

# Negative role of uncontrolled landfills in Georgia in environmental pollution processes

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## Abstract

In the laboratories the special research were carried to determine the pollution level in the samples collected, which due to the direct impact of these types of landfill sites on the surrounding areas, are often the main polluters of environment. The pollution conditions were studied based on modern methodology and techniques (ISO methods).

The received results allow concluding:

- The pollution is different for the West and East Georgia. The analysis of the water and soil samples showed that the territories and water bodies adjacent to the landfills located in western Georgia are relatively less polluted than similar areas in the East Georgia;

- In the analysed samples concentrations of various polluting ingredients (heavy metals- Pb,Cu,Zn,Cd and biogenic elements- total coli forms, Fecal streptococci, and E. coli) determined from the soil and water samples exceeded the maximum permissible concentrations.

**Keywords:** uncontrolled landfills, heavy metals, maximum permissible concentrations, microbiological indicators

## 1. Introduction

Still in Georgia the household and municipal wastes are existing. Such landfills are disposed country wide. They are often located near settlements, pastures and gorges. Even this time it is often impossible to transport wastes from these sites for final disposal or/and to clean up the territory. Uncontrolled landfills remain on the places of disposal for years becoming one of the sources of pollution of the surrounding areas with different types of waste. Accordingly, the sanitary state of these areas is significantly deteriorated. It would be taken into

consideration that nearby these sites the small rivers are existing and there is possibility to pollute their waters from landfills. These rivers can transfer this pollution to long distances. These hot spots create the necessity of complex study of the risk of pollution of the environment (land resources, surface waters, in some cases the underground water resources).So, this problem is important as uncontrolled landfills may cause a significant problems to population health.

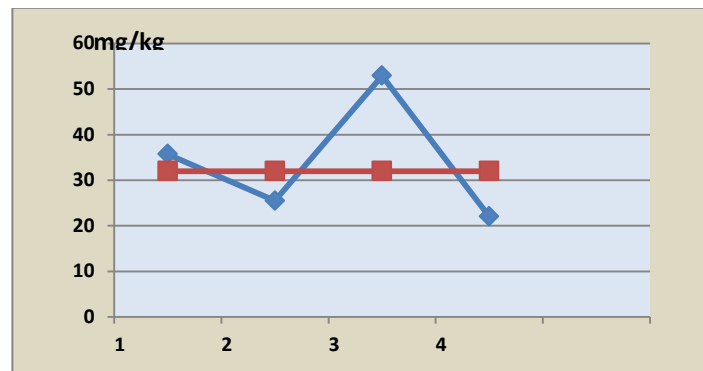
## 2. Objectives and Methods

Under laboratory conditions, using up-to-date methods and equipment (ISO methods) the polluting ingredients which frequently cause pollution of ecosystems as a result of direct impact of this type of landfills were identified in the samples. Therefore, we took samples (water, soil – 0-20 cm) in the field and some basic ions ( $\text{HCO}_3^-$ ,  $\text{Cl}^-$ ,  $\text{SO}_4^{2-}$ ), some forms of biogenic elements ( $\text{NO}_2^-$ ,  $\text{NO}_3^-$ ,  $\text{NH}_4^+$ ,  $\text{PO}_4^{3-}$ ) and heavy metals (Cu, Zn, Pb, Cd, As, Hg) were measured in them. From the viewpoint of assessment of sanitary state of territories adjacent to landfills, microbiological indicators. (indicator microorganisms), such as total Coliforms, fecal streptococci, and E-coli were also measured. Physical and chemical indicators (pH, temperature, electric conductivity, water dissolved oxygen, salinity) were measured in the field (if the landfill was situated on the riverside) using a mobile device. Thus, objects of our research were studied fully – from hydro-chemical and physical and chemical as well as from the microbiological standpoint.

### 3. Conclusion

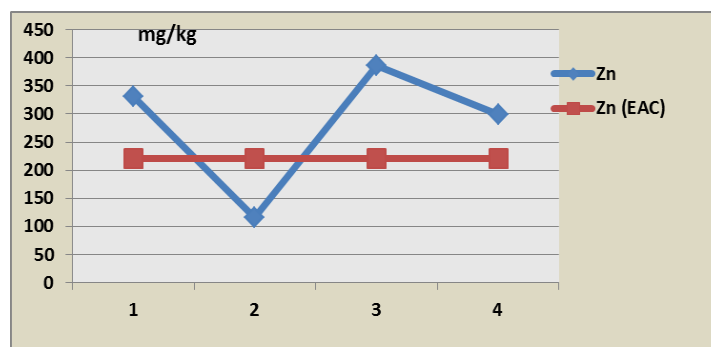
According to the results of the conducted analyses, we can conclude that uncontrolled landfills studied by us have certain impact on their adjacent territories. Therefore, though small but still negative role of these landfills is noticeable in river pollution processes. Increased concentrations of such heavy metals as Pb, Cu, and Zn were identified in soil samples, while presence of

Cd and Hg was registered in none of the cases. Slightly increased level of ammonia ions are sometimes noticed in rivers. According to the results of microbiological analyses, we can state that uncontrolled landfills located nearby the rivers have small impact on their ecological state.



**Figure 1.** The Lead concentration in the soil samples collected in Kakheti Region

- 1 - vil. Nukriani
  - 2 - vil. Zemo Magharo
  - 3 - Telavi ci
  - 4 - background
- Pb - concentration
  - Pb - MPC



**Figure 2.** The Zinc concentration in the soil samples collected in Imereti Region

- 1 - vil. Chognari
  - 2 - vil. Chognari (background)
  - 3 - vil. Kukhi
  - 4 - vil. Kukhi (background)
- Zn - concentration
  - Zn - EAC

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