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## SCIENTIFIC AND PRACTICAL MEASURES FOR THE PROTECTION OF DEGRADED LANDS AND RATIONAL LAND USE

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**Nuriddinov Otabek Khurramovich**

*assistant, Bukhara state technical university*

**Sharipova Bahor Xurshiddin qizi**

*student, Bukhara state technical university*

*Email: [nuriddinovotabek92@gmail.com](mailto:nuriddinovotabek92@gmail.com)*

### Annotation

The article analyzes the existing problems of rational organization and efficient use of agricultural land under conditions of ecological instability. Particular attention is paid to issues related to preserving and improving soil fertility, especially irrigated lands affected by degradation processes such as secondary salinization. The study examines the role of rational land use planning, land protection measures, and the introduction of resource-saving technologies aimed at mitigating soil degradation and improving land productivity. Based on the analysis, practical recommendations are proposed to enhance the sustainable use of agricultural land, reduce negative environmental impacts, and ensure long-term preservation of soil fertility under changing ecological conditions.

### Keywords

Land fund, rural areas, land degradation, soil cover, soil salinity, erosion, desertification, oasis ecosystems, soil fertility, crop rotation, land reclamation, humus content.

**Introduction.** In recent years, significant measures have been implemented in the Republic of Uzbekistan to ensure the rational and efficient use of land resources, strengthen state control mechanisms, and comprehensively regulate relations in the fields of land management, geodesy, cartography, and the state cadastre. These reforms are aimed at improving land governance, enhancing transparency in land use, and preventing irrational exploitation of land resources under conditions of growing environmental pressure.

Within the framework of national programs focused on the systematic accounting of land resources and control over their use, substantial progress has been achieved in regulating state cadastres and improving the national cartographic fund. In particular, a system of continuous monitoring of compliance

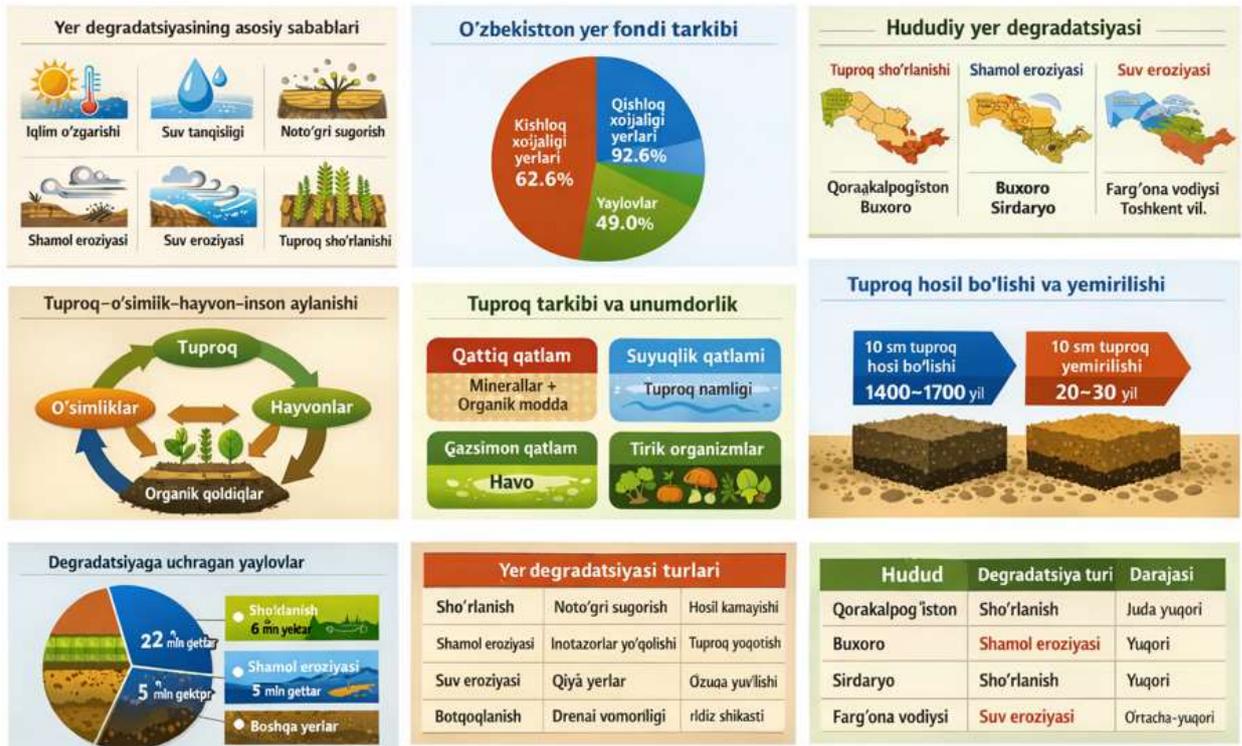
with land legislation has been developed and introduced, contributing to more effective oversight and decision-making in land management practices. At the same time, a comprehensive inventory of real estate objects has been carried out, forming a reliable informational basis for land use planning and cadastral registration.

A key stage of ongoing reforms is the initiation of the National Geoinformation System of the Republic of Uzbekistan, which provides for the integration of 21 state cadastres into a unified digital platform. The establishment of this system creates new opportunities for spatial data integration, real-time monitoring of land conditions, and the implementation of scientifically grounded approaches to land protection and rational use. In this context, the development of effective measures aimed at preventing land degradation, preserving soil fertility, and ensuring sustainable use of agricultural lands becomes particularly relevant, especially under conditions of ecological instability and increasing anthropogenic impacts.

In recent years, the process of land degradation has intensified as a result of global climate change, the reduction of water resources, and increasing anthropogenic pressure. In particular, the degradation of agricultural lands poses a serious threat to food security, environmental sustainability, and regional development. Therefore, ensuring the protection of degraded lands and their rational use has become one of the most pressing tasks of the modern land relations system.

At the same time, an analysis of land use conditions shows that regular state control over land use, the introduction of modern technologies, and the systematic accounting of land resources are not being implemented effectively enough. The timely and high-quality fulfillment of assigned tasks, as well as the rapid and efficient implementation of scientific research activities, are constrained by the fact that the material and technical base of the sector does not meet current requirements. The existing number of personnel, especially at the lower levels, does not allow for effective control over land use and comprehensive accounting of land resources.

Moreover, insufficient attention is paid to establishing close cooperation with leading foreign organizations in the field, studying and applying advanced international experience, and organizing internships and professional development programs for specialists. In order to strengthen control over land protection and rational use, improve geodetic and cartographic activities, and fundamentally enhance the efficiency of the activities of the State Committee of the Republic of Uzbekistan for Land Resources, Geodesy, Cartography, and State Cadastre, it is necessary to implement comprehensive and systematic reforms.



### 1-Rasm "O'zbekistonda yer degradatsiyasi: sabablari, turlari va tuproq unumdorligiga ta'siri"

In recent years, the Republic of Uzbekistan has implemented a series of institutional and regulatory measures aimed at ensuring the rational and efficient use of land resources, strengthening state control, and comprehensively regulating relations in the fields of land resources, geodesy, cartography, and the state cadastre. These reforms are focused on improving land governance, enhancing the accuracy and reliability of cadastral systems, and introducing advanced information and communication technologies into land management processes.

A key component of these reforms is the institutional strengthening of state authorities responsible for land administration. In particular, the activities related to state cadastres and the implementation of modern digital technologies are coordinated by specialized governmental bodies financed from the State Budget. This approach has contributed to improving inter-agency coordination, enhancing accountability, and increasing the effectiveness of land resource management at both national and regional levels.

In parallel, regulatory mechanisms have been reinforced to address improper land use practices. Administrative penalties imposed for careless land use, unauthorized deviations from approved land management projects, violations of state land cadastre regulations, and damage to boundary or restriction markers serve as important instruments for ensuring compliance with land legislation. Additional financial mechanisms, including fines related to delays in the

registration of property rights and increased fees for cadastral services, are directed toward strengthening the operational capacity of land administration institutions.

Irrigated lands play a critically important role in the agricultural sector of Uzbekistan. Covering approximately 4.3 million hectares, or 9.6 percent of the country's total territory, these lands account for more than 95 percent of total agricultural production. Given their strategic importance, ensuring the sustainable use and protection of irrigated lands has become a national priority, particularly under conditions of climate change and increasing water scarcity.

Within the framework of program-based initiatives, a continuous monitoring system for compliance with land legislation has been developed and implemented. This system supports systematic accounting of land resources, effective control over land use, comprehensive regulation of land relations, and large-scale inventory of real estate objects. Furthermore, ongoing efforts to establish the National Geoinformation System of the Republic of Uzbekistan, aimed at integrating 21 state cadastres, are expected to significantly enhance data interoperability, transparency, and evidence-based decision-making in land resource management.

At the same time, the conducted analyses indicate a number of systemic shortcomings in the organization of rational land use at the local level. In particular, insufficiently coordinated and consistent efforts are being undertaken in cooperation with self-governing bodies and relevant organizations to prevent irrational land use in a timely manner. Regular monitoring of land use conditions in rural settlements and local communities, especially in remote areas, remains inadequate. Moreover, the existing number of personnel does not allow for comprehensive control over land use and proper accounting of land resources.

These shortcomings significantly limit the ability to ensure rational and targeted land use, as well as to establish effective and comprehensive control over compliance with land legislation. In response to these challenges, during 2017–2021 a dedicated program of measures was approved to improve the effectiveness of the activities of the State Committee of the Republic of Uzbekistan for Land Resources, Geodesy, Cartography, and State Cadastre. This program focused on introducing advanced scientific and technological achievements, modernizing the material and technical base, and attracting international grants to the sector.

As part of institutional strengthening efforts, the material and technical capacity of the Committee and its regional divisions has been enhanced. District and city land resource and state cadastre departments have been provided with service vehicles, modern surveying instruments for field specialists, and appropriately equipped office facilities. In addition, in order to ensure effective

fulfillment of key tasks—such as control over rational land use and compliance with legal requirements—the Committee and its territorial bodies have been exempted from paying state duties on claims submitted to courts within the scope of their official authority.

Soil, as the biologically active upper porous layer of the Earth's surface, plays a crucial role in sustaining life processes and ensuring the circulation of matter within the biosphere. Under the influence of moisture, temperature, and microorganisms, organic matter in the soil is continuously decomposed and synthesized. Organic residues of plants and animals entering the soil undergo decomposition through microbial activity, forming humus, which interacts with mineral compounds and is subsequently absorbed by plants. These organic substances serve as food for humans and animals and eventually return to the soil through biological residues, forming a closed cycle within the “soil-plant-animal-soil” system. This natural cycle underpins the maintenance of soil fertility.

Soil is a complex natural formation consisting of solid, liquid, gaseous, and living components. The solid phase is primarily composed of mineral and organic matter, while the remaining volume is occupied by water, air, and living organisms in the pore spaces between soil particles. The proportion of these components determines soil fertility. Soil productivity largely depends on the presence of macroelements—such as aluminum, iron, potassium, magnesium, calcium, phosphorus, sulfur, and silicon—as well as microelements and the content of humus, which forms the organic basis of soil.

Microorganisms play a particularly significant role among soil biota. According to the Uzbek scientist M.V. Mukhamedjonov, the number of microorganisms in one hectare of fertile soil reaches 3–3.5 billion, and their biomass in a soil layer 0.5 meters thick amounts to 8–12 tons per hectare. During a single year, microbial generations may renew 18–27 times. According to estimates by the Russian scientist V.A. Kovda, the annual biomass of soil microorganisms is comparable to the phytomass of plants grown on the same area and, in some fertile soils, exceeds it by 1.5–2 times. In chernozem and other highly fertile soils, the annual microbial biomass may reach 20–50 tons per hectare.

Thus, all components of soil participate in ensuring its fertility. Soil can therefore be regarded as both the source and the product of organic life, constantly interacting with plants, animals, and humans. Plants absorb nutrients and water from the soil, animals consume plants, and consumed nutrients ultimately return to the soil, where they are transformed back into mineral forms available for plant uptake. In this sense, soil represents a vital link in the chain of life and is indispensable for plants, animals, and ultimately human existence.

Another important aspect of soil significance lies in its microelement composition. Approximately 60 chemical elements have been identified in plant and animal organisms, many of which enter the human body through food as biotrace elements originating from soil. Studies show that 24 microelements detected in human blood and 30 microelements present in breast milk are essential for human health. Deficiencies of specific elements in soil inevitably lead to their deficiency in agricultural products and, consequently, in the human body, potentially disrupting metabolic processes and increasing susceptibility to disease.

The analysis of land use dynamics further reveals that opportunities for expanding cultivated land areas are extremely limited. According to UNEP data, although the total area of developed land reached approximately 3.2 billion hectares by the year 2000, arable land per capita decreased almost twofold compared to 1975 due to population growth, soil erosion, and the conversion of land for urbanization and industrial infrastructure. Forecasts by the American expert Lester Brown (1978) suggested that between 1975 and 2000 the global urban population would double to over 3 billion people, requiring an additional 63 million hectares of land for urban development.

Human economic activity has led to widespread degradation of soil quality and declining productivity. Throughout its history, humanity has rendered nearly 2 billion hectares of land unusable. Each year, 6–7 million hectares of land worldwide are withdrawn from agricultural use due to water and wind erosion, desertification, and salinization. This process occurs much faster than soil formation; for example, the formation of a 10 cm soil layer requires 1,400–1,700 years, whereas water erosion can destroy such a layer within 20–30 years, or even during a single flood event.

In Uzbekistan, similar challenges have been observed. The country's total land area amounts to 44.9 million hectares, of which 28.1 million hectares are used for agriculture, including approximately 4.2 million hectares of irrigated cropland. During 1975–1985, about 1 million hectares of new land were brought into agricultural use, particularly in desert zones. However, insufficient attention to agro-technical practices, the abandonment of crop rotation, and monoculture dominance—especially cotton—led to adverse outcomes. Shelterbelts were reduced, melioration activities weakened, and erosion, salinization, and waterlogging intensified. Excessive water use contributed to the Aral Sea crisis, while salt-laden dust affected surrounding soils.

As a result, 90–95 percent of land areas in Karakalpakstan, Bukhara, and Syrdarya regions have been affected by salinization. In Bukhara region alone, 53,000 hectares out of 270,000 hectares of irrigated land have suffered from wind

erosion. Large areas in the Fergana Valley and Tashkent region have been exposed to water erosion. Currently, land degradation also poses a serious threat to livestock production, as out of 22 million hectares of pastureland, approximately 6 million hectares are affected by wind erosion and 3 million hectares by water erosion.

### REFERENCES:

1. FAO. (2017). *The future of food and agriculture – Trends and challenges*. Rome: Food and Agriculture Organization of the United Nations.
2. FAO. (2021). *Recarbonizing global soils: A technical manual of recommended management practices*. Rome: FAO.
3. UNEP. (2019). *Global environment outlook – GEO-6: Healthy planet, healthy people*. Nairobi: United Nations Environment Programme.
4. Lal, R. (2015). Restoring soil quality to mitigate soil degradation. *Sustainability*, 7(5), 5875–5895. <https://doi.org/10.3390/su7055875>
5. Montgomery, D. R. (2007). Soil erosion and agricultural sustainability. *Proceedings of the National Academy of Sciences*, 104(33), 13268–13272. <https://doi.org/10.1073/pnas.0611508104>
6. Brown, L. R. (1978). *The twenty-ninth day: Accommodating human needs and numbers to the Earth's resources*. New York: W.W. Norton & Company.
7. Kovda, V. A. (1973). *Fundamentals of soil science*. Moscow: Nauka.
8. Mukhamedjonov, M. V. (1990). *Soil microbiology and fertility*. Tashkent: Fan Publishing House.
9. World Bank. (2020). *Land governance assessment framework: Uzbekistan country report*. Washington, DC: World Bank.
10. FAO & World Bank. (2018). *Sustainable land management in practice: Guidelines and best practices*. Rome: FAO.
11. United Nations. (2015). *Transforming our world: The 2030 Agenda for Sustainable Development*. New York: United Nations.
12. Reynolds, J. F., et al. (2007). Global desertification: Building a science for dryland development. *Science*, 316(5826), 847–851. <https://doi.org/10.1126/science.1131634>
13. Ministry of Agriculture of the Republic of Uzbekistan. (2021). *National strategy for rational use and protection of land resources*. Tashkent.
14. State Committee of the Republic of Uzbekistan for Land Resources, Geodesy, Cartography and State Cadastre. (2020). *Annual report on land resources and land degradation*. Tashkent.

15. Eswaran, H., Lal, R., & Reich, P. F. (2001). Land degradation: An overview. In *Responses to land degradation* (pp. 20–35). New Delhi: Oxford Press.