

## Solid Waste Management in the Municipality (On the Example of Kutaisi)

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### Abstract

*The management of solid municipal waste in Georgia is one of the most important environmental challenges because the existing system requires radical reform. Establishment of solid municipal waste management system and efficient functioning is a prerequisite for the development of urbanization.*

*Effective management of solid waste remains a problem in post-Soviet countries, including Georgia, Kutaisi in particular.*

*The Law on "Waste Management Code", adopted in Georgia (2015) and responds to Georgia's obligations under the Association Agreement with the European Union. In this work the research was conducted on the example of Kutaisi municipality, the problems in the field have been identified, namely outdated landfills, problems in waste collection and recycling, The negative impact of landfills on environmental and human health has been identified, and recommendations have been developed based on sharing the experiences of other countries in solid waste management, in particular on the example of Moldavian and Romanian cities.*

**Key words:** waste, solid waste management, recycling

**J.E.L. classification:** Q01, Q5, R0

### 1. Introduction

Management of international standards of solid waste is one of the key obligations undertaken by Georgia with the agreements signed with the EU. This obligation simply means that there should be no such landfills in Georgia, such as the famous "Nikea landfill" and many more still present in the regions of Georgia. In addition to regulation of landfills, new standards include sorting household garbage in order to make the environment less likely to be harmed and the society living in this environment. In parallel with building the so-called modern standards of landfills, one part of these obligations is the construction of non-hazardous waste processing factories of modern standards.

Until recently there was no unified legislative system of waste management in Georgia, partly existing regulations did not fully reflect today's realities and did not comply with international requirements.

### 2. Literature review

Solid waste management means the management of old landfills as well as implementing non-existent technologies. Non-existent technology requires practical application of knowledge, methods and means to ensure the use of natural resources and energy, environmental protection and human health. As for the landfills they are held for 15-20 years (Eristavi, Danelia, Hasan, Archipova, 1985, p.36)

The Law of Georgia "Waste Management Code" entered into force on January 15, 2015 and responded to the obligations undertaken by the Association Agreement with the European Union (Law, 2015).

In order to find the problems in the field of waste collection and recycling, their causes and their possible solutions, the Imereti Scientists Union "Spectrum" conducted a survey of business entrepreneurs in this sector. The entrepreneurs were able to express their vision on the development of prospects of recycling, establishment of effective management mechanisms to facilitate mutual cooperation with governmental and non-governmental sectors. (Imereti Scientists Union "Spectrum", Report, 2018, p.45)

Based on the statistical data, the relationship between Kutaisi population (data is taken from the Kutaisi Civil Status Registration Card) - X, pollution – Y and disease -Z has been identified (Ministry of Environment Protection and Agriculture of Georgia, 2018).

It should be noted that unfortunately, in Kutaisi there is a kind of landfill such as the famous "Nikea landfill".

"Nikea landfill" is located on the continuation of Nikea Street, southwest, on the right bank of the river Rioni and belongs to the sanitary cleaning of the City Hall (Data was taken from the city sanitation service). The landfill is 45 ha, out of which 5 hectares are operating, and 37 ha is preserved. It mainly serves Kutaisi and parts of Tskhaltubo and Baghdadi zones receiving 600 m<sup>3</sup> industrial and household waste, in recent years, only from Kutaisi and Tskaltubo.

Landfill has been exploited for 40-50 years. This is when it is usually held for 15-20 years. At first, the landfill was allocated a few kilometers away from the city. Now, there are several hundred meters between the microdistricts build with modern multistory houses and the landfill.

For years the incorrect handling of the landfill, increasing the operational deadlines and violation of the sanitary protection zones from the residential areas put the new landfill construction on the agenda.

The main problems:

- Integrated waste management is not undertaken;
- The existing technical equipment is not enough to retain the whole territory of the city;
- There is no municipal hazardous waste management system.
- Composting waste is not implemented;
- High level of waste, especially the rivers' pipeline and riverbed pollution levels;
- Detailed inventory of wastes has not been conducted in Kutaisi. It is necessary to count the number of waste, the composition, the number of residuals we have, the potential for processing, where we need mining equipment, what can be repaired, etc.
- There is no supportive environment for waste separation, recycling and processing;
- Increasing trend of waste flows;
- Low level of consciousness of the population;

In order to improve the existing situation, Georgia should provide relevant measures according to the obligations undertaken by the Association Agreement with the European Union.

Georgian legislation complies with the Association Agreement with the European Union (Law, 2015).

The Code aims to create legal basis for waste management for implementation of measures to promote waste prevention and increase of their reuse. Environmental and human health is the main objective of this Code, which is designed to safeguard the waste environment in a safe way (including recycling and diversion of secondary raw materials, restoration of waste energy, safe storage of waste). The main objective of this Code is protection of environment and human health.

According to the law, the competence of the Ministry of Environment and Natural Resources Protection is to develop / implement a common state policy of waste management, state control over waste management, etc. The competence of the Ministry of Regional Development and Infrastructure in the field of waste management includes the arrangement, management and closure of non-hazardous waste landfills, arrangement and management of warehousing units taking into consideration the requirements of the Waste Management Code and the relevant subordinate normative acts.

Since 2019, waste management methods have significantly changed in Georgia, improved management methodology, increased demand for waste processing enterprises. It was necessary that the enterprises would have to collect more collected waste. Waste recycling is the business sector that needs to be quickly developed to meet the requirements of the existing reserve management sector in the country.

In order to find the problems in the field of waste collection and recycling problems, their causes and their possible solutions, the Imereti Scientists Union "Spectrum" conducted a survey of business entrepreneurs in this sector. Entrepreneurs were able to express their vision on the development of prospects of recycling, establishment of effective management mechanisms to facilitate mutual cooperation with governmental and non-governmental sectors.

Entrepreneurs of the survey participated in the field of plastic, paper and aluminum collecting and processing, in Kutaisi.

- Kutaisi - 5 enterprises, including plastic processing 3 enterprises, macula production enterprise-1 and aluminum collector enterprise -1;

As the analysis of the survey showed, it is important for entrepreneurs to get access to raw materials. The majority of plastic processing enterprises depend on the imported raw material. In particular, polyethylene and polypropylene granules have been brought from other countries. Local raw materials can not be produced due to the low level of plastic waste disposal in Georgia and the lack of modern equipment. However, there is an attempt to sort and collect the collected plastic on the spot. But the raw quality does not respond to the conditions of the technological process and this time it is less demanded on the market. The majority of enterprises are equipped with old-fashioned machinery. Entrepreneurs do not have the opportunity to invest big investments in modern technologies, which is thus reflected on the quality of their products. Consequently, the quality of manufactured products is low, which is reflected on the competitiveness of these products on the local market.

### 3. Determining quantitative attitudes between pollution and the disease caused by it.

The method of statistical analysis was used for research studies. Method of multifactorial linear regression dependence. Based on the statistical data, the relationship between Kutaisi population (data is taken from the Kutaisi Civil Status Registration Department) - X, some of the harmful substances (SO<sub>2</sub>) – Y and disease -Z has been identified. Multiple regressive analyzes have been conducted to identify this relationship. The equation of the regression derived is as follows:

$$Z = 0,77X - 0,31Y - 103,8 \quad (1)$$

Correlation R=0,8 (by 2000 year data).

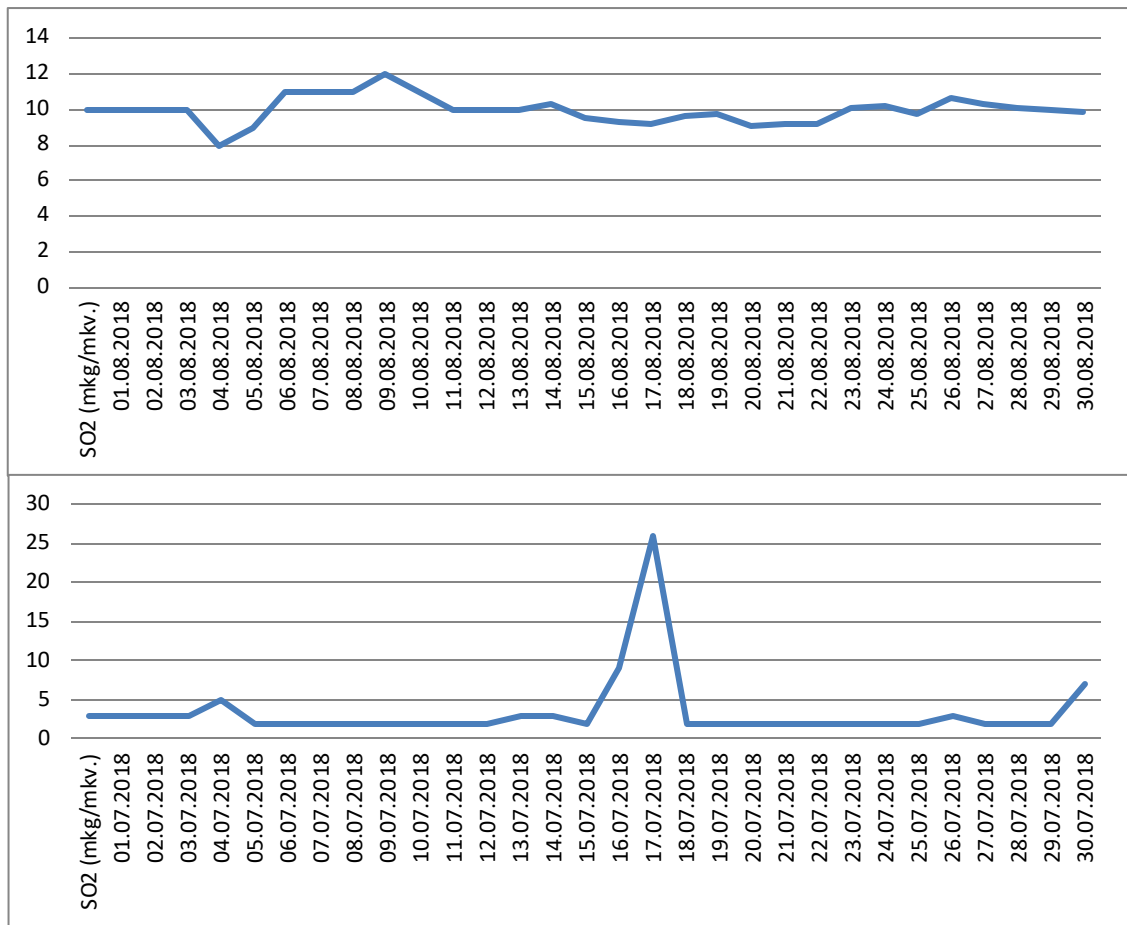
The approach allows for the correlation between the city's population, the harmful substances emptied from the landfill and the diseases caused by these contamination, according to the formula (1).

Table no 1 Street Average monthly concentration of the auto station in Kutaisi

Kutaisi	SO <sub>2</sub> (mkg/m.kv.)
08.2018	9.54
07.2018	2.8

Source: Ministry of Environment Protection and Agriculture of Georgia, National Environmental Agency.

Figure no 1. Concentration dynamics (August, 2018)



Source: Authors's contribution after Ministry of Environment Protection and Agriculture of Georgia, National Environmental Agency.

Harmful substances derived from landfill and diseases caused by these contamination

Determined connection between Kutaisi residents X, some of the harmful substances ( $SO_2$ ) -Y from the landfill and the diseases caused by the contamination – Z correlation connection.

R = 84.71 in July, R = 85.69 in July and R = 87.6 in August. Compared to previous years the growth of correlation union is caused by increasing the scientific and technical potential of the society. In our case, other factors were not included in the pollution.

#### 4. Conclusions

It is noteworthy that the Wastewater Integrated Management Project is designed to create a waste sorting enterprise in a new regional landfill that will significantly facilitate the separation of wastes into different factions and further processing. Construction and operation of a new regional landfill will be carried out in compliance with the requirements and standards of the EU legislation (Kutaisi Strategy, 2016).

Providing adequate conservation of old landfills in order to eliminate and minimize ecological threat from landfills, demands:

- Conducting periodic monitoring of soil, air and ground waters, planning pollution assessment and mitigation measures due to landfills;
- Improving the organization of collection and disposal of municipal waste;
- Introduction of modern methods of waste management;
- Increasing public awareness and involvement in waste management;

- Facilitating the implementation of sustainable management principles of waste, primarily to minimize waste prevention and waste generation;
- Introduction of modern technologies for waste collection and processing;
- Creation and development of waste processing infrastructure;
- Gradual introduction and functioning of the segmented collection system of municipal waste;
- Ensuring the implementation of separation, processing and secondary use mechanisms;
- Development of a local waste management plan, which will discuss in detail the placement and management issues of construction and hazardous waste (including mercury, asbestos, etc).

The introduction of waste management systems ensures the sustainable development of the environment, the reduction of solid waste, recycling of solid waste and consequently improving environment and human health.

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