

ESTIMATION OF UKRAINE'S LAND RESOURCE BY THE EROSION PROCESSES DYNAMICS

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Received 25 10 2019; Accepted 19 03 2020

Soils are considered as the main and most powerful in the territorial plane component of the environment. In agriculture, productivity largely depends on the soil condition. Due to excessive tillage, deficit balance of humus and nutrients, lack of organic matter and mineral fertilizers, chemical meliorants, pollution, soil Ukraine under current conditions continues to degrade. The problem protection of land, the struggle against degradation now rose to the level of major, global. To protect land measures in regions of Ukraine is very actual in our time. The analysis of changes in the state of Ukraine land resources for recent years, estimation the processes of droughts and desertification, that generate water and wind erosion, which causes degradation of soil fertility and reduces the productivity of agroecosystems. For determining the sources of the negative processes of water and wind erosion, used comparisons and analysis of statistical data for recent years by choosing the main agrosystem parameters. In the article used a structural analysis, based on the dynamics of the distribution of Ukraine land resources for the estimation of economic use by using the coefficients of economic stability and anthropogenic load. Factors, that deterioration of land quality, and hence increase their degradation, are excessive moisturizing, waterlogging, salinity, acidification, deflation, water erosion, and alkalization. To prevention the process of soil degradation and economic losses, to improving the environment, it is necessary to realize the complex measures of ecologization of agriculture.

Keywords: agricultural land, agroecosystems productivity, soils, sustainable management, water erosion, well-being.

JEL Codes: Q15.

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1. Introduction

Halt and reverse land degradation is key component of goal 15 'Life on Land' within the framework of Sustainable Development Goals (UNCCD, 2016). Being targeted at sustainable use of ecosystems, measures to protect land become ubiquitous background of other managerial decisions connected with natural and human resources use.

At the same time, land degradation has dangerous consequences, which can be measured in global scale near 10% of global GDP as a result of losses market value of agriculture products caused by irresponsible human activity in ecosystem (Sutton, Anderson, Costanza, Kubiszewski, 2016). Thus, land protection and issues of its efficient use have an important role in relations between authorities, business and local communities (Calfucura, 2018). Therefore, the political rank attributed to the problems of the development of farming and rural areas is important, for instance, in the EU policy (Chmielewska, 2016). For countries with lower level of socio-economic development, such as Ukraine, agriculture sustainable management based on land protection remains essential scientific task and unsolved practical problem.

The high degree of land development in agriculture and related intense use of chemicals, which is typical for Europe, are not conducive to renewable soil processes. A land resource consists of land with diverse functional use, quality and state legal status. Agricultural development of Ukraine accounted to 70,8 % share in the total arable agricultural land reached 78,3 % (NRSE, 2016; DGK, 2017).

The state of water and land resources and their use in any country remains one of the main actual threats to national security in the environmental sphere (Martynov et al., 2017; Orlov et al., 2016; Safonyk et al., 2018).

The total lands of Ukraine, regardless of their intended purpose, economic use and the features of the legal regime, relate to land resources and constitute the unified land fund of the state (Martin, 2010; Martin et al., 2015).

There is a sustainable transformation of the land fund in recent years. The area of agricultural land is reduced, the anthropogenic load is growing, the quality of the land fund is significantly deteriorating. The area of eroded land increases, soil fertility decreases, and nutrient deficiency grows, which negatively affects agricultural production. Intensive and irrational land use contributes increasing the part of the lands with unsatisfactory properties (degraded and other low productivity soils) (Osipchuk, 2008).

Thus, the purpose of this research is to analyse changes in the state of Ukraine land resources for recent years, in order to esteem the processes of droughts and desertification, generated by water and wind erosion, which causes degradation of soil fertility and reduces the productivity of agroecosystems.

To achieve this aim we determine the sources of the negative processes of water and wind erosion, using methodology of comparative statistical analysis within the main agrosystem parameters. In the article used a structural analysis, based on the dynamics of the distribution of Ukraine land resources for the estimation of economic use by using the coefficients of economic stability and anthropogenic load.

Considering aim of agriculture land zoning, we employ approach to define land using level and their economic purpose, developed in agroecological management (Cegielska et al., 2018; Piquer-Rodríguez et al., 2018), taking into account recommendations of Committee on Environmental Policy of Ukraine (CEP, 2015) and researchers of Institute of Soil Protection (ISP, 2018).

To consider the territorial differences in the natural and economic conditions of Ukraine, we use natural-agricultural zoning based on distribution of natural resources, as well as the peculiarities of their agricultural use (CEP, 2015; ISP, 2018).

Zoning is a kind of base for territorial accounting of natural conditions and resources, quantity, quality status and production capacity of lands in the system of taxonomic units. It is a natural and historical basis for the location of agricultural productions, land evaluation, the development of the plans for land use, schemes and projects of land management, farming systems, agriculture, etc. Natural and agricultural zoning shows needs for priority use of land resources for the aims of agriculture (Martin, 2010; Martin et al., 2015).

Similarly, to other studies in this area (Cegielska et al., 2018; Piquer-Rodríguez et al., 2018; Pomianek, 2014; Sutton, 2016), we use statistical analysis to define patterns of land economic use and soil degradation processes.

In order to esteem the economic utilization of land fund we use the coefficients of economic stability and anthropogenic load.

For our research we use data from State Statistics of Ukraine (data on plowing territory and plowing agricultural lands), Ministry of Ecology and Natural Resources of Ukraine, particularly, its National reports on the state of the environment (data on land degradation and their regional peculiarities),

Institute of Land Management of the UAAS (characteristics of the ecological state of land use and method to evaluate the coefficient of environmental stability as well as anthropogenic loading of the territory).

Belonging to interdisciplinary subjects of study, land degradation is investigated in economics and ecology in complementary dimensions and aims. Particularly, within economic field of study, which, in turn, related to efficiency and productivity of land usage, such directions as sustainable land management and sustainable agro-eko-system development have steep increase in scientific researches. Some works are devoted to land use management emphasised on problem of land protection via perception land as one of the natural capital assets (Cowie, et al., 2018; Kissinger, Rees, 2009; Lu, Xie, 2018). Others mostly explore an approach to define economic and social effects, including possibilities for economic growth on rural areas because of environmental oriented production and services (Shu, Xie, Jiang, Chen, Q., 2018; Zielinska, 2014).

Based on the sustainable development principles as an intersection of economic, environmental and societal aspects, the pillars of such sustainability are created by economic growth, natural sources protection and societal development. One of the known comparable studies – Human development index as a part of Human development report focuses its interest into three aspects of such a development, measured by citizens' health, citizens' literacy and economic well-being. (Stiglitz, 2008) Supposition for growth of at least two of these factors – citizens' health and economic well-being is an adequacy and right use of natural sources, including soil.

To be able to ensure citizens' security, the economic and environmental protection needs to be managed by a risk prevention approaches as a culture of prevention rather than reaction culture represented by a crisis management. (Drennan, McConnecl, Stark, 2015)

Responsible sustainable measures related to ecosystem can sufficiently enhance land productivity. It was well grounded via theoretical and statistical analysis, given in many works (Cowie, et al., 2018; Nie, 2019; Pomianek, I., 2014; Sutton, 2016), including created econometric model described returns, which assumes economically rational land use (Piquer-Rodríguez, et al., 2018).

Undoubtedly, land use as a sphere for economic activity in different forms can essentially change socio-economic relations and tendencies of development of areas. Moreover, land protection measures or actions aiming at land efficiency growth influence population increase or decrease via migration caused by changes in quality of life, employment and well-being in

general. It is proved in a lot of works (Collantes, Kloos, Henry, Mboya, Mor, Metternicht, 2018; Mishchuk Grishnova, 2015; Okpara, Stringer, Akhtar-Schuster, Metternicht, Dallimer, Requier-Desjardins, 2018; Pomianek, 2014; Salvati, Carlucci, 2015; Wang, Chen, Zheng, WDeng, 2018; Xie, Chen, Wang, 2018).

So, to avoid conflicts in economic and environmental protection strategies different measures are suggested, such as land policy restrictions (Kubitza, Krishna, Urban, Alamsyah, Qaim, 2018), “land finance”, based on balanced policy of land transfer revenues (Shu, et al., 2018).

Socio-economic evidences of substantial agroecosystem impact on well-being cannot be enough grounded without analysis of land use outcomes. Considering the fact that modern agriculture is connected with chemical fertilizer use and its negative long-term impact (Brown, Shrestha, 2000; Lu, Xie2018), it demands estimation of all connected processes, which causes degradation of soil fertility and reduces the productivity of agroecosystems. Among them water and wind erosion are the most difficult to manage, however they can significantly change patterns of economic activity and its outcomes.

According to the land purpose, we will study Ukraine lands, which are divided into nine categories by aims of use:

- agricultural land;
- land of residential and public buildings;
- lands of the natural reserve fund and other environmental protection purposes;
- land of wellness purposes;
- recreational land;
- land of historical and cultural proposes;
- forest land;
- land of the water fund;
- land of industry, transport, communications, energy, defence and other purposes (LCU, 1992).

However, the further zoning of agricultural land is needed in order to find the prerequisites of agroecosystem productivity growth.

2. Results

Land in Ukraine, within its borders, is 60354.9 thousand ha, that equal to 0.4 % of the Earth's land and under 6.0 % of the European subcontinent.

According to the State Agency of Land Resources of Ukraine the country's land structurally distributed as follows: a large proportion of land area (70.8 % or 42.76 million ha) – agricultural land, the structure of which agricultural land – 68.8% of them; 53.9 % are on arable land; 9.1 % is pastures; 4.0 % – hayfields; 1.5 % – perennial plantings; 0,4% – fallow. Forests and other wooded areas occupy 17.6 % (10,62 million ha) of the country, built-up land – 4,2 % (2.53 million ha), area covered by surface water – 4.0 %, wetlands – 1.6 %, other – 1.7 % (see Table 1.). The areas of natural reserve fund Ukraine is 2.9 million ha (ISP, 2018).

Therefore, the territory of Ukraine is characterized by extremely high rate of agricultural development (70,8 %), significantly higher than ecologically reasonable limits. Even with the decline in recent years, a rate significantly higher than in the most European countries. Compared with European countries, arable land which is occupied 30-32 % of the total land, plowing Ukrainian lands reaches 53,9 % due to shrinking forests, grasslands and pastures, causing climate change, the level of groundwater, active processes arid and desertification, developing water and wind erosion, resulting in falling soil fertility degradation and reduced productivity of agro-ecosystems and prevents their sustainable development, which is related not only environmental, but also food security (ZVU, 2017; Moshynskiy et al., 2018).

The total area of unproductive and severely degraded lands that require conservation, in Ukraine, is 1,1 mln. ha, including 644 ths. ha – degraded, 435,4 ths. ha – unproductive and 11,9 ths. ha – industrial polluted land. Total area of disturbed land in Ukraine is 144,5 ths. ha. Needs to improve 269,1 ths. ha unproductive lands (NRSE, 2015).

Table 1. Land in Ukraine

Types of basic land and economic activity	Land area	
	Total, ths. ha	% to tha total area
Agricultural land	42756.0	70.8
Including <i>farmland</i>	41536.3	68.8
Including <i>arable land</i>	32518.4	53.9
<i>Fallow</i>	253.5	0.4
<i>Perennial plantings</i>	894.3	1.5
<i>Hayfields</i>	2410.5	4.0
<i>Pastures</i>	5474.5	9.1
Other agricultural land	1219.7	2.0
Forests and other wooded area	10621.4	17.6

Including covered with forest vegetation	10218.0	16.1
Including not covered with forest vegetation	218.2	0.4
Including other forest land	310.0	0.5
<i>Shrubs</i>	403.4	0.7
Built-up land	2535.2	4.2
Including housing	479.7	0.8
<i>Industrial land</i>	222.9	0.4
<i>Land for open development, career, mines and related facilities</i>	153.5	0.3
<i>Commercial and other land use</i>	55.2	0.1
<i>Land for public use</i>	282.1	0.5
<i>Mixed-use land</i>	29.5	0.0
<i>Land used for transport and communications</i>	495.5	0.8
<i>Land used for technical infrastructure</i>	71.3	0.1
<i>Land used for recreation and other open land</i>	745.5	1.2
Open wetlands	980.1	1.6
Dry open land with special vegetation	17.7	0.1
Open land without vegetation or with little vegetation (stony places, sand, gullies, etc.)	1021.5	1.7
Total land	57931.9	96.0
Territory covered by surface water	2423.0	4.0
Total (area)	60354.9	100.0

*Source: (NRSE, 2016; NRSE, 2017).

The dynamics of realization to protect land measures in regions of Ukraine for 1995-2017 years shows a significant annual reduction of these measures, leading to critical consequences such as flooding of agricultural land, water erosion (sweeps, landslides) and has an annual significant losses to the state (ZVU, 2017; MEU, 2017). The main anthropogenic factors affecting land resources are level of agricultural development, especially plowing, erosion and other degradation processes, soil pollution and others. The high level of agriculture land development and the associated intensive chemicalization, which is typical for European countries, do not contribute to recovering processes in soil (ARMA, 2007; Martin et al., 2015).

So, in France and Germany, the part of plowland is about 33%, in Spain and the Netherlands about 24%. Actually, the level of agricultural development of Ukraine in 2017 was 70.8%, the part of the arable land in the total area of agricultural land reached 76.1%. Even with a reducing in recent years, this indicator significantly exceeds most countries of the world (NRSE, 2017; ISP, 2018).

Thus, in comparison with European countries, arable lands of which occupy 18-35% of the total land area in 2016 y. (Fig.1), plowing of Ukrainian lands reaches 53.9% due to the reduction of forest lands, hayfields and pastures, as a result of which the microclimate changes, the level of groundwater changes, develops the processes of aridization and desertification of land, water and wind erosion, which leads to soil fertility reducing, degradation and decreasing of agroecosystems productivity and makes their sustainable development impossible, which connected not only with ecological, but also the country's food security. The number of plowed agricultural land (Martin et al., 2015).

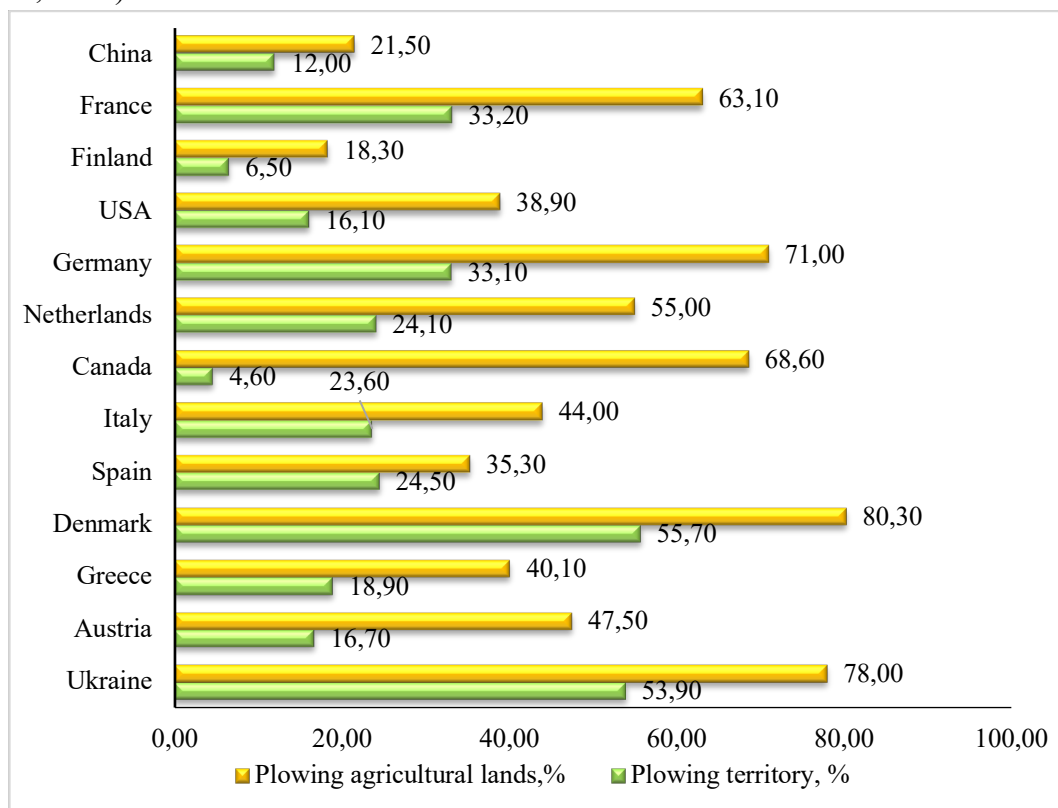


Figure 1. Plowing territory and plowing agricultural lands of the countries of the world, percentage (SSU, 2016)

For ecological optimization of land use Ukraine, as by purpose and by type of land use, needs to be improved land management at the national (intersectoral), regional (territorial) and local levels. However, considering a

large proportion of arable agricultural land use and anthropogenic load condition, especially in industrial areas, in these areas the land resources should be given the most attention in terms of ecologization.

Soils are considered as the main and most powerful in the territorial plane component of the environment. Soil is one of the most important factors ensuring food security and considered not only as the land surface, but also as the basis of life. In agriculture, productivity largely depends on the soil condition. Information on the status of soil fertility Ukraine formed by soil monitoring, the main component of which is currently the inspection of agricultural land held by a State institution “Soil protection institute of Ukraine”. Inspection carried out cyclically, every 5 years (ISP, 2018).

Until 1990 the issue of preserving soil, reproduction and improvement their fertility was a priority and have a real government support. During this period implemented almost the full range of activities aimed at preserving the soil and the amount of their annual increased. In the last twenty years, the situation has changed. Reduced to the minimum measures to radically improve the soil, and some work did not conduct for several years (CCD, 2002).

As a result, there is a steady trend of deterioration of soils quality, reduced inventories humus, content of nutrients, occurs acidification, salinisation, destructuring of soils. Under these conditions creates a real threat of further intensive degradation of soil cover – the main means of agricultural production.

Due to excessive tillage, deficit balance of humus and nutrients, lack of organic matter and mineral fertilizers, chemical meliorants, pollution, soil Ukraine under current conditions continues to degrade (Fig.2) (NRSE, 2011; NRSE, 2012). Dehumification – one of the most dangerous soil degradation processes, which resulted in reduced soil fertility. As a result of agrochemical certification of agricultural land during the 1986-2017 humus content in the soil decreased on 0,22 %. Considering, that an increase its content to 0,04 % required 10 years if the area without use, these losses will need to compensate for many decades. One of the main reasons for this situation is the significant reduction entering of organic fertilizers. Only in the last 10 years adding organic fertilazer decreased from 8,6 tons per 1 ha of arable land in 1990 to 0,5 tons per 1 ha in 2016 (NRSE, 2017).

Also, there is a depletion of soil on the content of such important nutrients for yield formation as mobile phosphorus and potassium. Average

content of mobile phosphorus in 20 years fell to 9 mg / kg soil and potassium – 8.6 mg / kg soil.

On the decline of soil fertility also shows a negative balance of humus and nutrients. Over the past 10 years, the balance of humus was acutely scarce, its losses were within -0.4 – -0.8 tons per hectare. During the intensive use of chemicals (1976-1998 gg.), nutrient balance was an average of 20-30 kg/ha more the equilibrium state. From the beginning 90-th year fixed a negative balance of nutriment. Deficiency is nitrogen and potassium (Martin, 2010).

Due to a significant reduction in chemical melioration activities, the use of physiologically acidic and alkaline fertilizers intensifying processes of soil acidification and alkalinization. An acid and alkaline soil is one of the factors limiting the cultivation of high quality and yields of crops. According agrochemical certification soil, areas that require urgent liming, is 3.9 million ha. In 2012, liming has been conducted on the area 105,3 ths. ha.

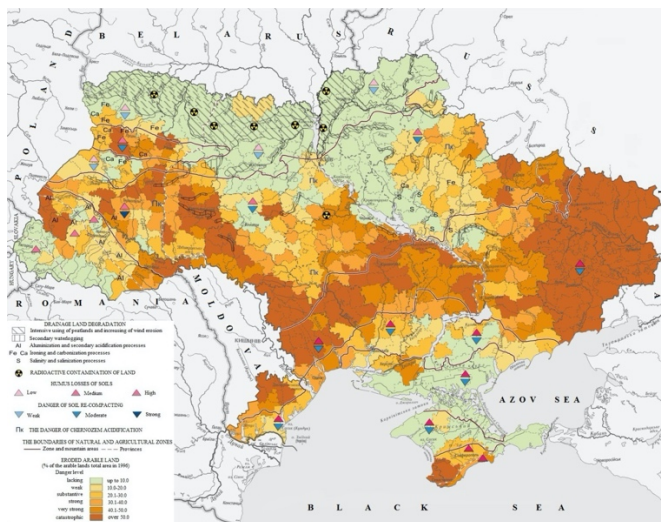


Figure 2. Land degradation in Ukraine

The steppe zone is the reverse process – alkalinization also negative for growing agricultural products. Today, this area of 1.8 million hectares, identified soils with very strong and highly alkaline reaction of soil solution and its area increase. In the 5 years from 2006 to 2010 reaction of soil solution changed toward alkaline by 0.29 units (CEP, 2015; ISP, 2018).

The problem protection of land, the struggle against degradation now rose to the level of major, global as land degradation occurs everywhere. The

main criterion of land degradation is the soil, as a particularly vulnerable object of nature. Soils monitoring results indicate that their condition has worsened in recent decades, and if you do not take the necessary steps, degradation processes in place and will continue instead fertile black soil available unproductive degraded soils.

The Address of the EU Commission “Towards a thematic strategy on soil protection” is defined 8 major threats to soil degradation, erosion, quantitative and qualitative reduction of organic matter (humus), pollution, salinization, compaction, landslides and floods, loss of biodiversity, soil covering (Chmielewska, 2009). In the last two, all types of land degradation prevalent in Ukraine. According to the NSC “Institute for Soil Science and Agrochemistry Research” the most common type of degradation - dehumification (loss of humus and nutrients), it exposed 43% of the total area (Table 2).

High soil compaction, which covers about 39 %, is a known problem in Ukraine, accompanied by adverse environmental consequences and significant economic losses. At cultivation of crops about 20% of arable land of the country have the density structure in the root layer higher than requiring these cultures (ISP, 2018).

Table 2. Distribution of the major soil degradation processes in Ukraine (Tretyak, 2001; ISP, 2018)

№	Types of land degradation	Distribution (% of total land area) respectively to the level			
		low	average	high	total
1.	Loss of humus and nutrients	12	30	1	43
2.	High soil compaction	10	28	1	39
3.	Creeping and crusting	12	25	1	38
4.	Water erosion	3	13	1	17
5.	Acidification	5	9	0	14
6.	Waterlogging	6	6	2	14
7.	Polluted by radionuclides	5	6	0,1	11,1
8.	Wind erosion, loss of upper soil layer	1	9	1	11
9.	Pollution by pesticides and other organic substances	2	7	0,3	9,3
10.	Pollution by heavy metals	0,5	7	0,5	8
11.	Salinization, alkalization	1	3	0,1	4,1
12.	Water erosion, formation of gullies	0	1	2	3

13.	Adverse effects of water erosion (silting of of water bodies, etc.).	1	1	1	3
14.	Reduction of the earth's surface	0,05	0,15	0,15	0,35
15.	The deformation of the earth's surface by wind	0,04	0,23	0,08	0,35
16.	Aridisation of soils	0,04	0,18	0	0,21

The average annual loss of soil from water and wind erosion are 15 t/ha. This means that the soil of the country annually loses about 740 mln. tons of fertile soil, which contains about 24 mln. tons of humus, 0,7 mln. tons moving phosphate 0,8 mln. tons – potassium 0,5 mln. tons nitrogen and large amounts of trace elements.

The main factors reducing soil fertility for today include:

- low rate of mineral and especially organic fertilizers;
- suspending measures for chemical melioration soils (lime, gypsum);
- failure of crop rotation;
- failure erosion control measures;
- use super heavy agricultural machinery and so on.

Excessive tillage (53,9 % of the Ukraine land fund), including slopes, leading to disruption of ecological balance of agricultural land, forests and water, which affects the sustainability of agricultural landscapes and cause considerable human impacts on the ecosphere (CEP, 2015; MEU, 2017).

As of January 1, 2017, the agricultural land of Ukraine comprises 42.7 million hectares (70.8%) of the total area; forests and other wooded areas - 10.6 million hectares (17.6%); built-up land - 2.5 million hectares (4.2%); underwater and open wetlands - 3.4 million hectares (5.6%); open land without vegetation or with insignificant vegetation cover (rocky places, sand, ravines) and dry open land with special vegetation cover - 1.0 million hectares (1.7%) (DGK, 2017).

The most valuable land in Ukraine is agricultural land, which occupied a large part of the country total area. Our state has one of the highest indicators of agricultural land provision and arable land per capita in the world. Thus, the largest is the part of the arable land, which occupies 53.9%, fallow - 0.4, perennials - 1.5, hay lands - 4.0 and pastures - 9.0%.

This distribution of land characterizes the high plowing and agricultural development of the territory of Ukraine. However, as the dynamics of land distribution in Ukraine shows (Fig.3), that in 2011-2016 there were no significant changes (MEU, 2017).

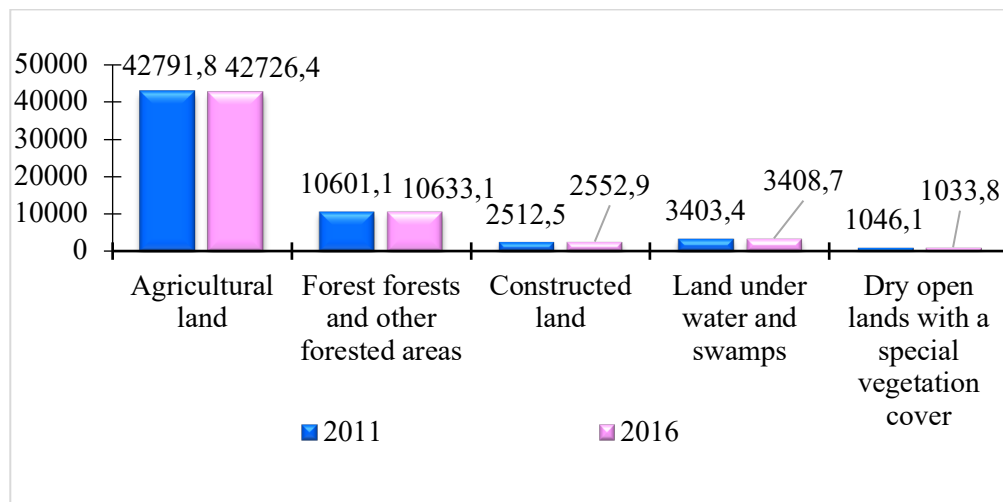


Fig. 3. Land degradation in Ukraine

Ukraine has an extremely high level of living space exploration: about 65% of the territory attracted to economic use (Table 3), but only 21.3 million hectares (35.3%) are ecological stability lands. The assessment of Ukraine land resources distribution by economic use on 01.01.2017 indicates that the largest part belongs to agriculture - 69.8%, in second place - forestry - 14.7%, in the third place - environmental protection - 4.8% and other non-used lands - 5.4%. Compared to 2016, there was increasing of residential and other development lands by 53.2 thousand hectares (ISP, 2018).

At the same time, there was decreasing the area of agriculture by 38.0 thousand hectares, industry by 13.8 thousand hectares, which is positive from an environmental point of view, but decreasing the territory of environmental protection by 7.0 thousand hectares and forestry on 4.8 thousand hectares is not positive from an environmental point of view.

Table 3. Assessment of the Ukraine land resources distribution by their economic use on 01 01 2017 (ISP, 2018)

Types of land economic use	total area		Including		
	thousand hectares	%	plowed land	built up area	ecological stability lands
Agriculture	42131,0	69,8	32173,4	1162,0	8795,6
Residential and other buildings	987,1	1,6	59,8	576,0	351,3

Forestry	8868,4	14,7	1079,1	791,7	6997,6
Water management	243,9	0,4	1,6	28,8	213,5
Industry and others	1653,7	2,7	223,2	968,0	462,5
Environmental protection	2909,8	4,8	1,0	1,5	2907,3
Health care of people	160,9	0,3	3,2	47,4	110,3
Culture, spirituality, etc.	170,8	0,3	42,2	69,4	59,2
Other unused land	3229,3	5,4	1044,1	777,2	1408,0
Total land:	60354,9	100,0	34627,6	4422,0	21305,3

Recently, as a result of the large-scale intensification of agriculture, the area of land under the various types of degradation has increased significantly. Factors of the land quality deterioration and their degradations are excessive moisturizing, waterlogging, salinity, acidification, deflation, water erosion, and alkalization. Water erosion and deflation increased the steepness of the slopes and their instability, siltation of floodplains and watercourses, and pollution of surface and groundwater. Acidification or salinization of soils causes acidification or salinization of water bodies, the negative transformation of hydrobionts contents and decreasing of fish productivity (Moshynskiy et al., 2018).

The intensification of agricultural productions, increasing the technogenic load on land resources, uncontrolled using of chemicals together with low agriculture education and other impacts lead to soils quality deterioration and a decrease in their fertility. The distribution of land resources according to economic use does not have sufficient economic and environmental justification. In particular, the structure of land use and the land fund ecological imbalance have not changed significantly over the last 25 years. Thus, the assessment of the land use environmental stability of the Ukraine regions by calculating the coefficient of environmental stability (Table 4) shows that the environmental stability of land use on the territory of Ukraine remains to be consistently unstable ($K_{e.s.}=0.40$) (DGK, 2017).

Table 4. Characteristics of the ecological state of land use in the context of Ukraine regions (ISP, 2018)

Regional unit	K _{e.s.}	K _{a.l.}	K _{e.s.}	K _{a.l.}	Ecological stability of the territory	Anthropogenic loading of the territory
	2012		2017			
<i>Autonomous Republic of Crimea</i>	0.39	3.40	0.41	3.0	stable unstable	Average

<i>Vinnytsia</i>	0.33	3.61	0.33	4.0	environmentally unstable	significant
<i>Volyn</i>	0.59	3.00	0.57	3.0	medium stable	Average
<i>Dnipropetrovsk</i>	0.28	3.71	0.28	4.0	medium unstable	significant
<i>Donetsk</i>	0.29	3.70	0.29	4.0	environmentally unstable	significant
<i>Zhytomyr</i>	0.50	3.03	0.55	3.0	medium stable	Average
<i>Zakarpattia</i>	0.74	2.68	0.71	3.0	environmentally stable	Average
<i>Zaporizhzhia</i>	0.28	3.71	0.27	4.0	environmentally unstable	significant
<i>Ivano-Frankivsk</i>	0.60	2.91	0.62	3.0	medium stable	Average
<i>Kyiv</i>	0.47	3.33	0.43	3.0	stable unstable	Average
<i>Kirovohrad</i>	0.29	3.72	0.27	4.0	environmentally unstable	significant
<i>Luhansk</i>	0.36	3.40	0.41	3.0	stable unstable	Average
<i>Lviv</i>	0.55	3.15	0.53	3.0	medium stable	Average
<i>Mykolaiv</i>	0.28	3.70	0.28	4.0	environmentally unstable	significant
<i>Odesa</i>	0.33	3.60	0.31	4.0	environmentally unstable	significant
<i>Poltava</i>	0.35	3.56	0.33	4.0	environmentally unstable	significant
<i>Rivne</i>	0.59	2.93	0.60	3.0	medium stable	Average
<i>Sumy</i>	0.40	3.40	0.42	3.0	stable unstable	Average
<i>Ternopil</i>	0.35	3.58	0.34	4.0	stable unstable	significant
<i>Kharkiv</i>	0.34	3.57	0.34	4.0	stable unstable	significant
<i>Kherson</i>	0.34	3.41	0.34	3.0	stable unstable	Average
<i>Khmelnyskyi</i>	0.35	3.56	0.35	4.0	stable unstable	significant
<i>Cherkasy</i>	0.38	3.49	0.36	3.0	stable unstable	Average
<i>Chernivtsi</i>	0.54	3.22	0.51	3.0	medium stable	Average
<i>Chernihiv</i>	0.47	3.24	0.47	3.0	stable unstable	Average
<i>Ukraine</i>	0.41	3.42	0.40	3.0	stable unstable	average

$K_{e.s.}$: less than 0.33 - the territory is environmentally unstable; from 0.34 to 0.50 - stably unstable; from 0.51 to 0.66 - average stability; exceeds 0.67 - the territory is environmentally stable.

$K_{a.l.}$: 5 points - a high level of anthropogenic load (land of industry, transport, populated territory); 4 points - significant (plowing land, perennial

plantings); 3 points - average (natural forage lands, meadows); 2 points - insignificant (forests, shrubs, swamps, covering by water); 1 point - low (micro reserves).

The anthropogenic load factor characterizes the influence level of human economic activity on land resources. High degree of anthropogenic load on land resources has built-up land, industry, transport; the significant degree of load - arable land, perennial plantings; the average degree of anthropogenic load has natural forage lands (hayfields, pastures), meadows; insignificant – forests, shrubs, swamps, territory underwater; and low degree - have micro reserves. Thus, for the whole country, the anthropogenic load is 3 and 4 points and characterized by an average and significant degree of load.

Thus, stable high level of anthropogenic loading of the majority of Ukraine regions causes ecological instability and creates negative preconditions for future egroecosystem development. So, modern condition of Ukraine lands and sufficient level of their degradation determine the need of sustainable management use. It demands permanent monitoring of land use based on zoning, according to features of land distribution and economic use.

3. Conclusion

The main ways of solving the problem are: improving the structure of land and direction of economic activity in order to create a balanced relationship between lands and ensuring environmental safety and balance of area; ensure the widespread introduction of environmentally balanced land use technologies; improving economic incentives promoting to landowners and land users to proceeding ecologically balanced activities, conservation and restoration of soil fertility; improvement of the environmental monitoring; ensure the proper functioning and improve early warning and monitoring of droughts and hydrometeorological monitoring network; implementation of an integrated approach to the land and other natural resources management, improve its coordination and efficiency.

Due to the large-scale intensification of agriculture productions, the area of land with the various types of degradation has increased significantly. Factors of the land quality deterioration and their degradations are excessive moisturizing, waterlogging, salinity, acidification, deflation, water erosion, and alkalization. Water erosion and deflation increased the steepness of the slopes

and their instability, siltation of floodplains and watercourses, and pollution of surface and groundwater.

To prevention the process of soil degradation and economic losses, to improving the environment, it is necessary to realize the complex measures of ecologization of agriculture.

The problem of land protection, prevention of their degradation, increased nowadays to the level of basic, global because land degradation occurs throughout the world. The main factor of land degradation is soil cover as one of the most vulnerable objects of nature. The results of soil monitoring show that their condition has deteriorated in recent decades and if the necessary measures are not taken, degradation processes will continue and unproductive, degraded soils can be obtained instead of fertile black soil. At the same time, land use is closely linked to socio-economic results, not only in terms of land productivity, employment, and earning opportunities. It can also enforce human mobility caused by well-being in environment of living. That is why the problem of soil protection becomes one of the most important environmental problems now.

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