ENVIRONMENTAL ANALYSIS OF THE CONDITION OF MUNICIPAL SOLID WASTE DISPOSAL AT LANDFILLS IN THE KHOREZM REGION

To'raxonov Dastonbek Muzaffarbek ugli
Urgench State University named after Abu Rayhan Beruni
Masharipov Adamboy Atanazarovich
Associate Professor, Urgench State University named after Abu Rayhan Beruni

Abstract: This article analyzes the environmental condition of municipal solid waste landfills in the Khorezm region and the volume of waste disposed of at these sites. During the study, the amount of waste received by the landfills in 2024–2025 and its distribution across districts were investigated. The results revealed an increasing trend in waste generation and justified the necessity of improving the regional waste management system.

Keywords: municipal solid waste, landfill, environmental monitoring, waste management, environment, environmental safety.

Introduction

Worldwide, rapid population growth, urbanization, and increasing consumption have led to a significant rise in the volume of municipal solid waste. Improper waste disposal without compliance with environmental standards causes pollution of the atmosphere, soil, and water resources. Therefore, effective waste management and the assessment of the environmental condition of landfills have become one of the priority areas of modern environmental science.

Although the waste management system in the Khorezm region has been developing steadily, the continuous increase in waste generation has resulted in a growing burden on existing landfill facilities. The main objective of this study is to assess the environmental condition of municipal solid waste landfills in the region and identify trends in waste disposal volumes.

Materials and Methods

Existing municipal solid waste landfills located in the Khorezm region were selected as the research object.

The data used in this study were obtained from the statistical reports of the Directorate for Landfill Management, Khorezm Regional Department.

The following research methods were applied:

- statistical analysis;
- comparative analysis;
- environmental assessment;
- analysis of dynamic changes.

The study examined the total area of landfills, the cumulative amount of waste disposed of, and the quantity of waste accepted during 2024–2025.

Results and Discussion

According to the research findings, the total area of municipal solid waste landfills in the Khorezm region is 125.35 hectares.

Before 2024, the cumulative amount of waste stored at these landfills reached 2,443,766 tons.

During 2024, 203,214 tons of waste were disposed of at the landfills, while in 2025 this amount increased to 240,813 tons, representing an increase of 37,599 tons or 18.5% (Table 1).

Table 1

Municipal Solid Waste Landfills in the Khorezm Region and the Volume of Waste Disposed

N	Indicator	Value	Unit
1	Total landfill area	125.35	hectares
2	Total accumulated waste before 2024	2,443,766	tons
3	Waste disposed in 2024	203,214	tons
4	Waste disposed in 2025	240,813	tons
5	Increase in waste volume during 2024–2025	37,599	tons
6	Growth rate of waste volume	18.5	%

In addition, the distribution of waste disposed of at landfills across the districts of the region was analyzed.

The results indicate that in 2025, the largest amounts of waste were disposed of in the districts of Urgench (38,084 tons), Gurlan (37,396 tons), Khiva (31,072 tons), Yangiarik (28,047 tons), and Khanka (27,997 tons).

Historically, the Urgench District landfill has experienced the greatest environmental burden, with 590,033 tons of accumulated waste. Likewise, 469,000 tons of waste have accumulated in the Khiva District, while the Khanka District landfill contains 347,168 tons of waste (Table 2).

Table 2
Amount of Waste Disposed of at Landfills During 2024–2025

District	2024 (tons)	2025 (tons)
Urgench	53,704	38,084
Bogot	16,422	0
Hazorasp	17,322	25,686
Khiva	26,729.5	31,072
Shavat	14,190.5	18,544
Khanka	21,015.5	27,997
Yangiarik	10,826.5	28,047
Gurlan	19,253	37,396
Yangibazar	8,192	0
Kushkupir	15,559	22,965
Total	**203,214**	**240,813**

Environmental Discussion

The increase in waste volume at landfill sites may lead to several environmental problems, including:

- methane and carbon monoxide emissions into the atmosphere;
- contamination of groundwater due to landfill leachate formation;
- soil pollution by heavy metals;
- deterioration of sanitary conditions;
- reduction of biodiversity.

In particular, methane produced during the decomposition of organic waste makes a significant contribution to the greenhouse effect. Therefore, increasing the share of waste recycling and reducing the amount of waste disposed of at landfills are among the key priorities of environmental protection.

Conclusion

The study findings demonstrate that the volume of municipal solid waste in the Khorezm region has been increasing annually.

In 2025, the amount of waste disposed of at landfills increased by 18.5% compared to 2024.

The greatest environmental burden is concentrated at the landfill sites of Urgench, Gurlan, Khiva, and Khanka districts. The continuous growth of waste volume may negatively affect air quality, soil, and water resources.

Therefore, it is recommended to implement the following measures:

- introduce waste separation at the source (households, enterprises, and institutions);
- expand recycling facilities;
- strengthen environmental monitoring at landfill sites;
- improve systems for collecting and treating landfill leachate (contaminated liquid generated by waste decomposition);
- implement technologies for utilizing landfill methane as an energy source.

The implementation of these measures will improve the efficiency of waste management and significantly reduce its negative impact on the environment.

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