

SANITARY LANDFILL IS A SOLUTION IN SOLID WASTE MANAGEMENT OR A SILENT THREAT TO ENVIRONMENT: MALAYSIAN SCENARIO

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Abstract: In Malaysia, the population is increasing at a rapid rate reaching 32.6 million in 2019. This has resulted in a tremendous amount of solid wastes being generated which was estimated as about 38,200 tons per day (1.12 kg/cap/day), in 2018 enough to fill the Twin Towers every seven days. 82.5% of which is disposed of in landfills. If not managed properly landfills can cause detrimental effects to environment, humans and aquatic world. Most of the landfills in Malaysia are lagging with adequate facilities. This paper encompasses the sections of history of solid waste management in Malaysia from 1970 to present, followed by some alarming and dreadful cases of pollution due to ill management of landfills and lastly some of the substantial measures to combat with the acute problem of solid waste focussing on the responsibilities of government, manufacturer and user. Whether it be creating awareness among people and implementing laws, 3R strategy or thinking before throwing all play vial role in solid waste management. Collective and consistent effort is essential to achieve Malaysia's targeted recycling rate of 22% by 2020 and hence achieving Malaysian vision with greater advancement towards a zero-waste nation.

Keywords: Solid Waste; Landfill; Leachate; Pollution; Recycling

1. Introduction

The tremendous trend on the increasing of solid waste generation led to the potential threat to the environment, society and economic losses as the dependence on the landfill as the main disposal method which is particularly causing serious environmental problems such as soil contamination, leachate, gas emission, and air pollution [1]. Proper solid waste management present an opportunity not only to avoid the detrimental impacts associated with waste, but it can recover resources, environment, economic, social benefits which towards to the sustainable future. National development plans and solid waste management plans in Malaysia are compiled (Figure 1) to provides a timeline of Malaysia's solid waste management from the late 1970s to the present.

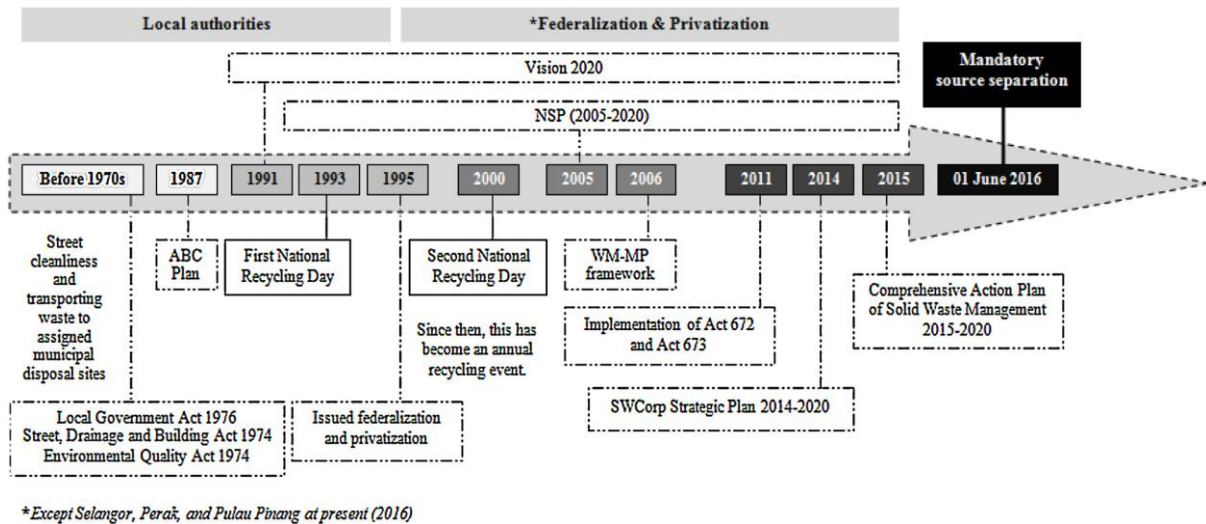


Figure 1. Solid Waste Management Policies and Plans Transformation in Malaysia [2]

1.1. Landfills

Landfill is the most common MSW disposal method due to the simple disposal procedure, low cost, and landscape-restoring effect. The primary objective of the landfill site design is to provide effective control measures to prevent negative effects on surface water, groundwater, soil and air. As a final dumping area for solid waste, the landfill is the most efficient way to settle the collected waste. The classification of landfill sites in Malaysia with their available facilities are summarised in table 1. In this section we will read about the number of sanitary and non-sanitary landfills and their location.

Table 1 Classification of landfill sites in Malaysia [2]

Levels	Available facilities	
I	Controlled dumping	Minimum infrastructure (fencing and perimeter drains)
II	Sanitary landfill with daily cover	Class I facilities (with gas removal system, separate unloading and working area, daily cover and enclosing bund (divider constructed as the embankment of different waste cells))
III	Sanitary landfill with leachate circulation	Class II facilities (with leachate recirculation system allowing the collection, recirculation and monitoring of landfill leachate)
IV	Sanitary landfill with leachate treatment	Class III facilities (with leachate treatment system)

2. Waste management acts and regulations in Malaysia (historical background)

Malaysia establishes the Action Plan for Beautiful and Clean (ABC Plan) country, a management system for solid waste that includes every state of Malaysia. This plan brings perks in enhancing Malaysia's image as a beautiful and clean country. Moreover, this ABC Plan is economically and environmentally friendly and should be easily accepted by the

community [3]. Under the supervision of Tun Dato Seri Dr Mahathir bin Mohamad as the 4th Prime Minister the Sixth Malaysian Plan was introduced in 1991.

He also structured Malaysia to come out with the Vision 2020, a vision that plans for the nation by the year of 2020 to be a fully developed country. Respectively, the ABC Plan leads to the recycling program first in the year 1993 and secondly in the year 2000. Started from November 11, 2000, the National Recycling Day was proclaimed to be an annual event for Malaysia. The recycling program encourages households to practice 3Rs habit, that comes with the tagline "*Think before you throw*". Later in this section it is discussed at length about how privatisation came into existence and about the enforcement of different plans and acts like NSP and Act 672 were formulated and enforced and the outcome of them.

3. Case studies at distinct locations directly or indirectly related to ill management of solid waste disposal or landfills

3.1. Landfill pollutants leaching into sea [4]

Fish farmers near Penang's Pulau Burung sanitary landfill are blaming the facility for emitting pollution that harms their cage-bred fish. There are about 150 fish farms, forming one of the largest clusters of floating fish farms in Malaysia, and they are located 2km from Penang's only sanitary landfill. The fish farms produce 20,000 tonnes of fish yearly, including for export to Singapore and Hong Kong. Fishermen are blaming the landfill for recent fish deaths in their nets and cages and are accusing the landfill which is managed by the Seberang Prai Municipal Council of illegally discharging leachate into the sea. Blackish water was found flowing into the sea, believed to be leachate from the landfill. Shortly after that tonnes of fish floated belly up in their cages. The fishermen want the department of environment (DoE) and the fisheries department to conduct an urgent investigation into the effects of the Pulau Burung landfill, which is located 6km northwest of Nibong Tebal, on the coastal waters. It was reported at least 1,700 to 1,800 tonnes of rubbish is dumped at the landfill on daily basis and at the time of rainfall, the drains are not able to contain the leachate and it leaks out to the sea. If the bund was built using concrete, it could have held back the leachate. This section incorporates many more case studies based on leachate contamination, burning of solid waste at the landfill site, severe consequences related to import of plastics, attitude and awareness of Malaysians to deal with solid waste, landfill capacities and illegal dumping of solid waste in prime cities. We can understand about the current Malaysian Scenario in solid waste management.

4.0 Substantial measures to be taken to control solid waste ill effects

4.1 Solid Waste Minimization through Recycling

Recycling is one of the fundamental parts of the solid waste minimization plan which the most desirable approach in reducing the amount of solid waste generation dumped in the landfill [5]. However, to attain the recycling targets, the solid waste management essentially requires an involvement from the local community as it largely depends on the household awareness regarding the solid waste recycling issues rather than focused on the local authority responsibility services [6]. This was followed by the role of government, manufacturer and an individual in the recycling and overall solid waste management.

5.0 Conclusion

This paper provides brief introduction about the Malaysian history of solid waste management policy and plan strategies to highlight the transformation of its policy and plan strategies since the late 1970s to the present, followed by some alarming incidents reported in different Malaysian areas with their detrimental effects to the environment and the people. Lastly, we have incorporated substantial measures to minimize the solid waste.

References

- [1] Agamuthu, P and Fauziah, S, H. 2011. Challenges and Issues In Moving Towards Sustainable Landfilling In A Transitory Country – Malaysia, *Waste Management and Research*, 29 (1), 13-19.
- [2] Moh, Y.C., and Manaf, L. A. 2017. Solid Waste Management Transformation And Future Challenges Of Source Separation And Recycling Practice in Malaysia, *Resources, Conservation and Recycling*, 116, 1–14.
- [3] Ministry of Housing and Local Government. 2006. The Study of National Waste Minimization in Malaysia Final Report. In cooperation with Japan International Cooperation Agency (JICA). Retrieved from <http://jpspn.kpkt.gov.my/>
- [4] Chern, L.T. 2019. Landfill pollutants leaching into sea, The Star Online, retrieved from <https://www.thestar.com.my/news/nation/2019/09/16/farmers-landfill-pollutants-leaching-into-sea>
- [5] Dinie, M. and Don, M., M. 2013. Municipal Solid Waste Management in Malaysia: Current Practices, Challenges and Prospect, *Jurnal Teknologi (Sciences & Engineering)* 62:1, 95–101.
- [6] Keramitsoglou, K., M and Tsagarakis, K., P. 2013. Public Participation In Designing A Recycling Scheme Towards Maximum Public Acceptance. *Resources, Conservation and Recycling*, 70, 55-67.