

THE SIGNIFICANCE OF GARBAGE DUMP 'SMILJEVIĆI' IN ECOLOGICAL HEALTH

ZDRAVSTVENO-EKOLOŠKI ZNAČAJ DEPONIJE „SMILJEVIĆI“

Pazina Nedžad¹, Mahmutović Omer², Sejfo Papić¹, Velić Safet¹

¹Assistant professor Faculty of educational sciences University of Sarajevo

²Associate professor Faculty of educational sciences University of Sarajevo

ABSTRACT

The impact of the Smiljevići garbage dump on the environment and on the health of the population living in the immediate area as well as in the wider area of Sarajevo was examined in this paper. All the waste collected in Sarajevo Canton is brought to the city's garbage dump Smiljevići, with a total area of 60ha. Waste water, from the entire dump which is contaminated with chemical and biological pollutants, is released directly into the Lepenički potok, which then flows into the river Bosna. Waste water purification system has never been put into operation. Waste water is contaminated with chemical and biological contaminants and presents a danger to the surrounding population that uses the water from the Lepenički stream for irrigation. The garbage dump releases source emissions of harmful substances that could come from mobile sources such as vehicles carrying out waste disposal, as well as from immovable sources, including facilities within the garbage dump. Air pollution is particularly dangerous to the population living near the garbage dump.

Keywords: garbage dump "Smiljevići", the impact of the garbage dump on the environment, waste water

REZIME

U ovom radu je istraživana uticaj gradske deponije "Smiljevići" na okoliš i na zdravlje stanovništva koje živi u neposrednoj blizini kao i na širem području grada Sarajeva. Sav otpad koji se prikupi u Kantonu Sarajevo se odloži na gradsku deponiju u Smiljevićima čija je ukupna površina 60h. Procjedne vode sa čitave deponije koje su kontaminirane hemijskim i biološkim zagađivačima ispuštaju se direktno u Lepenički potok koji se onda ulijeva u rijeku Bosnu. Sistem za prečišćavanje pojedinih voda nikad nije stavljen u funkciju. Procjedne vode su kontaminirane hemijskim i biološkim kontaminantima i predstavljaju opasnost za okolno stanovništvo koje koristi vodu iz Lepeničkog potoka za navodnjavanje njiva. Odlagalište komunalnog otpada ispušta izvore emisije štetnih materija koje mogu biti iz pokretnih izvora od vozila koja vrše dostavu i depopovanje otpada, kao i iz nepokretnih izvora i to objekata koja se nalaze u sklopu odlagališta kao i samog odlagališta. Zagađenje zraka je posebno opasno na stanovništvo koj živi u neposrednoj blizini deponije.

Ključne riječi: deponija „Smiljevići“, uticaj deponije na okoliš, pojedne vode

1. INTRODUCTION

The existence of uncontrolled waste landfills represents an ecological threat to ground and surface waters pollution and the generation of harmful gases. The construction of new landfills and the quality of existing landfills will reduce the risk of environmental pollution. Disposed

waste, in most cases, is very active. The decomposition process of the organic part of the waste generates landfill gas, and in contact waste with water, arises leachate waters. Therefore, soil and water have become a major source of toxic organic compounds, heavy metals, nitrates, phosphates, and other dangerous substances. They can also reach up to water courses.

Waste is classified according to the place of origin, including: municipal waste, industrial waste, hospital waste, sewage sludge, waste as a result of traffic, slag and ash from waste incinerators and other waste (1). Adequate waste landfill must have the possibility of acceptance and purification of the catchment waters and provision of a degassing system.

The municipal waste landfill "Smiljevići", built in the 1960s, is the location production and commercial space located in the locality Buća Potok, Novi Grad municipality. All the waste that is collected in the Canton of Sarajevo are placed on the city dump in Smiljevici. The surface area of prepared landfill for sanitary disposal of waste is 122.400 m². In the period from 1962 to 1997, an uncontrolled dumping on the Sarajevo landfill was carried out. The result of such disposal of municipal waste is that in that period, the "Smiljevici" landfill had three methane explosions, one of which (1981) had tragic consequences when seven people were killed, who at that moment were extracting secondary raw materials. The "Smiljevici" landfill has been a real air pollutant in Sarajevo for years, which has also affected the pollution of watercourses, the appearance of intolerable odour throughout the city, the appearance of various insects, birds and animals, and in the summer period this problem escalated to the appearance of infectious diseases in the surrounding settlements (2). The "Smiljevici" municipal waste collection plan was approved by the Federal Ministry of Environment and Tourism on 23 April 2013. (3).

2. MATERIAL AND METHODS

All the available literature and materials related to the Smiljevici waste dump and the most important data collected by the descriptive method were used for this work. In addition, field work has been used - several times it has been dispatched to the landfill itself. Particular attention is paid to the place where all the waste water is collected from landfill sites that pose great ecological danger.

3. RESULTS AND DISCUSSION

The negative impacts of landfills on the environment are reflected in water, air, soil, flora and fauna, influences on the population and material goods. Unwanted occurrences that may occur are:

1. air pollution and explosion of gases
2. ground and surface water contamination
3. soil contamination with unpleasant odors, lightweight material spreading and noise

3.1. Influence of landfill onto the water

Groundwater and surface water, when in contact with the waste, are polluted depending on the characteristics of the decomposed waste and the amount of water that is permeated through the dumpsite body. Further movement of the water in the soil, underground or surface, can cause pollution. In the wider area of the "Smiljevici" landfill, evacuation of surface and flowing waters takes place in the Lepenički potok, where they are poured without any treatment and directly into the river Bosna.

The membrane system for wastewater treatment has never been profited and represents a major environmental hazard. There are three types of catchment waters: the surface water that passes through the surface layers of the dumps, the deep water passing through the deeper layers of landfills that were dealt with tens of years ago, and the third species is the calotte - a source of water that was sometimes buried with garbage and it is now sprinkled through garbage layers. Before the discharge of wastewaters into surface waters, they should be cleaned up to the quality

that corresponds to the Decree on the conditions of discharge of wastewater to natural recipients and the public sewerage system (4). The landfill measures the basic parameters of wastewater such as temperature, pH value, BPK, HPK, water color, sludge concentration and electrical conductivity, but for some more serious analysis and assessment of ecological impact some further tests are required such as microbiological and heavy metal analysis. The particular problem of the influence of the catching waters is that the Lepenički potok flows through their own fields that some of them irrigate from the stream.

The Lepenički's stream continues to flow into the Bosna river with all its pollution loads. Under certain urgent needs, certain measures should be taken to find ways of scrubbing, as prescribed by law, and to stop such brutal pollution of the environment.



Photo 1. Place where collecting water from the "Smiljevici" landfill (PHOTO: N.Prazina, 2018)



Photo 2. Outflow of drainage waters from Smiljevici landfill into Lepenički potok (PHOTO: N.Prazina, 2018)

3.2. Influence of landfill onto air

Waste disposal site of municipal waste releases emission sources of harmful substances that can be from mobile sources from vehicles carrying out waste disposal, as well as from immovable sources, including facilities located within the landfill as well as one itself. The surface of the decomposed waste is the source of the emission if the landfill is not equipped with a degassing system. Disposal gases are gases created by physical, chemical and biological processes in decommissioned waste.

In addition to methane and carbon dioxide, traces may also contain carcinogenic substances. Potential problems that may arise regarding the uncontrolled emissions of landfill gas into the air and its migration to the underworld are:

- methane explosion and self-ignition of waste,
- groundwater contamination,
- physical destruction of the covering layer,
- unpleasant smells,
- damage and destruction of vegetation,

- contribution to the "greenhouse effect".

During the remediation of the landfill, air pollution can be expected due to cargo and other work vehicles and construction operations. At the location, the air can be contaminated by floating particles and exhaust gases as fuel combustion products. These impacts will only be present on the narrower location of the works and their temporary character. Also, temporal air pollution, local and temporary, may be expected during the transfer of waste (5).

The Sarajevo's landfill has a decommissioning system where further accumulation of gas in the landfill is prevented and reduced probability of re-fire and explosion, but the depot continues to spread unpleasant smells that seriously disturb the living environment of the surrounding population and affect their health. Particularly vulnerable is the younger population with more respiratory illnesses year by year (6). Several cases of leukemia in children living near the landfill further complicate this problem and require prompt intervention until it is late.

3.3. Impact of landfill onto land

The landfill extends over 60 acres of territory and is continually spreading permanently devastating in this way a huge area extending close to the settlement.

Possible consequences of waste material on land are:

- Possible damaging impacts on the surrounding land area, ie impact on the health of plants, humans and animals,
- Possibilities for contamination by soil and water,
- Danger may be due to the presence of radioactive substances,
- Possibilities of soil contamination at and around dumps with dump filter,
- Possibility of polluting the surrounding plots by spraying dust, small particles and powders emitting them, which, due to infiltration, enter the soil,
- Possibility of land leaching under the dumpsite (7).

3.4. Influence of landfill onto flora and fauna

The area occupied by the landfill in the fence is 60 hectares and if no reclamation and sanitary disposal measures are applied, it can significantly undermine the landscape values. The presence of methane in the composition of landfill gas of 100-400 ppm of methane can cause partial damage to vegetation and in the values of 400-1000 ppm of methane it prevents vegetation growth. The Sarajevo's sanitary landfill is situated in a natural slope with a low vegetation that is in the urban area and has no particularly valuable floristic and faunistic values. In order to prevent disturbance of the landscape value of abandoned landfills, landfills are recultivated by placing a humus layer and planting low vegetation and ornamental tree.

3.5. Influence onto population and property

As the landfill is in the immediate vicinity of the settlement, the following influences on the population may occur:

- transfer of infectious diseases due to unsanitary disposal of waste of unhindered access to landfills
- air pollution due to tanning and burning of garbage
- possible explosions
- the appearance of unpleasant smells.
- It is especially important to know the relationship between human health and epidemiology, ie possible samples of biological soil infection:
- bacterial diseases,
- viruses,
- mycoses,
- mouse fever,

- Non-contagious infections

Some of these impacts have been minimized by applying certain measures, but there is still the problem of gases spreading from the landfill that affects the life and tune of the surrounding population with an unpleasant odor and composition itself. We have also noted that flooding is a major danger and risk to the population.

4. ENVIRONMENTAL PROTECTION MEASURES

4.1. Mitigation measures for air pollution

When it comes to mitigation measures, the basic meteorological parameters (wind speed and direction, temperature, relative humidity and air pressure) should be monitored (Environmental impact study of the "Palice - Hum" commune waste disposal Vitez municipality, 2014).

At the Sarajevo's landfill an additional gas accumulation was prevented by building a degassing system and exploitation in the body of landfill, reducing the likelihood of re-fire and explosion, thus minimizing possible negative impacts on air quality. Closure of the landfill will provide a covering layer on the entire surface of the deposited material, thereby completely preventing air pollution (3).

4.2. Measures for soil protection

Determining the current soil contamination at the site of landfill involves land sampling and analysis according to the Rule book on determination of permissible quantities of hazardous and noxious substances in the land and their testing methods (12). After the final closure of the landfill, afforestation is foreseen, with the final layer being at least 100 cm to avoid deformation and erosion of the final covering layer. It is recommended to plant autochthonous tree species: Oak Quill, Common Grab (Quercus - Carpinetum iliricum) and Beech (Fagetum montanum). The first 5 to 10 years require frequent maintenance and is one of the most important factors for successful tree maintenance in life (3)

4.3. Water protection measures

The precipitation and precipitation water that is being produced in the landfill site should be treated in advance in the treatment regeneration, thus achieving the required degree of purification of PSP% and then purified as the effluent of the qualitative quality through the built system, leaving the natural recipients-Lepenički potok, in accordance with the applicable regulations :

- a. Water protection act (8),
- b. Regulation on watercourse categorization (9),
- c. Rule book on the species, method and extent of measurement and testing of wastewater, waste water and extracted material from watercourses (10),
- d. Decision on maximum permissible concentrations of radionuclides and dangerous substances in interpublishing waters, interstate waters and coastal waters (11).
- e. Regulation on conditions and discharge of waste water into natural receptacles and public sewerage systems (4).

4.4. Measures to protect flora and fauna

By rehabilitating the existing landfill, conditions for the reconstruction of certain habitats will be created, which will positively influence the further development of flora and fauna. There is a danger of creating habitats of non-autochthonous species, as well as an increased number of habitats and migration of birds to landfills. The landfill is fenced with a concrete fence height of 2.5 m to prevent the entry of larger animals into the landfill site, but also small rodents as one of the major transmissible infections (3).

5. CONCLUSION

The immediate vicinity of the Sarajevo's landfill and settlement requires, in addition to all measures taken, even greater engagement and care because its impact on the health of the surrounding population is unquestionable. The impact on air and water pollution is the most visible and urgent measures need to be taken to reduce this impact. Wastes of unpleasant smells spread in the landfill, where it is possible to have very dangerous and carcinogenic compounds. The appearance of leukemia in a few children may be related to this and it is necessary to carry out analyzes to protect the population. It is unacceptable that the polluting waters are not cleaned before they are released into the recipient because it is very dangerous to the environment and contrary to the Law on water protection.

6. LITERATURE

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