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EFFECTIVENESS OF LAND MANAGEMENT PROJECTS IN CONDUCTING MONITORING OF RECLAIMED LANDS

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Abstract

This article analyzes the effectiveness of land management projects in monitoring the reclamation status of lands. The use of modern land management methods is crucial for improving land reclamation conditions and increasing productivity. The study examines aspects such as planning reclamation activities, efficient use of water resources, enhancing soil moisture retention capacity, and implementing anti-erosion measures. Additionally, the possibilities of using digital technologies and remote sensing methods for monitoring reclaimed lands are analyzed.

Keywords: *monitoring, reclaimed lands, soil salinization, moisture level, vegetation cover, satellite, groundwater.*

Introduction. Currently, more than 26 million hectares of agricultural land are utilized in Uzbekistan, including 3.7 million hectares of irrigated croplands. These lands serve as a critical resource for producing food products to meet the needs of the population, as well as raw materials essential for various sectors of the economy.

In Uzbekistan, irrigated croplands fall under the category of agricultural lands. As of January 1, 2023, the total area of irrigated croplands amounted to 4,336.1 thousand hectares, accounting for 9.7% of the country's total land area. Given that the population of Uzbekistan reached 37 million as of April 22, 2024, the per capita availability of irrigated croplands is approximately 0.1 hectares.

These irrigated lands are the primary sites for cultivating the country's key agricultural products. Considering that agricultural lands, including pastures, constitute 58.4% of Uzbekistan's total land area, they are not only essential for ensuring national food security but also represent a valuable economic resource for the country's future, particularly in terms of revenue generation from agricultural exports.

The main crops grown on Uzbekistan's irrigated lands include cotton, wheat, vegetables, melons, and other agricultural products.

The demand for precise and integrated data on cultivated lands among land users is significantly high. This includes information on the scheduling and duration of planned agro-technical measures, the required agricultural machinery, soil cultivation methods, irrigation technologies and schedules, water requirements of crops, past yield indicators, and current yield forecasting practices. Additionally, comprehensive field histories—covering previously cultivated crop types, implemented agro-technical and land reclamation measures—are essential.

Furthermore, determining the necessary amount of fertilizers and monitoring the entire process from sowing to harvest is a critical issue at the national level. Providing land users with regularly updated digital data remains a pressing concern in ensuring effective land management and agricultural productivity.

A modern digital technology is widely utilized for monitoring, analyzing, and managing lands with deteriorated reclamation conditions. Through this system, data on land plots is collected and analyzed in the form of specialized maps.

Assessing the reclamation status of land involves identifying soil salinity, moisture levels, vegetation cover, and areas prone to waterlogging.

Remote monitoring enables the analysis of land conditions using satellite imagery and drones.

Planning necessary measures based on monitoring results helps determine which areas require reclamation interventions and ensures the efficient allocation of resources.

Dynamic analysis allows for the comparison of land conditions over time and the evaluation of effectiveness.

The use of GIS data facilitates efficient monitoring of lands with deteriorated reclamation conditions. These technologies enable accurate land assessment, resource conservation, and targeted implementation of reclamation measures. In the long term, this contributes to increased productivity and ensures the ecological sustainability of lands.

In accordance with the Presidential Decree of the Republic of Uzbekistan No. PF-5742 dated June 17, 2019, "On Measures for the Efficient Use of Land and Water Resources in Agriculture," the Resolution of the Cabinet of Ministers No. 496 dated December 23, 2000, "On the Approval of the Regulation on Land Monitoring in the Republic of Uzbekistan," and the Resolution of the Cabinet of Ministers No. 50 dated February 2, 2022, "On the Approval of the Regulation on Monitoring, Evaluating, and Reporting on Measures to Combat Land Degradation," the UzDavErLoyiha State Scientific and Design Institute has developed forecast indicators for the efficient use and improvement of reclaimed land areas for the period 2020-2030. The data on these forecast indicators is provided in Table 1.

According to preliminary forecasts for 2020-2030, land management and monitoring activities are planned to be carried out across 1,111,723 hectares nationwide. Additionally, 298,563 hectares of land are expected to be allocated for agricultural purposes. Specifically:

- ***535,632 hectares*** of rainfed and other types of land will be developed through the introduction of rainfed crops.
- ***155,057 hectares*** will be reclaimed using available groundwater reserves.
- ***72,472 hectares*** of forest fund land are planned to be repurposed for agricultural use.

In 2024, monitoring activities were conducted across ***67,137.8 hectares*** of irrigated land throughout the republic. Of this, ***31,333.5 hectares*** were identified as agricultural lands with deteriorated reclamation conditions.

The main factors contributing to the degradation of reclamation conditions, as determined by the monitoring results, include:

- ***Worsening water supply conditions***
- ***Rising groundwater levels***
- ***Soil salinization***
- ***Rockiness of agricultural lands***

The deterioration of water supply and the rise of groundwater levels disrupt the soil's water regime,

exacerbating salinization and rock formation. Salinization increases soil salinity, reducing fertility, while rockiness complicates land cultivation.

To address these issues, it is essential to improve irrigation systems, establish drainage systems, and implement modern land protection methods. These measures play a crucial role in enhancing land reclamation conditions and preserving soil productivity.



Figure 1: Land Plot № 14 of the "Qaraqalpaq Azamati" Farm, Located in the "Sari Altin" Area, Qanlikul District

Table 1.
Agricultural Lands with Deteriorated Reclamation Conditions, Area (thousand ha) (2024 Data)

№	Regions name	Districts name	Total Irrigated Land (ha)	Land with Deteriorated Reclamation Conditions				
				Total	Reasons			
					Poor Water Supply	Due to Rising Groundwater Levels	Salinization	Rocky Soil
1	Republic of Karakalpakstan	Beruniy	1036,8	896,0	734,1		162,0	
		Kanlikul	7993,6	2574,5	2294,0	277,1	3,3	
		Karaozek	13766,0	3978,9	3458,7	6,8	499,9	13,6
		Takhtakupyr	16440,4	4811,1	4384,4	7,9	418,8	
		Shumanay	9966,6	4700,2	4700,2			
	Total		**49203,3**	**16960,7**	**15571,3**	**291,8**	**1084,0**	**13,6**
2	Samarkand	Narpay	1163,0	370,3	239,1	110,3	20,9	
		Pastdargom	207,0	171,9	74,0	90,6	7,2	
	Total		**1370,0**	**542,2**	**313,1**	**200,9**	**28,2**	
3	Syrdarya	Khovos	4181,2	3710,8	1663,1	68,3	1979,4	
		Saykhunabad	151,6	141,9	21,5	12,2	108,3	
		Sardoba	1486,5	1460,7	401,6		1059,1	
		Syrdarya	177,8	136,1	84,3	44,7	7,1	
		Mirzaabad	6589,6	5142,5	2667,4		2475,1	
Total			**12586,7**	**10592,0**	**4837,9**	**125,1**	**5629,0**	
4	Tashkent	Urta Chirchik	239,4	234,3	34,5	197,4		2,4
		Akkurgan	141,9	121,3	100,7	17,0	0,8	2,8
		Zangiota	143,4					
		Bekabad	1166,6	1010,8	969,9	15,9	23,4	1,5
		Parkent	228,7	226,6	225,4	1,3		
		Piskent	263,3	176,1	98,0		1,7	76,4
	Total		**2183,3**	**1769,1**	**1428,5**	**231,6**	**25,9**	**83,1**
5	Khorezm	Bogot	336,7	257,2	252,7	4,5		
		Gurlan	64,4	11,0	9,4	0,8	0,8	
		Khazorasp	487,3	361,3	273,8	31,3	56,3	
		Khiva	62,9	35,4	35,4			
		Shovot	718,9	687,1	598,7	13,4	75,0	
		Tuprokkala	124,3	117,5	10,7	101,3	5,5	
Total			**1794,5**	**1469,5**	**1180,8**	**151,2**	**137,5**	

Results and Discussion. The total irrigated land area across five districts of the Republic of Karakalpakstan—Beruniy, Qanlikul, Qoraozak, Taxtako'pir, and Shumanay—amounts to ***49,203.3 hectares.*** Of this, ***16,960.7 hectares*** have been identified as having deteriorated reclamation conditions. Based on the research findings, the key factors contributing to the degradation of these lands are as follows:

- ***15,571.3 hectares*** affected by insufficient water supply,
- ***291.8 hectares*** degraded due to rising groundwater levels,
- ***1,084 hectares*** impacted by soil salinization,
- ***13.6 hectares*** affected by rockiness of agricultural land.

These results highlight the significant impact of water supply issues on land degradation, emphasizing the need for improved water management, drainage systems, and land reclamation efforts to ensure sustainable agricultural productivity.

In ***Samarkand region***, the total irrigated land area across ***two districts—Narpay and Pastdargom—amounts to 1,370 hectares***. Of this, ***542.2 hectares*** have been identified as having deteriorated reclamation conditions. According to the research findings, the main factors contributing to land degradation in these districts are:

- ***313.1 hectares*** affected by insufficient water supply,
- ***200.9 hectares*** degraded due to rising groundwater levels,
- ***28.2 hectares*** impacted by soil salinization.

These results indicate that water supply deficiencies and groundwater level fluctuations are the primary challenges affecting land quality. Addressing these issues requires the implementation of improved irrigation systems, effective drainage solutions, and advanced soil salinity management techniques to ensure long-term agricultural sustainability.



Figure 2: Land Plot No. 9 of the "Zokirjon Zarbulogi" Farm, Located in the "N. Nortaev" Area, Pastdargom District

In ***Sirdarya region***, the total irrigated land across ***five districts—Khovos, Saykhunobod, Sardoba, Sirdarya, and Mirzaobod—amounts to 12,586.7 hectares***. Of this, 10,592 hectares have been identified as having deteriorated reclamation conditions.

According to the research findings, the main factors contributing to land degradation in these districts are:

- ***4,837.1 hectares*** affected by insufficient water supply,
- ***125.1 hectares*** degraded due to rising groundwater levels,
- ***5,629 hectares*** impacted by soil salinization.

The data highlights that ***soil salinization and inadequate water supply*** are the most significant challenges affecting agricultural productivity in the region. To mitigate these issues, targeted reclamation measures, including ***advanced irrigation management, drainage system enhancements, and soil desalination techniques***, should be prioritized to restore soil fertility and ensure sustainable land use.



Figure 3: Land Plot No. 2525 of the "Sabir Kelajak Qalqoni" Farm, Located in the "Robot" Area, Saykhunobod District

In Tashkent region, the total irrigated land across six districts—O'rtachirchiq, Oqqo'rg'on, Zangiota, Bekobod, Parkent, and Piskent—amounts to 2,183.3 hectares. Of this, 1,769.1 hectares have been identified as having deteriorated reclamation conditions.

The research findings indicate the primary causes of land degradation in these districts:

- 1,428.5 hectares affected by insufficient water supply,
- 231.6 hectares degraded due to rising groundwater levels,
- 25.9 hectares impacted by soil salinization,
- 83.1 hectares affected by soil stoniness.

These results demonstrate that water scarcity and rising groundwater levels are the most significant contributors to land degradation in the Tashkent region. To address these issues, comprehensive irrigation system improvements, groundwater regulation, and soil treatment strategies should be implemented to enhance land productivity and sustainability.



Figure 4: Land Plot No. 21 in the "Nurafshon" Area, O'rtachirchiq District.

In Khorezm region, the total irrigated land across six districts—Bog'ot, Gurlan, Xazorasp, Xiva, Shovot, and Tuproqqal'a—amounts to 1,794.5 hectares. Of this, 1,469.5 hectares have been identified as having deteriorated reclamation conditions.

- The research findings indicate the primary causes of land degradation in these districts:
- 1,180.8 hectares affected by insufficient water supply,
- 151.2 hectares degraded due to rising groundwater levels,
- 137.5 hectares impacted by soil salinization.

These results highlight water scarcity as the predominant issue, followed by groundwater rise and salinization. To mitigate these problems, modern irrigation techniques, drainage system improvements, and soil salinity management strategies should be implemented to restore land fertility and sustainability.

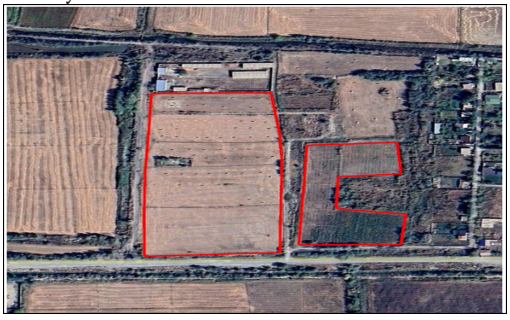


Figure 5: Land Plot No. 883 in the "Namuna" Area, Gurlan District.

An analysis of deteriorated agricultural land by region reveals that:

The highest affected area is in Karakalpakstan, with 16,960.7 hectares of degraded land.

The lowest affected area is in Samarkand region, with 542.2 hectares (see Table 1).

Conclusion. Monitoring the reclamation condition of land and evaluating land management project efficiency is of great importance. These projects aim to improve soil conditions, increase productivity, and ensure efficient use of natural resources.

During monitoring, the use of geospatial technologies, aerial photography, remote sensing, and topographic surveys enables precise assessment of land degradation. Land management projects utilize such data to design efficient irrigation, drainage systems, and soil reclamation measures.

In summary, land monitoring and land management projects are interconnected processes. Their effectiveness depends on accurate data, innovative technologies, and a systematic approach. Well-planned land management projects based on monitoring results are crucial for water conservation, increased land productivity, and maintaining ecological balance.

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