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Analysis of the factors affecting the economy of declining land productivity in Uzbekistan.

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Abstract The most important natural resource for humanity is the land, which is necessary for both our existence and advancement. Land deterioration, however, presents significant difficulties and exacerbates environmental, social, and economic problems. These include food insecurity, poverty, poor health, biodiversity loss, water scarcity, decreased climate change resilience, and community dislocation. While governments are making substantial efforts to address the impacts of land degradation, the growing effects of climate change are aggravating the problem. Many land types continue to degrade, with the pace of deterioration expected to increase. To tackle this urgent issue, more comprehensive and sustained actions are needed. Prioritizing the prevention of land degradation and investing in soil restoration efforts are critical to maintaining ecosystem health, ensuring food security, and supporting communities' adaptability to climate change.

Key words: Land resources, poverty, economic valuation, land degradation, land use.

1 Introduction

The earth provides the production of 95% of all food. Soil degradation results in the loss of its productivity. Thus, humanity is deprived of the means of food production. Soil breaks down faster than it forms. It takes hundreds and thousands of years to form 1 cm of topsoil. A few more centuries are needed for it to become fertile. And the soil is also home to a quarter of the microorganisms, insects, mites and worms that live on Earth.

In addition, the soil absorbs carbon, helping humanity to fight global climate change and adapt to its consequences. Don't forget that healthy soils filter pollutants, preventing them from entering the groundwater.

According to UNESCO, land degradation affects 3.2 billion people worldwide. According to scientists, in 60 years the topsoil may disappear, leading to famine, armed conflicts and mass migration of people. So far, about 25% of the entire land surface has avoided significant human impacts, but by 2050, according to experts from the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES), this figure will fall to 10 r%.[9]

Soil degradation is a combination of natural and anthropogenic processes that lead to a change in soil functions, a decrease in natural and economic significance, a loss of biological productivity, the economic value of agricultural land, caused by a change in

soil formation conditions as a result of natural causes or irrational land use (wind and water erosion, flooding, salinization, overgrazing, deforestation, fires, deforestation, etc.)

The degree of degradation (degradation) of soils is understood as a characteristic of their condition, reflecting the deterioration of the composition and properties. The extreme degree of degradation is the destruction of the soil cover and damage to the land. Soil degradation for each indicator is characterized by five degrees:

0 - not degraded undisturbed);
1 - slightly degraded;
2 - moderately degraded;
3 - highly degraded;
4 - very strongly degraded (destroyed).

Table 1. The degree of degradation is determined in accordance

Types of degradation	Main signs	Description
1.Technological (operational) 2. Erosion 3. Salinization 4.3 swamping	- Violationlands - physic aldegradation - agro depletion - aquatic - wind - actuallysalinization - alkalization	- deterioration of soil properties, their physical condition and agronomic characteristics, as a result of operational loads in all types of land use, - characterized by disturbance (deformation) of soil composition, deterioration of the complex of their physical properties. - loss of soil fertility as a result of agriculturalactivities. Typically accompanied by physical soil degradation up to the complete destruction of the soil cover. - destruction of the soil cover under the influence of surface runoff. Planar and linear erosion is distinguished * - capture and transfer of particles of the surface layers of soil by wind currents, leading to

		the destruction of the soil cover. - excessive accumulation of water-soluble salts and possible change reactions of the medium due to changes in their cationic-anionic composition - the acquisition of specific properties by the soil, due to the incorporation of sodium and magnesium ions into the soil absorbing complex - change in the water regime,expressed in longwaterlogging, flooding and flooding of soils and lands.

Table 2 Soil degradation indicators

Indicators	Degree of degradation				
	0	1	2	3	4
Indicator indicators					
Reduction of humus reserves in the soil profile (A+B), % of initial*	< 10	10-20	21-40	41-80	>80
The content of the sum of toxic salts in the upper fertile layer (%): - with soda	<0.1	0.1-0.2	0.21-0.3	0.31-0.5	>0.5
- for other types of salinity	<0.1	0.1-0.25	0.26-0.5	0.51-0.8	>0.8
Increase in toxic alkalinity (during the transition from neutral to alkaline salinity), mg-eq/100 g of soil	<0.7	0.7-1.0	1.1-1.6	1.7-2.0	>2.0
Increase in the content of exchangeable sodium (in% of CEC): - for soils containing < 1% sodium	< 1	1-3	3-7	7-10	> 10
- for other soils	<5	5-10	10-15	15-20	>20
Increase in the content of	<4	40-	51-	61-70	>70

exchangeable magnesium (in% of CEC)	0	50	60		

Economic damage (as an indicator of environmental and economic assessment) implies an assessment in monetary terms of possible and actual losses in crops, soil fertility, destruction of natural fodder lands, soil and agricultural products pollution with technological waste from livestock complexes, agrochemicals, etc., resulting from economic activity, as well as the necessary resources to eliminate the negative consequences of the total anthropogenic agricultural load and stabilize the environment.

Environmental damage to soil fertility is characterized by natural and cost indicators. Natural indicators include: areas of eroded, polluted lands by types of pollution; weight of lost soil organic matter, phosphorus and potassium, incl. in terms of organic and mineral fertilizers necessary for their restoration; the area of arable land with an unfavorable reaction of the soil environment (acidity, salinity); area of land taken out of agricultural circulation.

The estimated cost of land degradation is US$44 billion per year. Worldwide, the annual loss of 76 billion tons of soil costs the world about $400 billion a year.[7]

The real threat to sustainable land use in Uzbekistan is the scarcity of land and its low quality composition. The rate of population growth far outpaces the rate of increase in the area of irrigated land. The problem is aggravated by the fact that, along with a high degree of natural desertification, there is a process of anthropogenic desertification, that is, associated with human activity.

The Republic of Uzbekistan is located between the Amudarya and Syrdarya rivers and covers an area of 448.9 thousand km2. The length of the territory of the Republic from west to east is 1425 km, from north to south - 930 km. Most of the territory of Uzbekistan is occupied by plains (about four-fifths of the territory). [4]

In Uzbekistan, the economic and demographic burden on land, especially for agricultural purposes, is increasing year by year. Of the 17.8 million hectares, representing the total area of agricultural land in the republic, only 25% is arable land. Over the past 15 years, the area of agricultural land has decreased by more than 5%, and per capita - by 22%, mainly due to pastures, orchards and vineyards.

In the last century, the widespread use of unbalanced norms of mineral fertilizers, irrigation water and other resources with a focus on obtaining maximum yields without more careful consideration of the characteristics of each field, natural factors and environmental conservation, led to a deterioration in the reclamation state of lands, soil erosion, and pollution of groundwater with chemicals. , violation of the ecological balance of irrigated fields and a decrease in their fertility.

2 Data and materials

The problem is aggravated by the fact that, along with a high degree of natural desertification, there is a process of anthropogenic desertification, that is, associated

with human activity. The processes of soil erosion and soil salinization continue. Over 3 million hectares of land suffer from wind and water erosion - during the season, the average loss of the fertile layer for this reason reaches 80 tons per hectare. Despite the fact that over the past 10-15 years the volume of use of pesticides and mineral fertilizers has decreased by 3-4 times, today about 54% of soils are contaminated with pesticides, more than 80% have an increased content of harmful substances. In many respects, all this is due to the ill-conceived mass development of lands, including those unsuitable for melioration. Over the past 50 years, the area of irrigated land has grown from 2.46 million hectares to 4.28 million hectares.
Currently, 77.0% of the lands in use or potentially suitable for use in the countries of Central Asia are subject to degradation of vegetation cover, 9.1% to salinization as a result of irrigation, 3.6% to soil salinization caused by the drying of the Aral Sea, 5.9% - water erosion, 1.5% - deflation, 2.4 - technogenic desertification. [10] And the shrinking Aral Sea is a clear example of an environmental disaster caused by human activity. Recent estimates by the Food and Agriculture Organization of the United Nations (FAO) show that more than 13 percent of the region was degraded from 1981 to 2003 (net primary productivity loss adjusted for climate change), affecting the livelihoods of 6 percent of the population. According to the Asian Development Bank (ADB), yields have declined by 20-30 percent across the region since independence due to land degradation, resulting in annual production losses of up to US$2 billion. Scientists note several main types of land degradation in the region. Water and wind erosion, often associated with inefficient agricultural practices, plays a large role. According to some estimates, about 800,000 hectares of irrigated farmland in Uzbekistan are heavily affected by soil erosion. According to other estimates, more than 50 percent of agricultural land in Uzbekistan is subject to significant wind erosion. [CAC News. January-June, 2014, page 10] Scientists note several main types of land degradation in the region. Water and wind erosion, often associated with inefficient agricultural practices, plays a large role. According to some estimates, about 800,000 hectares of irrigated farmland in Uzbekistan are heavily affected by soil erosion. According to other estimates, more than 50 percent of agricultural land in Uzbekistan is subject to significant wind erosion. [CAC News. January-June, 2014, page 10] Scientists note several main types of land degradation in the region. Water and wind erosion, often associated with inefficient agricultural practices, plays a large role. According to some estimates, about 800,000 hectares of irrigated farmland in Uzbekistan are heavily affected by soil erosion. According to other estimates, more than 50 percent of agricultural land in Uzbekistan is subject to significant wind erosion. [CAC News. January-June, 2014, page 10] more than 50 percent of agricultural lands in Uzbekistan are subject to wind erosion to a significant extent. [CAC News. January-June, 2014, page 10] more than 50 percent of agricultural lands in Uzbekistan are subject to wind erosion to a significant extent. [CAC News. January-June, 2014, page 10]. Land degradation is a serious problem for the development of agriculture and rural areas both throughout the world and in the countries of Central Asia. Since,

desertification and land degradation are real threats to a significant part of the world's population. Restoring the productivity of degraded land and mitigating the effects of drought could improve the lives of more than 1.3 billion people. The 197 parties to the UNCCD are actively working to achieve the goals of land degradation neutrality (Land Degradation Neutrality - LDN) in line with the new UNCCD Strategic Framework 2018-2030. [https://carececo.org/main/news/news/tsentralnaya-aziya-priverzhena-resheniyu-problemy-opustynivaniya-putem-ustanovleniya-i-dostizheniya-/]

Factors leading to land degradation.The process leading to land degradation in drylands and factors is subject to change over time and va10 ptries by location. Immediate factors include climatic conditions, in particular low soil moisture levels, distribution of rainfall and evaporation. Indirect factors are mainly related to human life and include the level of poverty, technology used, global and domestic market trends, socio-political dynamics in society. Poverty is both a cause and a consequence of the process of land degradation.

The degradation of natural resources destroys the livelihoods and future livelihoods of a large number of the poor. This is most evident in agricultural systems, which are the basis of the livelihoods of the vast majority of rural poverty. [3] According to researchers, 80% of the extremely poor live in rural areas, while 65% work in the agricultural sector.

Because land is one of the few productive assets owned by the rural poor, and almost all such households are engaged in some form of agriculture. Between 2000 and 2010, the number of rural poor living on degraded agricultural land increased in low-income countries, as well as in sub-Saharan Africa and South Asia. While degradation threatens the livelihoods of the poor, the interaction is complex and driven by key economic, social and environmental factors. These factors also limit the impact of economic growth and general economic reforms on poverty reduction. A comprehensive development strategy requires investment,

3 Methods

The costs of combating land degradation (cost of action) are lower than the cost of inaction in Central Asia by 5 times over a 30-year horizon, which means that every dollar spent on combating land degradation will probably get about $5 in return. This is a very strong economic argument for taking action against land degradation. The researchers calculated that the costs of combating land degradation would be approximately $53 billion over a 30-year horizon, while if nothing is done, the losses could be almost $288 billion over the same period. Effective measures to combat land degradation include better access to markets, development of extension services, secure land tenure for small producers.

The results of many studies show that the costs of land degradation in Uzbekistan are significant; they amount to about US$0.85 billion annually as a result of the loss of valuable land ecosystem services due to land use and land cover changes alone between 2001 and 2009. On the other hand, economic modeling also shows that the payoff from actions to combat land degradation can be up to four times their cost over

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a 30-year planning horizon, i.e. every dollar invested in land restoration can generate $4 in return over this period. It is proposed to consider Karakalpakstan, Bukhara and Syrdarya regions of Uzbekistan as priority geographical areas for actions to combat land degradation, where the impact of actions is greatest.[1]

4 Results and Discussion

Due to the arid climate, agricultural production in most of the country is possible only with irrigation. Currently, the area of irrigated land is about 4.3 million ha (CACILM 2006), while rainfed arable land covers 0.8 million ha, or only about a fifth of the irrigated land (ICARDA 2003).

Rangelands are the largest type of land cover in the country, with an area of about 24 million ha (CACILM 2006), which is more than half of the total area of Uzbekistan. Recent estimates indicate that about 26% of arable land and 17% of pasture land have been severely degraded over the past three decades (Le et al. 2014).

The relevance of land degradation issues is noted in the decree of the President of the Republic of Uzbekistan "on the development strategy of the new Uzbekistan for 2022-2026, Goal 30" Increasing the income of dekhkans and farmers at least twice while ensuring annual growth in agriculture by at least 5 percent due to intensive development of agriculture and the application of advanced achievements of science and increasing the fertility of the soil, and protecting it from degradation.

How to solve the problem of land degradation?The problems of land degradation and drought are relevant for all regions of the world. In Uzbekistan, agriculture accounts for about 20% of gross domestic product (GDP) and employs a third of the active labor force (Sutton et al. 2007).

Irrigated lands are the most valuable agricultural lands, the size of which is limited by the availability of irrigation water in irrigation sources [3; 6]. More than 95% of agricultural production is produced on irrigated lands.

Agriculture in the economy of all countries of the world, including in Uzbekistan, is of great importance, therefore the governments of all states strive to make this branch of the national economy as economically profitable as possible, and its development sustainable. For, more than 98% of the food people get from everything that is grown on earth and about 60% of the world's food comes from rice, wheat, corn and other grains (although people also eat more than 20,000 other species).

However, land degradation is a critical factor affecting rural living standards (CACILM 2006). The annual costs associated with land degradation in Uzbekistan are estimated at about US$1 billion (Sutton et al., 2007). The most degraded areas are concentrated in the lowlands of the Amu Darya River (Khorezm and Karakalpakstan), as well as in the Bukhara, Navoi, Kashkadarya and Fergana regions, in order to solve the problems posed, it is necessary to implement comprehensive measures in the following main areas:

Firstly, improvement of legal regulation in the field of prevention of land degradation (including soils), economic mechanisms in this area;

Secondly, improving the accounting system for lands subject to degradation, taking into account biophysical and socio-economic indicators, obtaining on a systematic basis up-to-date information on the quantity, condition, distribution of lands subject to degradation, the dynamics of land degradation processes and their restoration;
Thirdly, the functioning of the land monitoring system; conservation, improvement and rational use of land and water resources;
Fourth, restoration of degraded lands based on the experience of foreign countries.
In conclusion, I would like to emphasize once again that the potential for the development of agricultural production in Uzbekistan is very high, both in terms of traditional cultivation of crops, and in relation to the use of new innovative formats and technologies. And the ongoing reforms are aimed at the full development of the existing potential, at increasing the competitiveness of both agricultural products and the entire agro-industrial complex.

5 Conclusion

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