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ANALYSING THE CURRENT SOLID WASTE MANAGEMENT SYSTEM IN MANGYSTAU REGION

[1]Bekbergenova Zh*, [2]Allakhberdieva L.
[1]Yessenov University, Aktau, Kazakhstan
[2]Moscow State University for the Humanities and Economics, Moscow, Russian Federation
e-mail.ru:zhuldyz.bekbergenova@yu.edu.kz, leila26uz@mail.ru

Annotation. The aim of this article is to study and evaluate the economic state of the current solid domestic waste management system in the region. This issue is one of the key priorities in implementing the Action Plan for the Republic of Kazakhstan's transition to a "green" economy.
The existing solid domestic waste management system in the region has proven to be ineffective. The volume of municipal solid waste (MSW) continues to increase, leading to widespread littering and the expansion of landfills. This, in turn, has a negative impact on the ecological state of the land occupied by landfills, contributing to the rise in unauthorized dumps. Furthermore, there is no rational system in place for the disposal, processing, transportation, and reclamation of landfills. Environmental protection remains a pressing issue for the region, with the disposal of industrial and consumer waste being particularly challenging.

As demonstrated by the experience of developed countries, the prioritization of waste management strategies is primarily determined by societal decisions and national policy goals.
The practical significance of this research lies in its analysis of waste management practices, emphasizing the need for the development of new technologies for MSW processing. In particular, the construction of an MSW incineration plant is proposed as a solution to improve waste management efficiency.

Keywords: production and consumption waste; solid domestic waste; recycling; littering; management system; environment; main pollutants.

Introduction

A waste management system consists of a set of measures for the collection, transportation, recycling, reuse, and disposal of waste, along with the monitoring and control of these processes. In this context, waste generally refers to materials generated as a result of human activities. The primary goal of this system is to minimize the harmful effects of waste on human health and the environment, while also considering economic benefits through the recycling of waste and aesthetic improvements [1].

Environmental protection is one of the most pressing issues in the Region, and the management of industrial and consumer waste remains particularly challenging. As demonstrated by the experience of developed countries, the prioritization of waste management strategies is primarily determined by societal decisions and national policy objectives.

To establish project indicators effectively, it is essential to consider regional variations in key parameters such as the volume and composition of generated waste, the demand for secondary raw materials and energy, natural and seasonal factors, and the availability and quality of land resources.

Materials and methods of research

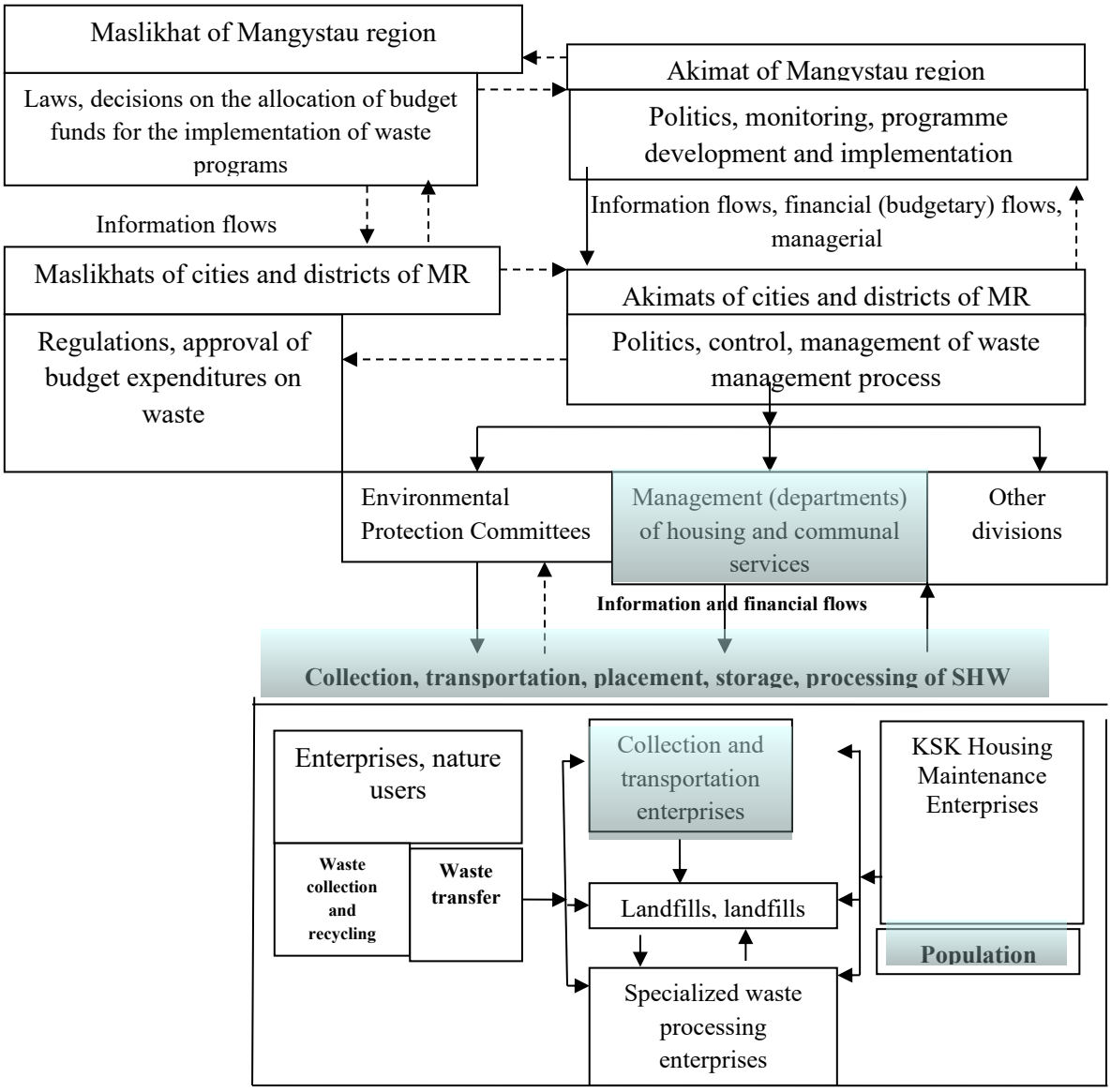
Urban landfills and other facilities within the municipal solid waste (MSW) management system fail to meet the country's current environmental and sanitary standards, as well as the technological requirements for MSW storage and disposal. Many landfill sites are located near residential areas, rural settlements, rivers, reservoirs, and lakes, posing significant environmental and health risks.

The current landfill system primarily involves compacting waste using heavy machinery. Consequently, lightweight waste materials are often carried over long distances by the wind, leading to widespread pollution. Additionally, groundwater, water bodies, soil, and vegetation are contaminated due to improper waste management practices.

The indiscriminate collection and disposal of waste from individuals and organizations into a single landfill mass contribute to the accumulation of hazardous materials, including radioactive, bioactive, and epidemiologically dangerous substances. This study employed document analysis, statistical analysis, synthesis, comparison, and generalization. Additionally, expert assessments of regulatory and program documents, as well as reporting and statistical materials, were utilized.

Research results

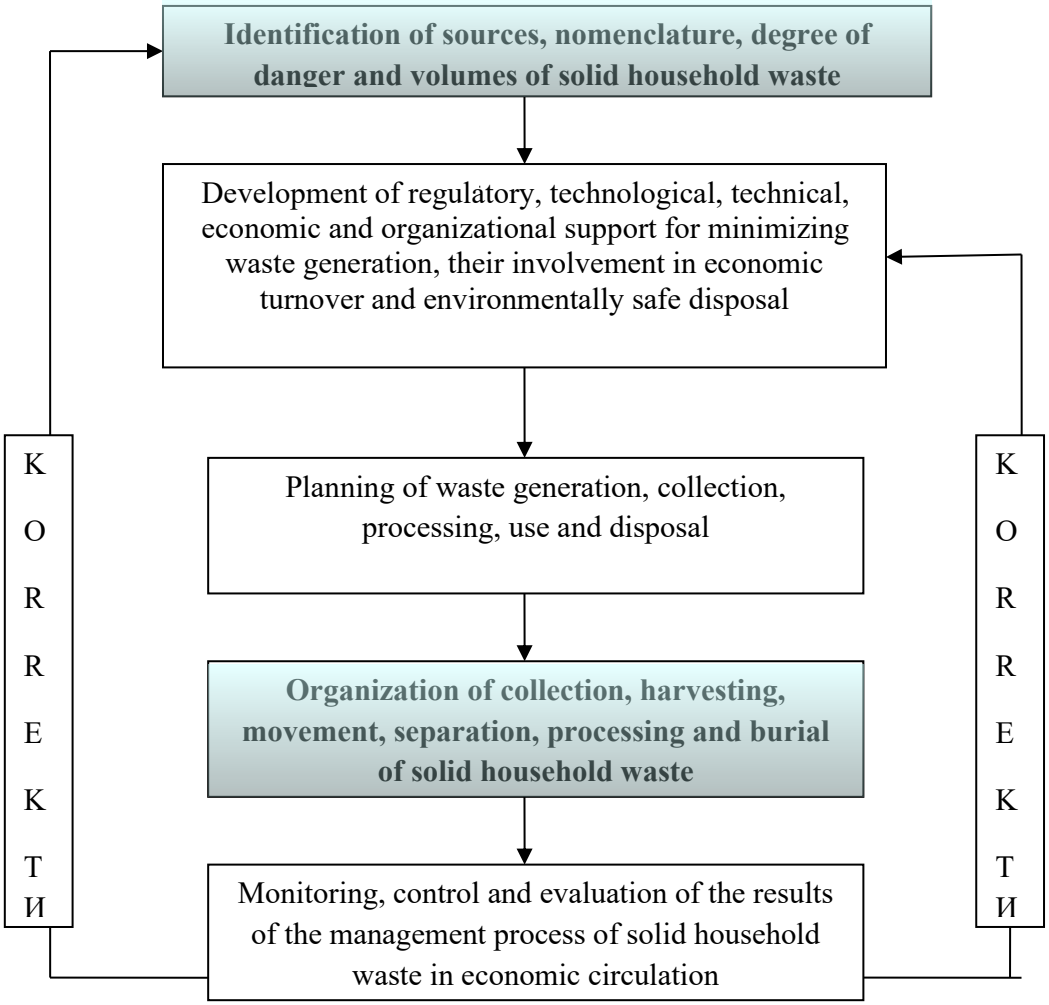
In Mangystau Region there is a typical waste management scheme, which is primarily oriented to sanitation of cities and districts. This scheme is presented in Figure 1.



1- Figure - Solid Waste Management Scheme in Mangystau Region

Since the issues of sanitary cleaning in settlements are addressed as a priority, the primary responsibility for solid waste management in Mangystau Region falls on the housing services of cities and districts.

These services are funded through the respective budgets, which cover the organization of waste collection and transportation from residential areas to designated disposal sites.



2- Figure - Stages of the solid waste management process [1]

According to the data of the Department of Statistics of Mangystau region as of 1 January 2023, the population of Aktau city is 271,7 thousand people, so to ensure representativeness it is sufficient to conduct surveys in the residential sector, where 3.6 thousand people live [2].

In this study, the sample size for the housing stock was 5 034 thousand people. All objects selected for observations have a standard level of improvement for Aktau city, i.e. have hot and cold-water supply, sewerage, central heating.

In order to conduct a detailed analysis of the existing solid waste management system in the Mangystau region, field surveys were carried out and the necessary data were collected, in particular, requests were sent to various organizations: State Institution «Department of Statistics of the Mangystau Region», State Institution «Department of Energy and Housing and Communal Services of the Mangystau Region», State Institution «Aktau Department of Housing and Communal Services, Passenger Transport and Highways», State Institution «Mangystau District Department of Housing and Communal Services, Passenger Transport and Highways», State Institution «Zhanaozen City Department of Housing and Communal Services, Passenger Transport and Highways», Akims' Offices of the village of Akshukur, the village of Shetpe, Limited Liability Partnership «Caspiy Operating», State State Enterprise «Tazalyk», State State Enterprise «Mangystau Zhylu, Su».

The influx of a significant part of the rural population into the cities of the Mangystau region has led to an unplanned increase in the number of urban populations, settlement of the outskirts of cities, and an increase in the amount of solid waste generated.

City services are constantly facing shortages of transportation, fuel, and personnel. A significant portion of solid waste remains unusable due to the current level of technological development.

With changes in trade practices, an increase in packaging materials, and the import of large quantities of food and industrial products, the volume of household waste has grown significantly. The absence of waste processing plants and the lack of effective solid waste recycling technologies have led to a continuous accumulation of waste in landfills [3].

In most cases, municipal landfills and other facilities within the MSW management system fail to meet national environmental and sanitary regulations, operational standards, and technological requirements for waste storage and disposal. Many landfill sites are located near residential areas, rural settlements, rivers, reservoirs, and lakes, posing serious environmental risks.

The landfill system currently consists only of compacting waste using heavy machinery. Consequently, lightweight materials are carried over long distances by the wind, leading to widespread pollution. Additionally, groundwater, water bodies, soil, and vegetation are being contaminated.

The indiscriminate collection and storage of waste from individuals and organizations in a single landfill mass result in the accumulation of hazardous substances, including radioactive, bioactive, and epidemiologically dangerous materials. The disposal of toxic waste, such as fluorescent lamps and mercury-containing devices, remains a critical issue.

Once landfills reach full capacity, they are not rehabilitated and continue to be long-term sources of environmental pollution. Furthermore, old, unused landfill sites are often not recorded on city maps, and as a result, they are sometimes repurposed for construction, grazing, or agricultural use, leading to further ecological and health hazards.

The transition to a paid waste management system has exacerbated the problem of non-payment for waste disposal services, particularly in private sector areas, where a new system of organization is required.

The suburbs and outskirts of cities in Mangystau Region are not sufficiently covered by public utility services. Additionally, the costs of waste collection and transportation beyond city limits often exceed allocated budgets, resulting in service disruptions, the accumulation of large volumes of waste in settlements, and the formation of unauthorized dumps near city borders.

City authorities have not established mechanisms or incentives for waste segregation, and the necessary waste processing infrastructure remains undeveloped.

According to the existing legislation, all legal entities that generate MSW, before placing them in the natural environment, must obtain a permit for their disposal [4].

Currently in Mangystau Region about 60 per cent of entities have such permits.

The problem is aggravated by the fact that in the city there is no single state body coordinating all stages of work with waste, there is no reliable accounting of waste generation, utilisation and disposal, lack of funds, as well as weak material and technical base of enterprises engaged in collection, removal and disposal of household waste.

Within the framework of the study, calculations of daily, average seasonal and annual norms of MSW accumulation in volumetric and weight indicators, as well as average waste density were made.

As a result of the research, it was established that the level of MSW accumulation is influenced by such factors as the degree of improvement of the housing stock, the presence of public facilities, and, no less importantly, the lifestyle and welfare of the population, as well as climatic conditions and seasonality.

The maximum MSW accumulation rate (1,94 m^3 year per 1 person) is set for the housing stock of the largest city of the region - Aktau, characterised by a higher standard of living of the population and a higher degree of improvement of the housing stock.

Accumulation of MSW during the period of urban mass events increases on average by 10% in the places of events and by 2% on the routes of MSW collection and removal.

The main volumes of municipal waste in Mangystau Region are formed in Aktau and Zhanaozen, as in the largest cities of the study region.

In Aktau, as well as in many cities of Kazakhstan, the main way of utilisation of municipal waste is its burial at the landfill.

In accordance with sanitary and epidemiological rules and regulations SanPIN № 3792, landfill refers to the objects of municipal purpose of I class with the size of sanitary protection zone of 1000 m.

The existing system of municipal waste management in Aktau leads to the growth of areas for waste disposal and, as a rule, does not contribute to the recycling of a significant number of useful components (recyclable materials) contained in MSW.

This system of waste management does not provide for pre-sorting of incoming consumption and production waste, which leads to the loss of many valuable components: glass, plastic, metals, etc.

Currently, the following organisations are engaged in collection and removal of MSW from the population from all micro-districts of Aktau city, as well as from the majority of enterprises:

«Atameken Tazalyk» LLP, «Caspiy Operating» LLP, «Soc-Service A» LLP, «Euroservice Joe» LLP, «Munaily Kyzmet» LLP, «Eco Caspian» LLP, «Koktem Tazalyk Eco» LLP, «WRS» LLP.

For the collection of solid domestic waste in Aktau, standard metal containers with a volume of 0,75 m^3 are used, which are placed in the neighbourhoods near each residential building or block, depending on the number of residents living there and taking into account the expected daily accumulation of waste [5].

The total number of containers in Aktau city is 1 732 units.

MSW removal from container sites is carried out in accordance with the waste shipment schedule approved at the enterprise and individual contractual terms with some organisations of the city. In the area of residential buildings, the removal of municipal waste is carried out once a day, except for high-rise buildings that have a rubbish chute, the reception chambers of which are cleaned every morning. Most of the waste collection vehicles are specialised rubbish trucks with a capacity of 8-11 m^3, the average service life of which, as a rule, is 5-6 years.

Analysis of the data obtained as a result of enquiries to the relevant organisations and enterprises has shown that on average over the last five years the volume of municipal waste generation in Aktau decreases by 5-6 thousand tonnes annually, while the urban population increases every year (Table 1).

1- Table - Data on the population of Aktau, as well as the proportion of the population covered by municipal waste removal services (persons/year)

Year	2019	2020	2021	2022	2023
Number of populations covered by municipal waste removal services, people.	133 725	134 181	147 314	147 443	147 198
Population of Aktau, people.	174 900	177 700	204 551	262 511	271 148

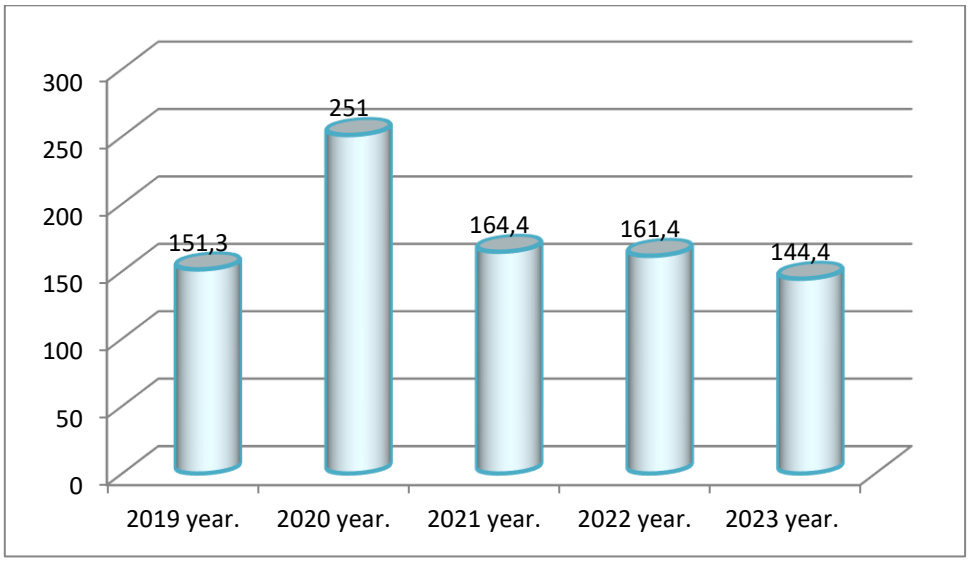
The data in Table 1 also shows that on average, about 84-86% of the population living in Aktau is covered by municipal waste disposal services.

The remaining part (mainly residents of the private sector and new buildings), do not conclude contracts with organisations engaged in the removal of MSW to the city landfill, and, as a rule, are responsible for the formation of spontaneous dumps, many of which were found during field surveys on the city territory.

In addition to disturbing the architectural appearance of cities, spontaneous dumps, on the one hand, carry the danger of mass spread of infectious diseases, up to the emergence of epidemics, and on the other hand, they are sources of anthropogenic pollution of urban environment components (air, water resources, soil).

According to the Agency of the Republic of Kazakhstan on Statistics, in 2022, more than 141 thousand tonnes of waste were removed to the existing landfills (dumps) of Mangystau region.

Figure 3. shows the dynamics of the volume of collected and disposed municipal waste in the region for 2019-2023.



3- Figure - Dynamics of the volume of collected and removed municipal waste in the Mangystau region for 2019-2023.

The situation is aggravated by the fact that in Aktau city there is a low norm of MSW accumulation equal to 1,5 m^3 year per 1 person, the approved tariff for the residents of the well-appointed sector is 504 tenge per month per person, for residents of cottage houses - 640 tenge per 1 cottage per month.

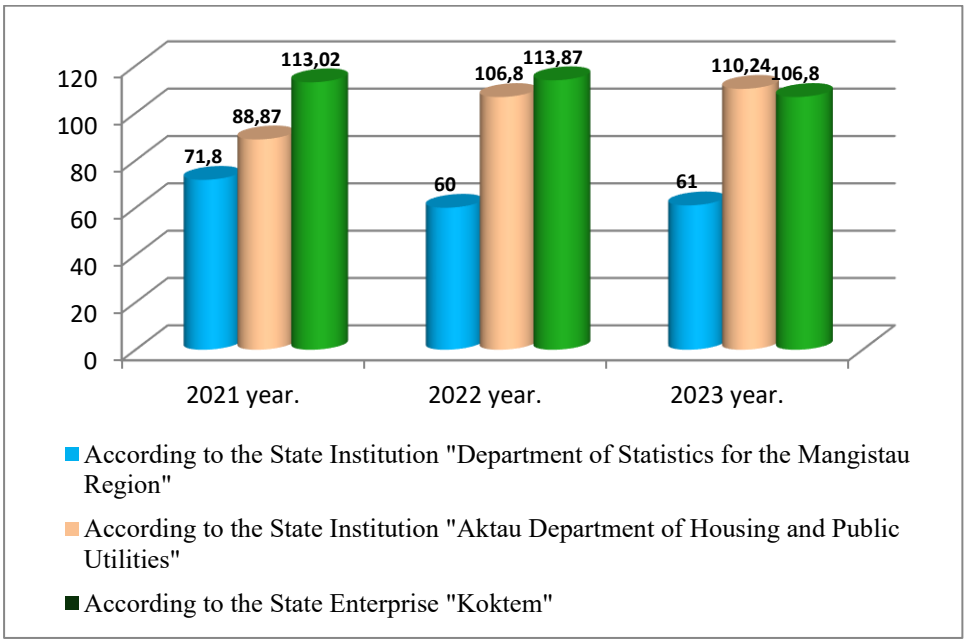
Differentiated norms for organisations of the city are not developed, waste removal is paid for the actual volume of MSW at the rate of 1890,74 tenge per 1 m^3.

2- Table - Dynamics of the volume of collected and exported municipal waste in Mangystau region for 2018 -2023.

Year	Total, tons/year	Including, tons/year					
		mixed municipal waste (household waste)	separately collected municipal waste				
			street garbage (including garbage from illegal dumps)	waste from markets	garden and park waste	large-size waste	other waste
2018	151 324	112701	36857	360	1376	30	
2019	95 472	84 111	10 194	27	1 114	26	
2020	251 008	108 803	12 537	972	1 274	126 022	1 400
2021	164 373	114 906	13 588	4 990	1 215	1 303	28 371
2022	161 441	118 797	42 644	5 343	5 083	1 205	1 306
2023	141 063	105 421	2 628	3 684	2 558		26

In general, it should be noted that, despite the increase in population and the growing volume of economic activity, since 2017, the region has been experiencing a trend of annual decrease in the amount of collected and removed municipal waste, which can be largely due to the fact that not all the population is covered by the services for the collection and removal of municipal waste on the one hand, on the other hand, both at the landfill and at the stages of

collection, transport, there is no weighing equipment, for this reason, there is practically no adequate accounting of MSW.



4- Figure – Volume of municipal waste generation in Aktau city

The data presented in Figure 4 also highlight significant discrepancies in the reported volumes of municipal waste generated in Aktau. These discrepancies were identified in responses to requests sent to various state organizations responsible for municipal waste accounting in the regional center.

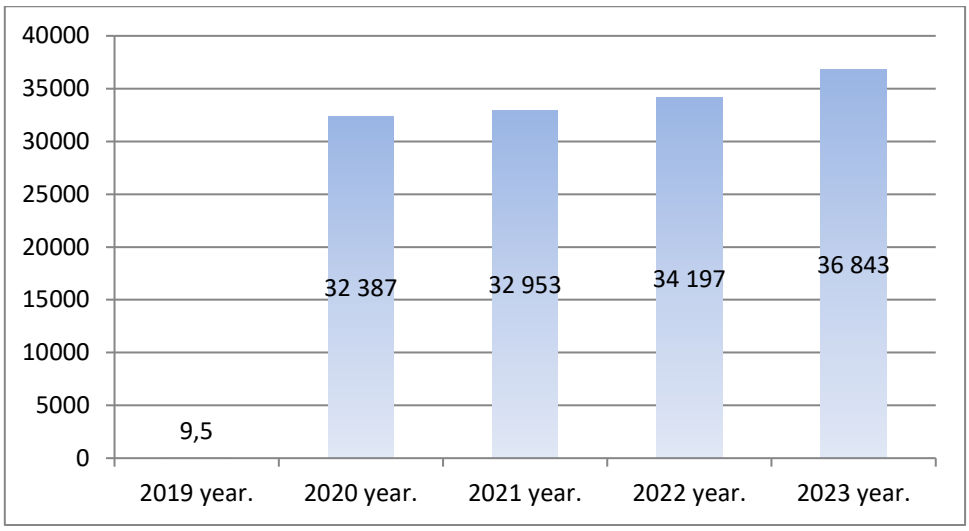
The inconsistencies between the reported decline in municipal waste generation and the continuous population growth in recent years, along with variations in the provided data on municipal waste volumes, suggest that Aktau lacks a unified and reliable waste accounting system. This issue persists at nearly all stages of waste management, including generation, collection, transportation, and disposal.

Zhanaozen, located 150 kilometers from Aktau, had a population of 81,545 as of December 1, 2024. The collection and storage of municipal solid waste (MSW) and industrial waste in Zhanaozen is managed by the State Enterprise "Tazalyk."

Similar to Aktau, metal containers with a capacity of 0.75 m³ are used for solid waste collection. There is a total of 2,955 containers in the city, including 2,105 located in the private sector. However, waste collection sites are often heavily littered due to container overfilling, which may indicate an insufficient number of containers. In other cases, when containers are not filled, the issue may be attributed to residents' low waste disposal discipline.

It is important to note that employees of State Enterprise "Tazalyk," who are responsible for MSW removal, also clean up waste from collection sites during the loading process.

An analysis of the MSW collection and removal data provided by SCP "Tazalyk" indicates that, on average, municipal waste generation in Zhanaozen has been increasing over the past five years. (Fig. 5).



5- Figure – Volume of municipal waste generation in Zhanaozen

However, it should be noted that about 82% of the population living in Zhanaozen city are covered by municipal waste disposal services. The rest of the population do not conclude contracts with organisations engaged in solid waste disposal to the city landfill, and, as a rule, are the culprits of formation of spontaneous dumps, identified during field surveys in the city.

In Zhanaozen city at present there is an outdated norm of MSW accumulation per person 1,06 m^3 year, given in RND 03.1.0.3.01.01-96 «Procedure for rationing the volume of formation and disposal of industrial waste», but it is not taken into account in the calculation of tariffs for rubbish disposal. The approved tariff for residents is 223 tenge per month per person [7]. Differentiated norms for organisations of the city are not developed, waste removal is paid for the actual volume of MSW at the rate of 2245, 26 tenge per 1 m^3.

Municipal wastes are taken to the landfill of the State Enterprise «Tazalyk» located 14 km away from Zhanaozen city in the Eastern industrial zone. The landfill is transferred for permanent use, according to the decision of Akim of Zhanaozen city № 416 from 4.04.2006. The area of land allotment for the landfill is 7,0 hectares. The total volume of waste accumulated at the landfill as of 1 January 2021 is 137 718 tonnes.

A waste processing plant has been operating in Zhanaozen since 2014 (with a capacity of 50 000 tonnes per year). It produces construction materials from sorted waste: tiles, paving stones and paving stones. In 2021-2025 phased expansion of this sorting shop, for the city of Zhanaozen: expansion of the production of solid waste processing plant and by opening a system for the production of paving stones, kerbs, gutters, rubber coatings (implementation period - 2021);

– 2021 - 20% of accumulated waste will be processed;
– 2022 - 25% of accumulated waste will be processed;
– 2023 - 30% of accumulated waste will be processed;
– 2024 - 35% of accumulated waste will be processed;

As a result of the survey of the territory of the existing landfill in Zhanaozen, the following was revealed:

- the system of accounting of municipal waste brought to the landfill, as well as in Aktau is imperfect, the amount of MSW brought to the landfill is estimated by the volume of the bin of rubbish trucks; the density of municipal waste to convert the volume of waste into units of mass is not determined by an experimental method. The weighing equipment required to objectively determine the mass of waste entering the landfill has not been installed;

- the landfill area is fenced all around the perimeter, but the landfill is only partially fenced, which leads to domestic animals (cattle, camels) entering the landfill. In addition, contrary to sanitary requirements, there are no green areas around the landfill, which leads to pollution of adjacent territories by light fractions of MSW;

- the landfill does not have a system for collection and utilisation of landfill gas, which does not comply with the recommendations and leads to air pollution of the adjacent territories on the one hand, and on the other hand - to the formation of possible fires of municipal waste during its storage;

- access roads to the landfill are not asphalted, there is no disinfection bath at the exit from the landfill, and there are no radiological control devices;

- monitoring of atmospheric air quality at the boundary of the SPZ of the landfill is carried out on a quarterly basis, but the list of measured pollutants does not fully meet the regulatory requirements. Thus, according to reports on industrial monitoring, the quality of atmospheric air was determined by such substances as methane, sulphur dioxide, hydrocarbons (in total), carbon monoxide, nitrogen oxides, dust, while the main pollutants emitted in the process of biological decomposition of MSW are, in addition to methane, hydrogen sulphide, ammonia, as well as associated ingredients such as benzene, trichloromethane, carbon tetrachloride, chlorobenzene.

It should be noted that according to the results of industrial monitoring, the quality of atmospheric air at the boundary of the SPZ of the landfill complies with the normative values for all determined ingredients;

- soil monitoring is carried out by the enterprise for the content of oil products, lead, copper, cobalt, zinc, mercury and nickel, which is also not a complete list of harmful ingredients to be controlled in soils of the territories of municipal landfills. According to the results of industrial monitoring no exceedances of MPCs of the measured substances in the soil cover were also not revealed;

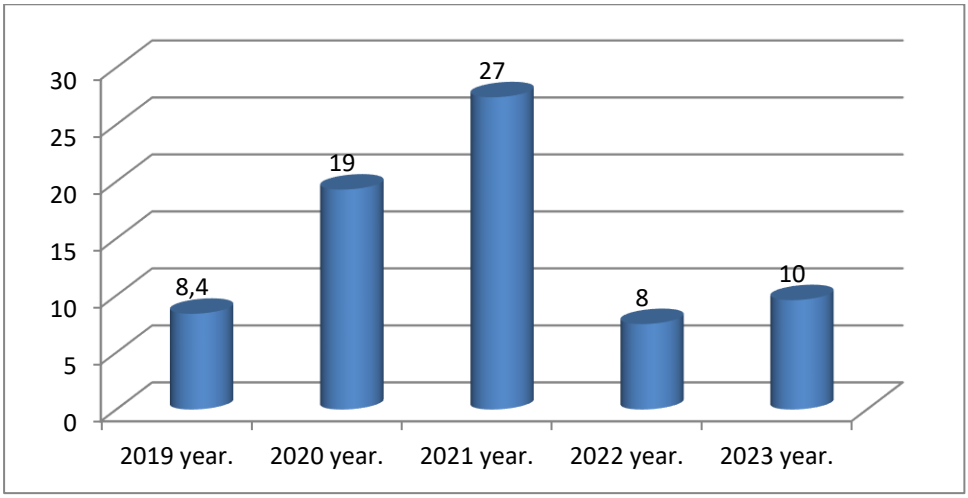
- there is no information on monitoring of groundwater and leachate, which also does not meet the requirements of cl. 4 Art. 305, p. 121 and p. 294, as these data are used to assess the level of negative impact of the operating landfill on groundwater adjacent to the territory of the city [8].

Shetpe village is the administrative centre of Mangystau district, located 108 km north-east of Aktau city. The population is 35 334 thousand inhabitants.

Services on removal of MSW from the population and organisations of the town are provided by the State Enterprise «Mangystau zhylu, su». For MSW collection 200 metal containers with capacity of 0,75 m^3, as well as non-standard containers are used. It should be noted that often there is a strong littering of sites for waste collection, due to the insufficiency of containers for MSW, and, as a consequence, their overfilling, and in some cases - the low level of culture of the population.

There is no approved waste removal scheme in the village, MSW is removed by special vehicles from container sites at the request of residents, as well as in accordance with individual contracts with the city organisations, and 1 specialised rubbish truck is used.

Information on the amount of collected municipal waste in 2019-2023 is presented in Figure 6.



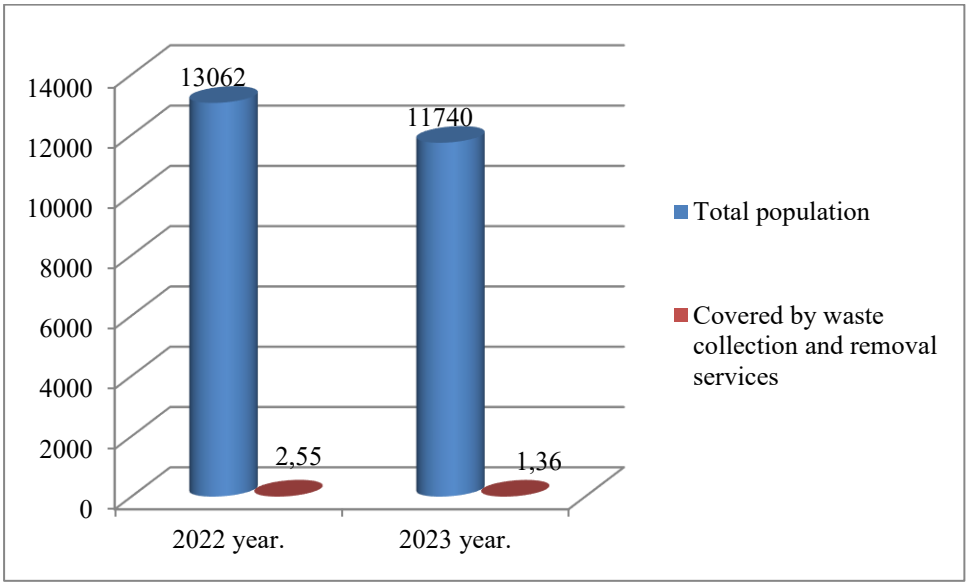
6- Figure - Dynamics of collection and removal of solid waste in the village of Shetpe

Analysis of data on the volume of MSW collection and removal, provided by the State Enterprise «Mangystau Zhylu, su» indicates that up to 2019 the amount of MSW removed to the landfill has increased dramatically, in 2020 the volume of removal to the landfill of municipal waste decreased by more than 3,5 times.

It should be noted that only 5,6% of the settlement's population is covered by municipal waste removal services. The rest of the population removes municipal waste to the landfill on their own.

The norms of MSW accumulation for the population and organisations of Shetpe settlement have not been developed. The approved tariff for collection and removal of MSW is 260 tenge per person per month, for organisations – 1404,76 tenge per 1 m^3.

The current situation in the sphere of MSW management leads to the formation of numerous spontaneous dumps identified during field surveys in the territory of the settlement (Figure 7).



7- Figure – Number of populations covered by solid waste collection and removal services (according to data from the State Enterprise «Mangystau Zhylu, Su»)

Municipal waste is taken to the landfill located 8 km north-east of Shetpe village (road to Zhetybai village) [9].

The landfill was put into operation in 2008 in accordance with the decision of Akim of Shetpe village of 11.11 Shetpe village akim № 577 from 11.11. 2005 on allocation of land plot for landfill. The area of the landfill is 5 hectares. The total volume of accumulated waste as of 1 January 2020 was 3500 m^3.

As a result of the survey of the territory of the operating staff of the LLP 'Republican Research Centre for Atmospheric Air Protection' the following was established:

- accounting of imported municipal waste, as well as in other settlements of the region is carried out in most cases by the volume of the bin of rubbish trucks; the density of collected municipal waste to convert the volume of waste into units of mass is not determined by the experimental method;
- the landfill territory is bunded and fenced around the entire perimeter, but there are no green plantings, which does not meet sanitary requirements;
- the landfill does not have a system for collection and utilisation of landfill gas, which does not comply with the recommendations and leads to air pollution of the territories adjacent to the facility on the one hand, and on the other hand - to the formation of possible fires of municipal waste during its storage;

- monitoring of the quality of atmospheric air, soil, groundwater and leachate in the landfill area is not carried out.

Tupkaragan District is a district in the west of Mangystau Region. Its administrative centre is the town of Fort-Shevchenko. The district is located in the west of Mangystau Region. The total area of the district is 8,52 thousand km^2. The district includes the city of Fort-Shevchenko, the villages of Bautino, Kyzylozen, Akshukur, Taushyk, and the rural district of Sayyn Shapagatov.

The total population of Tupkaragan district is -38 894 people, annual population growth for the last 2 years is about 2-2,5 %.

According to the Ministry of Ecology, Geology and Natural Resources of the Republic of Kazakhstan in 2023 in Kazakhstan will be formed 4,5 - 5 million solid domestic waste. Collection and disposal of municipal waste in RK according to the Bureau of National Statistics in 2023 was 4 142 952 million tonnes.

On average, 15 000 tonnes of municipal waste are generated in Tupkaragan district per year, with the level of coverage of MSW disposal services18 at 80,6% (Table 3). Over the last three years, 45 007 tonnes of municipal waste were generated and disposed of.

3- Table - Collection (formation), processing and disposal of municipal waste for 2021-2023 in Tupkaragan district

Date	Name	Unit of measurement	**2021 year.**	**2022 year.**	**2023 year.**
01.03.2024	Collection (Education)	thousand tons	13,3	14,5	15,002
01.03.2024	Burial	thousand tons	13,3	14,5	15,002

Waste management problems remain unresolved due to the absence or insufficient development of the infrastructure necessary for this territory. The program provides for the allocation of funds for the modernization and construction of infrastructure, including collection points and transportation systems. Due to the remoteness of the Tupkaragan district from regional centers, separate collection and sorting of waste is not carried out in the district.

Several enterprises are involved in the collection and disposal of waste in Tupkaragansky: «Caspi Kommunaldyk Kyzmeti» LLP, «Damir GLOBAL», «Atameken Tazalyk» LLP, «IP Sataev».

Accumulation and collection of municipal waste in the Tupkaragan district is carried out in two ways:

- in containers;
- containerless (bagless) method - by driving around the territory and collecting waste in bags/sacks placed in designated places, according to a schedule. Containerless removal is carried out in the private sector. Separate waste collection has not been implemented in the district.

More than half of the existing containers are outdated, dented and require replacement.

There are no container sites in the villages and they also require repair, as many lack fences and hard surfaces, which does not meet sanitary standards.

To date, the number of containers in the area is:

- village of Bautino - 203 units;
- town of Fort Shevchenko -929 units;
- village of Kyzylozen -0 units;
- celery-0 units;
- fat Akshukur-300 pieces;
- Shapagatovo rural district -238 units.

One of the key environmental issues is the shortage of landfills for the processing and disposal of MSW; the lack of containers for collecting and sorting solid household waste from the population; and an increase in the number of illegal landfills in populated areas. For the further development of the district, it is necessary to increase the share of recycling and disposal of solid

household waste, this task is reflected in the PRT24 of the region. First, it is necessary to install separate containers for types of garbage, attract entrepreneurs to engage in waste recycling and recycling.

All municipal waste removed from container sites is buried without sorting at the MSW landfill. It is necessary to increase the share of recycling and disposal of solid household waste.

Thus, the study found that the existing MSW management system in Aktau, Zhanaozen, Akshukur village and the village of Shetpe is far from perfect. The only way to dispose of municipal waste is to dispose of it at a landfill, which leads to an increase in waste disposal areas and, as a rule, does not contribute to the recycling of a significant number of useful components contained in solid waste.

This situation is aggravated by the fact that in most cases the organization and operation of landfills is carried out without compliance with technical and sanitary standards, monitoring of the state of environmental components in the locations of landfills is insufficient. Landfills are a source of the spread of pollutants into the components of the natural environment, having a harmful effect on them over a long period of time [10].

Conclusion

In the settlements of the Mangystau region, there is a continuous increase in the volume of solid waste generation per capita, which is largely due to the increasing volume of economic activity and the intensive development of the consumer market. At the same time, there is no unified system for adequate accounting of municipal waste volumes, collection and removal of solid waste in rural settlements is irregular, and the number of containers for collecting solid waste is clearly insufficient.

In the Mangystau region, there is an urgent need to create new technologies for the processing of solid waste, namely the construction of a plant for the incineration of solid waste. Integrated solid waste processing in the Mangystau region should include the following methods: separate collection of solid waste, mechanized sorting, enterprises and plants for waste processing and the production of materials from recycled materials.

The implementation of the integrated waste management system will reduce the volume of waste disposal by 30-40% and ensure rational use of natural resources in the Mangystau region.

It is planned to ensure full coverage of legal entities in the Mangystau region for issuing permits for the placement of solid waste, in order to keep records of the formation and movement of waste, introduce a system for separate collection of solid waste, clarify the norms for the accumulation of household waste for all categories of the population and enterprises, and develop waste management rules. It is necessary to teach the population to divide household waste by type, improve collection, removal and storage technologies, improve the legislative framework, involve the private sector in solving household waste problems, and improve the interaction of the administration, utilities KSK and the public.

Thus, the solid waste management system should be integrated into the economic and environmental management system of the region, which, in turn, is part of the state management system, and in order to reduce the number of unauthorized landfills, reduce waste volume, and reduce the burden on officially operating landfills, it is necessary to create an integrated waste management system.

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МАҢҒЫСТАУ ОБЛЫСЫНДАҒЫ ҚАТТЫ ТҰРМЫСТЫҚ ҚАЛДЫҚТАРДЫ БАСҚАРУДЫҢ ҚОЛДАНЫСТАҒЫ ЖҮЙЕСІН ТАЛДАУ

[1]*Бекбергенова Ж. Т., [2]Аллабердиева Л.М.

[1]Есенов Университеті, Ақтау, Қазақстан

[2]Мәскеу мемлекеттік гуманитарлық-экономикалық университеті, Мәскеу, Ресей Федерациясы

e-mail.ru:zhuldyz.bekbergenova@yu.edu.kz, leila26uz@mail.ru

Аңдатпа. Мақаланың мақсаты - облыстағы қатты тұрмыстық қалдықтардың айналым саласын басқарудың қолданыстағы жүйесінің экономикалық жағдайын зерттеу және бағалау. Бұл Республиканың «жасыл» экономикаға көшуі жөніндегі іс-шаралар жоспарын іске асыру жөніндегі маңызды бағыттарының бірі болып табылады.

Бүгінгі күні өңірде бар қатты-тұрмыстық қалдықтарды басқару жүйесі өзінің тиімсіздігін дәлелдейді: қатты-тұрмыстық қалдықтардың жинақталу көлемі ұлғайды, бұл өз кезегінде полигондар аумағының қоқысқа тасталуы және ауқымының өсуі орын алуына алып келеді. Полигондар астында орналасқан жерлердің экологиялық жай-күйі бұзылып жатыр және рұқсат етілмеген қоқыс үйінділерінің саны ұлғаюда; кәдеге жаратумен байланысты қатты - тұрмыстық қалдықтармен жұмыс істеудің ұтымды жүйесі жоқ, полигондарды қайта өңдеу, тасымалдау және рекультивациялау жүргізілмейді. Облыс үшін қоршаған ортаны қорғау өзекті мәселе болып табылады, ал өндіріс пен тұтыну қалдықтарын кәдеге жарату ең күрделі мәселелердің бірі болып табылады. Дамыған елдердің тәжірибесі көрсеткендей, басымдықтарды таңдау ең алдымен қоғамның шешімдерімен және ұлттық деңгейде қойылған мақсаттармен анықталады.

Зерттеудің практикалық маңыздылығы айналым саласын басқаруды талдау болып табылады қатты тұрмыстық қалдықтарды өңдеу бойынша жаңа технологияларды құру қажет, атап айтқанда қатты тұрмыстық қалдықтарды өңдеу зауытын салуды қажет етеді.

Түйін сөздер: өндіріс және тұтыну қалдықтары; қатты тұрмыстық қалдықтар; қайта өңдеу; аумақта қоқыс тастау; басқару жүйесі; қоршаған орта; негізгі ластаушы заттар.

АНАЛИЗ ДЕЙСТВУЮЩЕЙ СИСТЕМЫ УПРАВЛЕНИЯ ОБРАЩЕНИЕМ С ТВЕРДЫМИ БЫТОВЫМИ ОТХОДАМИ В МАНГИСТАУСКОЙ ОБЛАСТИ

[1]Бекбергенова Ж. Т[*]., [2]Аллахбердиева Л.М.
[1]Университет Есенова, Актау, Казахстан
[2]Московский государственный гуманитарно-экономический университет», Москва, Российская Федерация
e-mail.ru:zhuldyz.bekbergenova@yu.edu.kz, leila26uz@mail.ru

Аннотация. Цель статьи - изучить и оценить экономическое положение существующей системы управления обращением твердых бытовых отходов в регионе. Это одно из важных направлений реализации плана действий по переходу к «зеленой» экономике республики.

Сегодня существующая в регионе система обращения с твердо-бытовыми отходами доказывает свою неэффективность: объемы накопления твердо-бытовых отходов увеличились, что, в свою очередь, приводит к завалке свалок и увеличению размеров свалок. Ухудшается экологическое состояние земель, расположенных под свалками, увеличивается количество несанкционированных свалок мусора; отсутствует рациональная система работы с твердо-бытовыми отходами, связанная с размещением, переработкой, транспортировкой и рекультивацией свалок. Охрана окружающей среды для области является острейшей проблемой, а утилизация отходов производства и потребления одна из самых сложных. Как показывает опыт развитых стран, выбор приоритетов определяется прежде всего решениями общества и заданными на национальном уровне целями.

Практическая значимость исследования заключается в анализе управления оборотной отраслью, что требует создания новых технологий обращения с твердыми бытовыми отходами, в частности, строительства завода по переработке твердых бытовых отходов.

Ключевые слова. Отходы производства и потребления; твердые бытовые отходы; утилизация; захоронение; система управления; окружающая среда; основные загрязнители.