



Landfills in greater Beirut area: A protracted part of municipal solid waste management

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Abstract

Municipal solid waste management in Lebanon is problematic. The vast majority of municipalities rely on open dumping and open burning. In Beirut and its surrounding area Mount Lebanon, waste management is centralized. By a governmental decision, waste is dumped in two landfills: Bourj Hammoud-Jdeideh and Costa Brava. They are alternative to the Naameh landfill which operated for 17 years. Further to Beirut explosion in August 4th, 2020, all the wastes entering the landfills became unsorted and untreated. This decreased the lifetime of the landfills which required expanding new cells. Due to the economic crisis, companies are not participating in the waste management tenders launched. It is feared that the solid waste crisis manifested by wastes piling up on the streets will happen again after similarly to the events in 2015 and in 1997. Since waste collected within Greater Beirut area is not sorted, composted, and recycled, hope is individual awareness and private companies expand to reduce the landfilled waste to delay or halt the awaited waste crisis in late 2024. The objective of this paper is to review the waste management issue to urge finding new alternatives the soonest possible to prevent great environmental damage with its associated health impacts.

Keywords: Municipal solid waste, Landfills, Waste crisis, Waste solution, Environmental hazards.

Introduction

Lebanon faces several environmental problems including municipal solid waste (MSW) management. The management of this sector was centralized in the 2 governorates Beirut and Mount Lebanon while in the other three governorates it is endorsed to municipalities. The main disposal methods are open dumping and open burning. In Beirut and Mount Lebanon, the disposal method has been landfilling since 1997. Only 23% of national MSW has been recovered by composting and recycling inferior to the possible percentage of recovery which is more than 85%. Landfilling is not only an unsustainable solution in waste management, but it has also become unfeasible in Mount Lebanon due to the lack of spaces for landfilling. The following sections will briefly cover the status of municipal solid waste and the landfills in Mount Lebanon since relying on them for over 20 years has inevitably affected people's perspective on waste management and their role in it. Moreover, it will give them insights for future sustainable strategies in waste management.

Municipal solid waste and its management

Municipal solid waste (MSW) makes up about 90% of the total solid waste generated. MSW average generation per capita is 1.05kg/d. The high production rate, 1.2kg/d, mainly corresponds to the region of Beirut and part of Mount Lebanon. In year 2013, 2 million tons of waste were generated countrywide with 51% coming from Greater Beirut Area (Beirut and Mount Lebanon) alone. Organic wastes are the largest component of the waste stream averaging 53% followed by potentially recyclable material (31%) then *other* wastes (16%). As for municipal waste collection, the coverage is high reaching 99 % (Sweep-net, 2014). Municipal solid waste is not sustainably managed because of poor legislative framework and lack of laws' enforcement (MoE/UNDP, 2017; De Quero-Navarro et al., 2020).

Status of landfills in Greater Beirut Area

There are three sanitary landfills in Mount Lebanon of which one is closed and two are still operating. They share being constructed and operated due to a governmental decision as emergency responses to solid waste crises. Thus, regardless of being sanitary, they lost their appeal to the public and were not

endorsed in municipalities (except for two landfills across Lebanon). The first landfill constructed in Mount Lebanon is Naameh sanitary landfill. It covered 300,000m², operated for 17 years, and received 14 million tons of waste. Although it operated way more than its intended time of operation (8 years) and received waste seven times its original estimated capacity (2 million tons), the landfill was properly operated and avoided causing a hazard on the surrounding groundwater quality (Citton et al., 2020; Khadra and Stuyfzand, 2014). Consequent research is being done on the surrounding groundwater quality, quality of compost, and of leachate generated and treated from the landfill (Sawaya et al., 2021). However, back then with uncertainty of the hazards to the public, and with unfulfilled promises to close the landfill for operating for too long, it was closed by protestors year 2015 only to re-open again in 2016 for 2 months to collect the garbage piled up on the streets across Beirut and Mount Lebanon in what is known as the 2015 solid waste crisis.

After closure of Naameh landfill, it was decided to dump wastes in two coastal landfills: Bourj-Hammoud-Jdeideh and Costa Brava. These landfills were already treated as dumpsites thus were rehabilitated and constructed to receive wastes for 4 years, from 2016 to 2020. Yet, due to failure of the public sector to implement sustainable solutions in waste management, and the impossibility to find new areas to landfill waste, these landfills kept operating till present. New cells have been extended but their capacity will be reached by 2024 and by then sustainable management must take place else another waste crisis will be awaiting.

Conclusion

The waste crisis year 2015 had a positive impact on people's attitude in waste management by working on the hierarchy of re-using, recycling, and composting. Moreover, the economic crisis that emerged year 2019 had two effects in this area. The first was reduction in consumption and thus in waste generation while the second was promoting private companies to collect recyclables and thus aid in

reducing wastes to be landfilled. Although environmental awareness has increased since then, it is far from enough to induce changes in the population's tasks in waste management. Laws should be upgraded and implemented. Likewise, municipalities should take responsibility individually away from the old centralized scenario. They may manage wastes in affordable costs and with good benefits as is the case with a few but pioneering municipalities in this domain.

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