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**PROBLEMS AND CHALLENGES OF  
SOLID WASTE MANAGEMENT:  
A CASE STUDY IN SOUTH JOHOR, MALAYSIA**

by

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**Abstract**

Many urban areas in Malaysia are experiencing waste management problems due to the enhancement of urbanization and industrialization. These are further escalated by urban growth, changing consumption habits as well as social lifestyles. This new growth has been accompanied with an ever increasing rural-urban migration which culminates in the proliferation of squatter areas due to the scarcity of land and resources. The increase has given rise to collection and disposal problems which could pose as a potential environmental pollution and health risk to the general public through disease transmission. In this paper, the impact of solid waste management to the environment will be evaluated. It is also aim at introducing to the public the awareness of the health and safety risks caused by solid waste.

**Key Words**

Waste management, generation rate, waste stream health risk, environmental pollution, landfilling.

### **Introduction**

Everywhere as long as man's activities exist, wastes are generated. Mankind in search of progress and excellence, worked hard to achieve these objectives culminating into modern development through urbanization and industrialization. The usage of modern and sophisticated machineries further heightened the economic development and hence increased the production of wastes.

The volume of refuse, food wastes, industrial residuals, sludges, agricultural wastes and animal manures discarded and thrown out every year in most of the countries are increasing year by year. This increase in solid waste generation constitutes a hazard for the natural environment that have an acute impact on the human health [1]. Most of these environmental problems occur due to inefficient and poor management of solid waste, particularly during collection and disposal stages. Solid waste disposal is a problem every country is struggling to handle. Environmental degradation slowly destroys the quality of life, which in turn places a severe burden on a country's economy [2].

Malaysia has witnessed a tremendous economic growth within the last decade which has been accompanied with an ever increasing exodus from rural to urban areas. The lure for "a more secured and better way of life" is something that cannot be swept aside by the rural population. The total population of Malaysia has increased from 13.4 millions in 1980 to 17.7 millions in 1990 census data. The urban population has increased from 2.5 to 4.2 millions within the 1970 - 1980 period. This could be seen through the proliferation of squatter areas. The large bulk volume of solid waste produced due to the strong economic growth and large influx in rural-urban migration has strained the ability of most city authorities to manage the waste [3]. Scattered garbage on streets, rivers and public places are almost becoming a familiar sight.

### **Solid Waste Situation in Malaysia**

The quantity of municipal solid waste of most urban centres have more than doubled in size during the past decade. In a study carried out by Fan and Kheng, it was observed that Johor Bahru Municipal Council collects more than 0.5 kg of waste per person per day [4]. This figure is expected to increase to more than 0.8 kg/person/day by the year 1995. A knowledge of the sources, types, quantity and characteristics of the waste generated is important for the planning and design of an efficient management system. The estimated waste generated for some major towns in Peninsular Malaysia are given in Table 1.

**Table 1 : Solid wastes generated in major towns in Malaysia**

Urban Centre	Solid Waste Generated (tonnes/day)		
	1970	1980	1990
Kuala Lumpur	98.8	310.5	586.8
Johor Bahru	41.1	99.6	174.8
Ipoh	22.5	82.7	162.2
Georgetown	53.4	83.0	137.2
Klang	18.0	65.0	122.8
Kuala Terengganu	8.7	61.8	121.0
Kota Bharu	9.1	56.5	102.9
Kuantan	7.1	45.2	85.3
Seremban	13.4	45.1	85.2
Melaka	14.4	29.1	46.8

Source: Local Government [5]

A survey was carried out in 5 municipalities, Majlis Bandaraya Johor Bahru (MBJB), Majlis Daerah Muar Selatan (MDMS), Majlis Daerah Pontian (MDP), Majlis Daerah Mersing (MDM) and Pihak Berkuasa Tempatan Pasir Gudang (PBTPG), in the state of Johor. The estimated waste generation (kg per capital per day) for the above municipalities are as in Table 2.

**Table 2 : Waste generation per capita per day**

Municipalities	No. of Houses	Population	Waste Generation Rate
MBJB	65637	328646	(0.94)
MDMS	14401	79206	(0.96)
MDP	6164	33902	0.63*
MDM	2442	13431	0.40*
PBTPG	7146	39303	0.56**

- ( ) includes industrial wastes  
 \* includes commercial wastes  
 \*\* domestic wastes only

The principal sources of municipal solid wastes are generally from households and activities related to urban life such as market places, offices, restaurants, hospitals and governmental institutions. The composition of waste in modern way of life differ from the past and components such as plastic containers are hard to dispose through incineration or composting.

The increasing proportion of plastic wastes in the waste streams is becoming a concern in recent years. A case study was carried out in Johor Bahru area. From the study, a marked variations in some of the waste components could be seen in Table 3.

**Table 3: Different percentage of waste components in Johor Bahru**

Components	1986 (w/w %)	1992 (w/w %)
Organics	35.0	45.0
Paper & Cardboard	25.0	19.0
Plastic	3.0	12.0
Textiles	2.0	5.0
Yard Waste	15.0	7.0
Glass	3.0	3.0
Metals	5.0	9.0
Miscellaneous		-

Source: Pillay (6) Hani and Othman (7)

### Managing The Waste

During a one week survey carried out at Taman Ungku Tun Aminah, Johor Bahru, a range of waste streams observed are listed in Table 4.

**Table 4: Range of waste streams collected at Taman Ungku Tun Aminah, Johor Bahru**

Components	Range of Each Components (w/w%)
Organic	47.0 - 63.0
Paper & Cardboard	8.0 - 18.0
Plastic	7.5 - 17.0
Textiles	0.0 - 4.0
Yard Wastes	0.5 - 9.5
Glass	2.0 - 5.5
Metals	5.0 - 12.5
Miscellaneous	0.0 - 5.0

Source: Abd Karim [8]

Generally, the waste generated in most cities in Malaysia are disposed directly to a dumping site. The rapid urban growth resulted in difficulties of siting a proper Landfill. Some activities at dumping sites as obtained from questionnaire on solid waste final disposal, February 1989 are shown in Table 5.

**Table 5: Activities found in dumping sites**

	Number of Dumping Sites in Municipal Councils	Number of dumping Sites in District Councils
With Scavengers	15 (79%)	68 (65%)
Without Scavengers	4 (21%)	37 (35%)
With Animals	15 (79%)	63 (56%)
Without Animals	4(21%)	49 (44%)
With Open Burning	6 (32%)	86 (75%)
Without Open Burning	13 (68%)	28 (25%)

Open dumps and open burning of garbage, although very common continue to be the main source of environmental problems which may include, air pollution, groundwater contamination, surface water pollution, odour generation, disease vector multiplication and hazardous gas production. These problems are escalated with the mushrooming of squatter communities nearby the dump sites, especially in swampy areas or along river estuaries. Scavenging becomes a familiar sight at dumping sites.

Samples from leachate ponds at two dumping sites in Johor Bahru were taken. The samples were analyzed for heavy metal contents and compared to the ambient water quality criteria for aquatic life protection of Malaysia (DEO-UM, 1986) and United States (EPA, 1980). The results are shown in Table 6.

**Table 6: Comparison of heavy metal contents for samples from Bandar Baru Uda (BBU) and Kempas Landfill Sites with ambient water quality criteria (DEO-UM) and United States (EPA)**

Metals	BBU (mg/l)	Kempas (mg/l)	DOE - UM (m/l)		US - EPA (Salwater-ug/l)	
			Max	Avc	Max 24hr	Avc
Cadmium	0.496	1.002	0.011	0.0007	NA	NA
Copper	0.829	0.818	0.012	0.008	23	4
Lead	0.014	0.007	0.014	0.0013	668	25
Nickel	1.287	0.223	0.9	NA	140	7.1
Zinc	0.205	0.200	0.35	NA	NA	58

### **Evaluations of Case Study**

Solid waste from household is particularly difficult to deal with as only a small amount of waste is produced at a very large number of places. The fact that household waste is much less well regulated than industrial waste along with its small generation, may mean that the waste has an environmental impact which is out of proportion to the quantity of waste and toxicity of its constituents. Surprisingly a wide range of chemical products are being used for our daily chores in the house. Household cleaners, garden chemicals, car care products many be toxic, flammable or corrosive. Products such as batteries and fluorescent lamps contains heavy metals. There is no doubt that excessive exposure to such certain toxic wastes may lead to serious human health effects and even death in some cases [9].

The change in waste compositions, especially in the increase in plastic as well as other packaging materials, are very visible. At the moment these wastes are disposed through landfilling. Plastic litter floating in rivers and seas is also causing a major concern to the environment. The disposal and burning of some types of plastic resins and additives which come out of leachate and in incinerator ashes, and in the emission of toxic gases such as furan and dioxin when burning halogenated plastic could possibly threaten public health [10]. Proper management of solid waste is therefore needed in order to reduce or contain these risks. The potential for recycling and reused the materials should be investigated, which could greatly reduced the amount of wastes to be disposed directly onto landfill site.

Although, landfilling proved to be most economical and acceptable methods for the disposal of solid wastes improper handling and disposal of solid waste could pose a potential health risk to the general public through disease transmission [11]. Children, vagrants and scavengers are particularly vulnerable to cuts and abrasions when exploring solid waste stored in public places, such as on the streets or in public litter bins or even at dumping sites. They might also pick up infection through direct hand-to-mouth route, if they gain access to contaminated waste.

Because it was an easy task to haul solid wastes to the edge of town and dump them onto land, open dumps become a common method of disposal for urban communities and burning on these dumps was widely practised. Open dumps attracted flies, rats and other disease vectors and caused ecological impacts such as water and air pollution. Poor solid waste disposal will encourage fly-breeding and may thus promote the transmission of faecal-oral infections notably cholera and typhoid, but also include a wide range of other diseases, such as infectious hepatitis, diarrhoea and dysenteries [2].

From the analysis of water quality, it was suspected that pollution has occurred at the sea shores where refuse is dumped near the river estuaries. Another threat that should not be ignored is the potential of leachate to pollute nearby water bodies. Levels of cadmium, copper and nickel were found to exceed both the DEO-UM and US-EPA criteria. Although the water can dilute the pollutants or metabolize them, large quantities of solid waste would contaminate the water.

### Conclusion

Although there are some things human beings cannot control, it is up to all of us to ensure that we mitigate our impact on the environment as much as possible to allow for continued development by future generations. Proper solid waste management as well as continuous environmental monitoring should be introduced by the authorities. Alternative management techniques which could minimise solid waste problems such as waste recycling and treatment of leachate should be investigated.

The public must be made aware of the awesome potential of the waste to pollute the environment if improperly handled and managed. Safety measures are thus essential for prevention and control of solid wastes exposure to minimise health risk to the various workers and general public. Public information programmes should be introduced to guide householders on refuse management in the home and to make aware of the health and safety risks to themselves and solid waste workers.

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