2	59,8
China	74,7	76,9	72,7
the USA	78,4	80,9	75,9
India	66,8	68	65,8
Japan	82,3	85,7	79

Data in Table 2 show that the highest life expectancy is in Japan – 82.3 years, and the lowest is in Russia and India – 66.3 and 66.8 years, respectively. In Ukraine, this figure is 68.6 years, which is lower than the average, which reaches almost 71 years. In all countries without exception, the life expectancy of men is lower than that of women.

The current population in Ukraine, as of December 1, 2020, was 41,629.9 thousand people. Compared to January-November 2019, the volume of

natural decrease increased by 33.3 thousand people. A significant excess of the number of deaths over live births characterized natural population movement in January-November 2020: 49 live births per 100 deaths [3].

Income is an indicator of the economic affordability of food. In January-December 2020, the size of the average monthly nominal salary of full-time employees of enterprises, institutions, and organizations (with 10 or more employees) was up to UAH 11,591 and compared to the corresponding period of 2019, increased by 10.4%. The average salary in all regions was higher than the minimum; however, only in four of them, it exceeded the average level in Ukraine: Kyiv – 17,086 UAH, Donetsk region – 12,647 UAH, Kyiv region – 11,887 UAH, Dnipropetrovsk region – 11,681 UAH. The lowest level of nominal wages, which did not exceed 81% of the average in the economy, was observed in Chernivtsi, Volyn, Chernihiv, Kherson, and Ternopil regions. The index of real wages in January-December 2020 compared to the corresponding period of 2019 was 107.4% [3].

Recently, due to rising food prices, the population has become more prudent in shopping. The consumer price index (inflation index) in 2020 was 105.0% (in 2019 – 104.1%) as a whole. Food and non-alcoholic beverages went up by 4.9%. Prices for sugar, eggs, grain products, and sunflower oil increased the most (by 47.7-21.7%). Fruit, bread, beef, pasta, rice, milk and dairy products, fish and fish products, butter, and soft drinks were 12.9-2.0% more expensive. At the same time, vegetable prices decreased by 12.1%. Poultry meat fell in price by 4.8% and pork by 1.7%. According to statistics, the main item of household consumption expenditure in 2020 is food, which share was 51.6% with a 60 percent threshold. For comparison, food expenditures in EU households do not exceed 12% of total consumer expenditures, and the main expenditure item is housing and energy expenditures accounting for almost a quarter of such expenditures.

As already mentioned, land resources are a key factor in ensuring food security. Ukraine has unique opportunities: of the 60 million hectares of the state territory, more than 70% are agricultural lands. Therefore, in our country, it is necessary to create all conditions for the land potential to be used more efficiently to ensure the food security of the state. In terms of the black soil area (28 million hectares), our country ranks fourth in the world after Russia, the United States, and China. The world now needs an increase in food, and Ukraine can provide the biggest growth. According to various estimates, we have the potential to feed more than 600 million people. Thus, according to the World Bank, in Ukraine, the level of labor productivity in the economy is 5 times lower than in EU countries. Comparing the average value added per worker in agriculture in the EU and Ukraine, it found that in Ukraine, it is 6 times less; we are 20 times behind France. This has a significant impact on the food security index [4]. In the Global Food

Security Index (GFSI), Ukraine ranks 76th out of 113 countries. The index is a dynamic quantitative and qualitative model of benchmarking, built on 34 unique indicators that measure the driving forces of food security in developing, as well as in developed countries.

Support for the appropriate level of food self-sufficiency, which is the stable provision of food security in Ukraine, involves the use of state support for domestic agricultural producers and the implementation of measures to control imported products to protect domestic producers from foreign competition. According to P. Sabluk and Yu. Luzan, “non-compliance with the requirements of the legislation on the state support of agricultural producers through direct expenditures from the state budget and significant reduction of their volumes under certain programs, contribute to the development of subsectors of the agricultural sector, which led to a deterioration in the structure of food production” [5].

In 2020, according to the State Statistics Service of Ukraine, the volume of agricultural products at actual prices, according to estimates, amounted to 885,627 million UAH. The crop production index compared to 2019 is 86.1%, including at enterprises – 83.5%, households – 92.2%. In the livestock industry, the index of production in 2020 compared to 2019 – 97.4%, including at enterprises – 99.1%, households – 95.5% [3]. Under such conditions, regarding the production of agricultural products and the provision of food for the population of Ukraine, it is necessary to consider the constant growth of the share of agricultural products in the structure of exports. In particular, according to the Ministry of Economic Development, Trade, and Agriculture of Ukraine, in 2019, the share of agricultural products in the structure of exports was 44.2%. In January 2020, agricultural products worth \$ 1.98 billion were exported to foreign markets, which is 14% more than in the same period of 2019 [6].

Issues of environmental development are still relevant for all countries around the world, and Ukraine is no exception. Our country is affected by the ecological crisis, which is caused primarily by excessive atmospheric pollution, disruption of relationships in ecosystems, and irrational use of land resources.

A purely operational approach and environmentally destructive economic activity have led to the disruption, as well as to the destruction of natural landscapes. In 2017, Ukraine took first place in the ranking of plowed countries with 33.5 million hectares (56.1% of arable land from the total area of the state) of arable land. The second and third places are occupied by Moldova (53.7%) and Poland (35.7%), respectively [7]. An alarming consequence of the high degree of plowing of soils in the country is their degradation, water and wind erosion, and reduced land resource productivity.

Based on various scientific sources, we have generalized the parameters of degradation processes in arable soil of Ukraine: –dehumidification with an intensity of 0.5-1.5 t / ha annually with a sign of reducing losses until the end of the 1980s. Since 2005, the intensity of dehumidification is 0.42 - 0.51 t / ha each year; – increase in the deficit of the mobile nutrients ratio, in particular, nitrogen and potassium (respectively, 41.5-56.4 kg / ha in 2001 and 32.9-64.2 in 2018); – increase in the acidity of black soil, most noticeable in Cherkasy and Sumy regions ($\Delta\text{pH} = 0,3 - 0,5$); – overconsolidation, which is foremost noticeable in the Western Forest Steppe and is generally common in 40% of arable land, destruction of the structure, the formation of boulders and crusts; – decrease in the capacity of the upper layer of soil due to the spread of erosion processes, which extends by several centimeters in black and drained soil of Polissya; – secondary salinization and salinization of irrigated soils, operation of peatlands.

Assessment of ecological stability of the territory within the regions of Ukraine by calculating the coefficient of ecological stability (C ec.st.) is given in Table 3. The score of anthropogenic load (S a. l.) characterizes the degree of human impact on the environment, including land resources.

According to the scientific methodology of the Institute of Land Management of UAAS, if the coefficient of ecological stability is less than 0.33 – the territory is environmentally unstable; from 0.34 to 0.50 – refers to the stable unsteady; from 0.51 to 0.66 – is within the limits of average stability; if it exceeds 0.67 – the territory is environmentally stable. If the anthropogenic load score is 5 points it is a high degree of anthropogenic load (industrial land, transport, settlements); 4 points – significant (arable land, perennials); 3 points – average (natural forage lands, tinned beams); 2 points – insignificant (forest belts, shrubs, forests, swamps, underwater); 1 point – low (micro natural reserves).

Thus, within the regions of the country, the coefficient of environmental stability ranges from 0.71 in the Zakarpattya region to 0.27 in the Zaporizhzhia and Kirovohrad regions.

Table 3

Characteristics of the environmental condition in the regions of Ukraine as of 2019

Regions	C ec.st.	Environmental stability of the territory	S a. l.	The level of anthropogenic load
Vinnitsia	0,33	unstable	4	significant
Volyn	0,57	average	3	average
Dnipropetrovsk	0,28	unstable	4	significant

Donetsk	0,29	unstable	4	significant
Zhytomyr	0,55	average	3	average
Zakarpattya	0,71	stable	3	average
Zaporizhzhya	0,27	unstable	4	significant
Ivano-Frankivsk	0,62	average	3	average
Kyiv	0,43	average	3	average
Kirovohrad	0,27	unstable	4	significant
Luhansk	0,41	unsteady	3	average
Lviv	0,53	average	3	average
Mykolayiv	0,28	unstable	4	significant
Odesa	0,31	unstable	4	significant
Poltava	0,33	unstable	4	significant
Rivne	0,60	stable	3	average
Sumy	0,42	unsteady	3	average
Ternopil	0,34	unsteady	4	significant
Kharkiv	0,34	unsteady	4	significant
Kherson	0,34	unsteady	3	average
Khmelnysky	0,35	unsteady	4	significant
Cherkasy	0,36	unsteady	3	average
Chernivtsi	0,51	average	3	average
Chernihiv	0,47	unsteady	3	average

Source: according to data [8]

Moreover, only one region is environmentally stable (Zakarpattya region) and 6 are within the limits of average stability (Volyn, Zhytomyr, Ivano-Frankivsk, Lviv, Rivne, Chernivtsi). All other areas of the region are stable unsteady and environmentally unstable. In general, in Ukraine, the anthropogenic load is 3 and 4 points and is characterized by an average and significant degree of load.

Soil and its condition are the main and most powerful components of the environment in terms of territory. Adverse anthropogenic evolution of soil is a legitimate concern of agricultural producers. Arable soil is in an unsteady condition.

It is well known that the supply of nutrients to the soil is ensured by the application of fertilizers. Organic fertilizers remain the most important resource for soil humus reproduction. According to the research, land resources are provided with mineral fertilizers by 48% and organic – 5%

of need. When such an insufficient amount of fertilizers is applied, there is a lack of humus and nutrients in the soils of Ukraine, i.e. the removal of nutrients must be replenished by returning them to the soil. According to the latest agrochemical survey of soil, there is almost no soil with a high humus content in Ukraine, and if in 1990 there were 36.9%, today – only 3%.

Regarding this situation, a very important conclusion should be drawn: along with changes in soil characteristics, agricultural technologies must also change. Moreover, the soil-preserving aspect of the latter should prevail over the negative results of anthropogenic soil change. The soil protection orientation should dominate in the methods of their cultivation [9, p. 16].

Thus, soil with rather unsatisfactory properties (degraded and infertile) in the land structure of our state occupies a large area. According to the Institute of Land Management, the area of such soil exceeds 6.5 million hectares, i.e. – 20%. According to other scientific institutions (“Sokolovsky Institute of Soil Science and Agrochemistry” NSC, “Institute of Agriculture” NSC), the area of soil that has undergone degradation processes and infertile soil reached about 10 million hectares. As a result, every year, losses from the use of such lands in Ukraine as a whole reach about 400 million UAH [9, p. 15]. Therefore, there is an urgent need to take effective measures to protect and restore the natural environment, soils foremost. Long disregard of these issues will lead to a situation in which reforms will prove ineffective and futile. After all, a country that does not care about its safe environment and the activities of the economic complex has no future.

The production of organic products, which strictly limits the use of artificial chemically synthesized fertilizers and pesticides, is one of the promising areas of ensuring the production of environmentally friendly products. The use of antibiotics and growth stimulants is prohibited in livestock husbandry. Among the methods of organic agriculture, a special place is given to crop rotations that restore and preserve soil fertility. Crop rotation is also a natural system of plant protection against pests. The cultivation of genetically modified crops is strictly prohibited. Certification authorities constantly ensure that animals are kept on a large territory sufficient for the free movement to meet high standards of welfare.

Today, Ukraine has a significant potential for the production of organic agricultural products, their export, and consumption in the domestic market. Some results have already been achieved in the development of domestic organic production. In recent years, with a steady positive dynamics of growth of agricultural land, which is certified organic production, there is sustainable growth in the number of operators of the organic market, as well as the level of consumption of organic products in Ukraine. Official statistical reviews of IFOAM confirm that in 2002, in Ukraine, there were 31 farms with the status of “organic”. In 2019, there were 617 operators of

the organic market, of which 470 – agricultural producers. The total area of agricultural land with organic status and the transition period amounted to about 468 thousand hectares (1.1% of the total agricultural land area of Ukraine) [10]. According to the area of agricultural land used for growing organic products, Ukraine ranks 20th in the world among more than a hundred countries, ahead of such leaders of the organic movement as Hungary, Denmark, the Netherlands, Sweden, and Switzerland.

The domestic consumer market of organic products in Ukraine continues to expand through the main supermarket chains. The main types of organic products produced in Ukraine are cereals, milk and dairy products, cereals, meat and meat products, fruits and vegetables (Table 4).

Table 4

Volumes of the consumer market of organic products in Ukraine, 2004-2019

Year	2004	2009	2012	2015	2016	2017	2018	2019
mln. Euro	0,1	1,2	7,9	17,5	21,2	29,4	33,0	36,0

Ukrainian organic products are bought by EU countries most of all. In 2019, Ukraine ranked 2-nd out of 123 countries in terms of imports of organic products to the EU, rising two places compared to the previous year. Thus, in 2019, 3.24 million tons of organic agri-food products were imported into the EU, more than 10% of which are Ukrainian. At the same time, Ukrainian imports to the EU increased by 27% – from 265.8 thousand tons in 2018 to 337.9 thousand tons in 2019 [11]. Currently, imported Ukrainian organic products are certified quite successfully by foreign entities that use a versatile evaluation system.

Environmental responsibility in the field of agricultural land use plays an important part in the food security of the country, as the problem of providing quality food is critical for the population. The estimated loss from food contamination in Ukraine is more than 6 billion dollars per year. From time to time, there are scandals in the world with newly discovered substances that are hazardous to health, and the emergence of new forms of infections questions the possibility of sustainable development of society. This situation can lead to the fact that increasing the level of consumption of agricultural products (above all – food) can reduce the quality of life in general. Furthermore, this is primarily a decrease in the health of the population, which leads to a loss of human capital [12].

Thus, affecting the environment, environmental safety also affects humans. In this context, the quality of air, water, land, as well as the quality of food, which is usually suitable for life and quality, is important.

Resolving the issue of food security and the production of environmentally

friendly and useful products requires strict control by the state in terms of the natural environment condition, as well as the production of quality food. The state must also take care of the affordability of these environmentally friendly and high-quality food products for the population, as a healthy nation is a strong country.

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