

SOLID WASTE MANAGEMENT PROBLEM IN KANDY MUNICIPAL COUNCIL – A CASE STUDY

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ABSTRACT

The Solid Waste Management (SWM) problem is currently a rigorous problem for the Sri Lankan Municipalities. Not only the urban areas the rural areas also started to suffer from this rapidly emerging problem which is causing so many problems to the society, economy and for many other areas. There is a great risk that new projects also end up as failures due to lack of expertise and proper guidance available with the Local Authorities. The primary reason for this deficiency is that the domain expertise is limited and expensive and hence the Local Authorities most of the time find it difficult to afford such expertise within their limited budgets. The lack of capacities of the Local Authorities in Sri Lanka is one of the dominant influences for this MC as well. The public awareness regarding SWM is truly in a worse situation. The collection of solid wastes is doing in an acceptable manner but yet there is no proper way defined for final disposal which is currently being dumped at Gohagoda dump, adjacent to the River Mahaweli. This paper discusses about the main impacts associated with current practices of waste management in Kandy Municipality.

Key Words: Solid Waste Management, Kandy Municipal Council, Gohagoda Dumping Site

1. INTRODUCTION

Kandy is second only to Colombo as the center of the Sri Lankan economy. It is the second-largest city of the island and the capital of Central Province of Sri Lanka. Many major corporations have large branch offices in Kandy and many industries include textiles, furniture, information technology and jewelry are found there. Many agriculture research centers are located throughout the city. Kandy is one of the eight world heritage sites in Sri Lanka. Also it is one of the major places where tourists are attracted mostly. The scenic beauty and the ancient pride lead the tourist attraction and also the floral and faunal diversity throughout the area are added values to that.

Though it is a much important city, nowadays it faces a growing problem of Wastes. Despite the persistence of solid waste disposal problem in Kandy for over quarter of a century or more, Kandy does not have a proper solid waste disposal system. All it does is to collect its solid wastes from the points of generation to dump it on a dumping ground. The generated Solid Wastes from the Kandy Municipal Council (KMC) are dumped at Gohagoda Solid Waste Dump Site

adjoining the country's longest river 'Mahaweli Ganga'. The leachates leaving the solid wastes pile have found their way into the waters of 'Mahaweli Ganga'.

Sri Lanka is located on the planet in the tropical region and in the Indian Sub-Continent. Also it is located between 60 and 100 North latitude and 800 and 820 Eastern longitude. The island country has four major climatic zones namely wet zone, dry zone, intermediate zone and arid zone. The total land area belongs to this country is 65,690 km² and having divided in to 9 major provinces and 25 districts. The population of the country is simply over 20 million. The GDP is around 700 \$ and the SW generation is around 0.89 kg/cap/ day (World Bank, 1999).

2. STUDY AREA

Kandy Municipal Council (KMC) is the second capital city of the country; also it is the capital of the central hills. The daily solid waste collection within the city limits is around 100 tons. Basically it belongs to the wet zone. The city is a large commercial area and most part of it is named as a world heritage due

to the ancient pride and the Temple of Tooth Relic. That is a major concern when attracting so many local and foreign tourists. Therefore the day time population is very high and even higher within the “Kandy Perahera” season. Industries including agriculture and others are also taken place here so the generation of solid wastes has become a big amount due to all above facts.

3. METHODOLOGY

The study consisted of following methods to find data in the SWM system at KMC.

1. Collect and review existing data from the KMC
2. Data and literature reviews from the past researches
3. Observations around the City and the dumpsite
4. Interviewing the Engineers, Public Health Inspectors, Technical Officers, Supervisors, Labourers and the Neighboring public to the Gohagoda Dump site

Available data were collected from the Municipal Council and the relevant governmental offices for further reviewing. Literature reviews were done using **Capacities of Solid Waste Management for Kandy MC**

past researches. Dump Site and Kandy city observations were used to clear up the image of the present SWM practices. Engineers, PHIs, Technical Officers, supervisors, Labourers and the Neighboring public to the Gohagoda Dump site were interviewed to gather data related to the SWM system in the area, mainly included available resources, collection procedure, health aspects, frequency of collection, collection rout planning, difficulties, possible improvements and the workers behavior.

4. STUDY FINDINGS AND CLARIFICATION

One of the main responsibilities of KMC is Municipal Solid Waste Management (MSW). Other services can also be shown such as planning and road maintenance. But the institutional arrangements for waste management are not consistent.

Here in KMC the Municipal Mechanical Engineer, the MOH, PHIs and Technical Officers are involved in the SWM works.

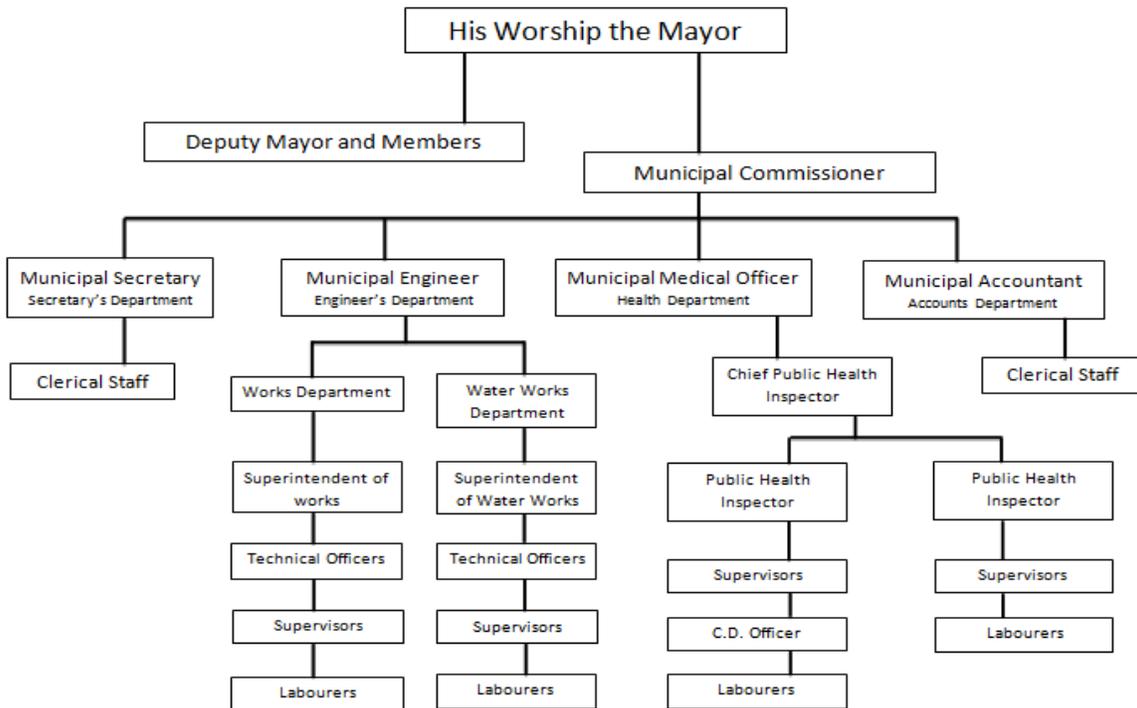


Figure01: Organizational Structure of KMC

Table 01: Statistical Data for Solid Waste Management Capacity in Kandy MC (Abstract data from Kandy Municipal Council Budget Document 2011)

Land Area/(km ²)	Population	Whether a Disposal Method is in place and it's success		Collection Methods			Number of Labours involved	Equipment Uses					Availability of other methods for SW treatment Yes/No	Daily Waste Collection (Ton)
		Yes/No	(%)	Main Streets	Sub Streets	From Households		S	T4	T2	C	O		
28.53	133,450	Yes	>75	Daily	Daily	Daily	262	7	15	-	97	-	No	~100

S – Special Waste carrying vehicles, T4 – Tractors with Tailors, T2 – Land Masters with Tailors, C – Hand Carts, O – Others

In Sri Lanka, the basic legal framework required for solid waste management is provided under a range of Government, Provincial Council and LA regulations and legislation. The sections 129, 130 and 131 of the Municipal Councils ordinance provide necessary legislation background for the MSW Management. 1980 According to the MC ordinance, all MSW generated within the boundary of MC is their property, and they are authorized to remove and dispose of those materials without causing any nuisance to the public. The views of officials of LAs obtained during this study were that these legislations are outdated and do not have the essential power to prevent indiscriminant dumping. The officials of KMC expressed their concern for the non-existence of government policies. Local authority officials involved in day-to-day operations were more concerned with the necessity for stringent legislation to control haphazard dumping of waste.

In KMC the revenue streams of LAs are property tax, license fees, assessment tax, fines and service charges. MCs spent approximately 14% of their budget for waste management (DCS, 1998). The majority of that money is spent as salaries to staff and Labourers, fuel for vehicles and vehicle maintenance. The expenditure on final disposal is low. In Sri Lanka it is not yet introduced a solid waste collection fee on

households. Instead of a collection fee only a property tax is being collected from the citizens, quarterly to get aid for the SWM. Therefore the politicians and the officials are thinking of a fee collection system for SWM in order to find necessary monetary assistance.

While there are standards for industrial effluent discharge, there are no prescribed standards for disposal of MSW in landfills. Currently KMC is not disposing waste in an environmentally conventional manner are dealt with under Section 12 of NEA and the Public Nuisance Ordinance. Although, it is already developed general guidelines for waste disposal site selection, achievable environmental standards are urgently needed.

In Sri Lanka Solid Waste Generation of the municipal councils around 0.65 – 0.85 (kg/day/person), (UNEP 2011) and it has a high content of organic matter, moderate content of plastics and paper and low content of metal and glass and also having high moisture contents in it. In Kandy MC there is no proper method for the determination of the amount of Solid Waste Collection. The only way of expressing the amount of solid waste collection is telling the No. of loads which were brought to the dumping site. Typical collection vehicles are handcarts, two-wheeled tractors, and four-wheeled tractors (See Table 01). Apart from those Kandy MC has compactor trucks (Special Waste Carrying vehicles) as well. Mainly the collection vehicle type is selected due to the

conditions of the collection route. If the road is wide then a 4 wheel tractor or Compactor truck can be used. Due to poor planning and inappropriate use of collection vehicles for other purposes has made worse conditions. Transport vehicles cause wind-blown litter, spreading odour and flies throughout the collection area due to the absence of a cover for wastes while transporting.

The Solid Waste Management Section of Kandy MC is running under one Mechanical Engineer and 4 Public Health Inspectors. Followings are the major services those are allocated for this section to perform.

- Waste Collection and Disposal
- Lavatory Services
- Cleaning works at the central market area and the Menik Kumbura Market area
- Maintenance and Services works at the Gohagoda Landfill site
- Controlling Infectious Diseases and Services
- Supervise the cleaning duties in the Municipal area

To formalize the waste management services, the entire Municipal area is sub divided in to 5 major sections as follows.

Zone – 1: Consist of 2 major sections

A – The Centre of the city. The cleaning services are performed as a special project

B – Closer areas to the city Ampitiya, Around the Kandy Lake, Deiyannewela areas

Zone – 2: Mahaiyawa, Aniwatte, Dodamwala, Poornawatte areas

Zone – 3: Peradeniya, Getambe areas

Zone – 4: Katugastota, Mawilmada areas

Zone – 5: Aruppola, Watapuluwa areas

The final dumping of solid waste is done at Gohagoda which is called as “Thekkawatta” Landfill site, Gohagoda. It was started to dump waste since 1970’s. The Land is owned by Kandy Municipal Council though it is located in Harispaththuwa Pradeshiya Sabha area. The Mahaweli River flows 200 m below the site in it Western side beyond a paddy field. Other area mainly consists of paddy land and residence facilities for workers of Kandy MC and the Landfill. The active filling area is located in a steep slope area, which has already filled up to the access road elevation. The site is situated in Mid Country wet zone, which receive annual rainfall of 2500 mm with Binomial distribution pattern. There is a small stream at the bottom of the landfill site which connects to the Mahaweli River 300 m away from the site. The stream already contaminated with leachate and it has directly diverted to the Mahaweli River without using for Irrigation of paddy field or domestic use. The catchments area of the dumping site is approx. 3.5 ha including the active filling area. The active dumping area is about 2.5 Ha. The land uses of the surrounding are mainly residential and agricultural.

There are no environmental protections measures are taken for solid waste disposal here in the dump site. The executive organization stands for collection of wastes is Kandy Municipal Council. These wastes are consisted of household wastes, market wastes, commercial wastes and wastes from drains. In order to that Health Care wastes and Industrial wastes are also coming in to the dumping site. Previously the sewages of the Kandy MC were also brought to the treatment plant located nearby the dumping ground which is currently not functioning. Therefore sewages are taken away from Gohagoda where there is a new waste water treatment facility established in Hantana area.

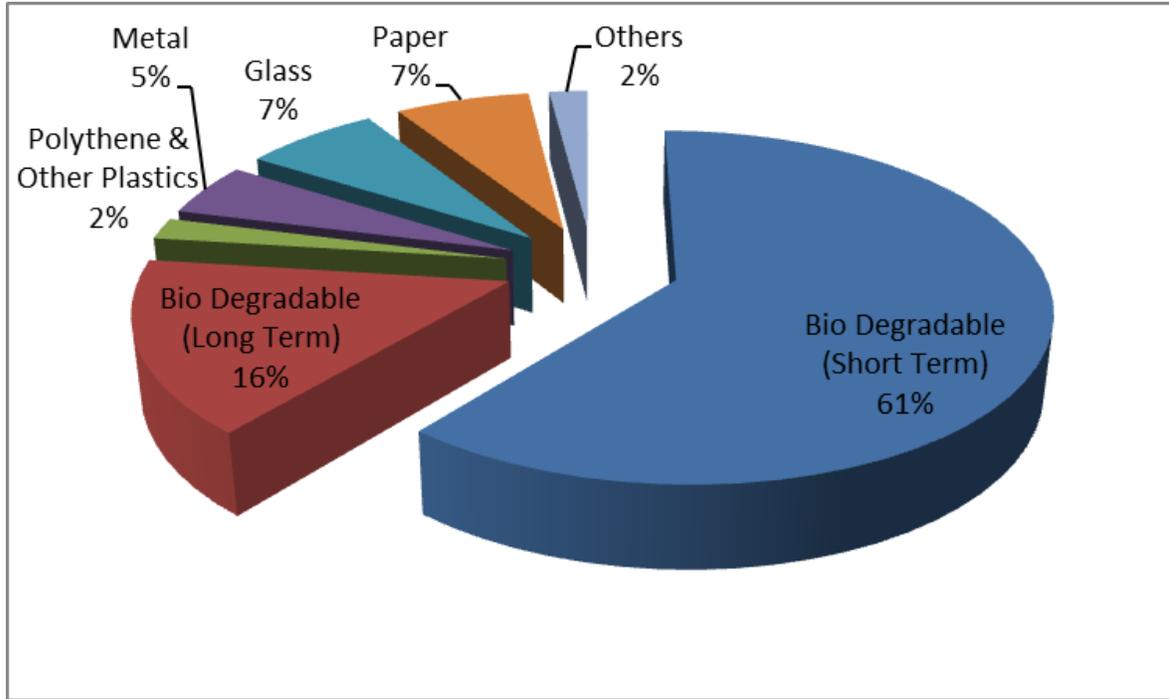


Figure 2: Composition of SW at Disposal Location (Weight Basis) (Source: Abenayake, 2007)

The existing dump site at Gohagoda is now fully utilized. According to the literature, it has been used for dumping waste since the 1970's. Since then this

dump site was undertaken for many rehabilitation projects but the current status at the dump site tells about the weak maintenance and planning.

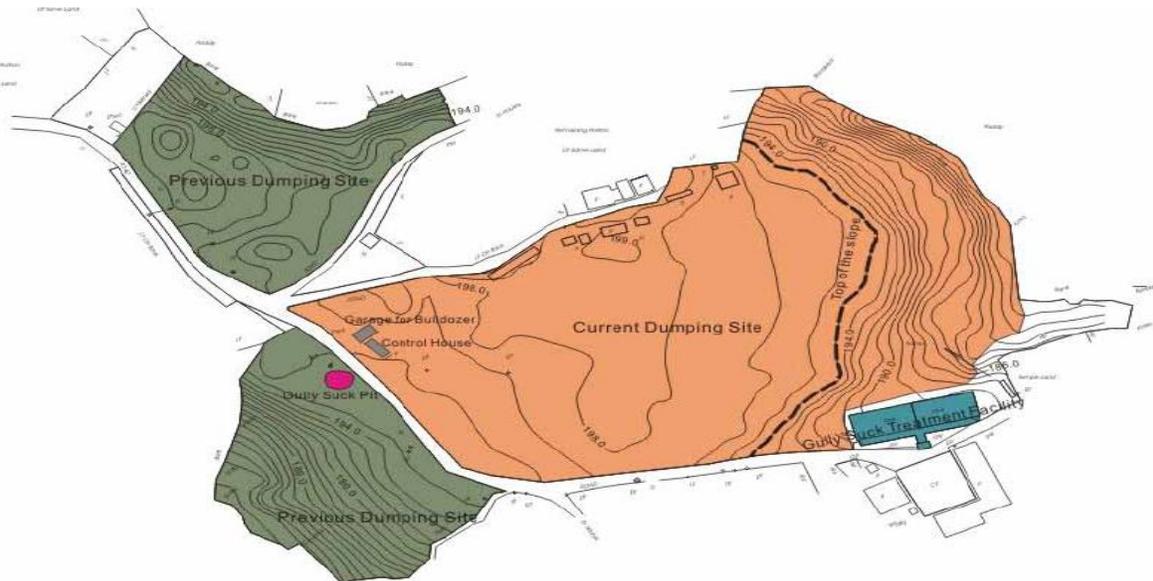


Figure 3: Gohagoda Dumping Site (Geographical View): (Source, JICA Report, Improvement of Gohagoda Landfill Site)

Even hospital wastes could be found with municipal wastes. There was a separate area for hospital waste disposal. This separate area was maintained temporarily until the hospitals are capable of finding disposal methods by their own within a short period of time (JICA Report, Improvement of the Gohagoda Landfill Site). They are now causing severe biological pollution since on average one ton of hospital wastes and 50 to 100 kgs of hazardous waste, including anatomical and clinical waste are disposed on daily basis.

There was a Study performed by JICA in 2007 regarding "Improvement of Gohagoda Landfill site". An annex was introduced through this report for "Operation and Maintenance Manual for Controlled Landfill Site at Gohagoda in Kandy" for further proper maintenance of the dumping site. But after the improved project was handed over to the MC the recommended tasks were not performed as prescribed in the manual. The application of soil cover is neglected at the moment and the wastes are disposing everywhere. According to the manual it was recommended for a leachate and night soil treatment. The treatment facility was totally abandoned since about 3, 4 years back. Also it says that the slope of the landfill should be maintained as 1:2 and it should be properly turfed. But today it can be seen that the turfing is neglected and over the turfed area the solid wastes are tipped and the slope of the waste dump is un-even. During the rainy seasons the solid wastes are flowing with the surface runoff and mix with the river Mahaweli. Also the current leachate flows are too contaminating with the river water. Sudden fires are occurring during the dry season and ashes are flowing away with the wind towards the residential areas nearby. Animals like birds, cattle and dogs are spreading the wastes all around the area and cause problems for the people who are living closer to the dumping site. Due to leachate

contamination some paddy fields located closer to the dumping site were abandoned. With the absence of a soil cover odour and pests are spread everywhere beyond the dumping site. The ugly view, Gas generation, Waste scattering, Vermin, flies, mosquitoes, rats, crows, etc. are the other remaining problems here. Moreover the most serious problem at the moment is no remaining capacity to dump waste for much longer. The available spaces are almost fully utilized and the areas outside the dumping ground are also used for the dumping purposes at the moment.

According to the officials the current numbers of labours are approved in 1960's. Even though the approved number is 320 the current numbers of labours are 262. Therefore it seems that the MC is currently suffering from a lack of labours. Though about 55 labours are being worked for the collection vehicles they are unable to be worked for the direct cleaning purposes. Even from the rest of the labour force, about 10% of them are taking leaves per a day. So the numbers of labours who are worked daily are lesser. Only 12 supervisors are available out of 39 approved staff. Due to the retired and transferred officers this situation was happened and the vacancies were not filled yet. The current Solid Waste Management Section is facing lack of space in their offices and the storages.

Possible Solutions for the Solid Waste Management problems in Kandy MC can be shown as follows.

- Capacity Strengthening
- Waste Minimization
- Waste Collection Improvement
- Environmental Education
- Landfill Improvement

Under Capacity Strengthening Preparation of SWM by-laws based on the statistical data

relevant to the MC, Supervision of SWM services for officials of the local authorities (including public health inspectors), management, training on the matters related to cooperation from the residents, Supporting activities of the improvement/finalization of the SWM plans (action plan) Can be suggested. Promoting Composting at the source of generation (especially household level), Support the private sector recycling plants, Promoting reduce and reuse of plastics and polythene will be positively effect on waste minimization.

Establishment of proper discharge and collection rules, Distribution and proper maintenance of the various types of public waste bins, introduction of waste collection centers will be improve the waste collection efficiency. Establishment and operation of environmental education centers where general citizens and students can learn about the environment and solid waste issues, Establishment and operation of an on-site environmental education capability, Implementation of public awareness-raising activities for residents and the students, Implementation of source separation promotion activities will give a better education. Improve the facilities required for sanitary landfill, provision of landfill equipment, technology transfer on sanitary landfill operation methods, and guidance in measures related to social considerations will be improve the qualities of landfills.

5. CONCLUSIONS

Due to the bad practices of waste management with the increasing economic prosperity and increasing population Solid Waste problem is at a crucial situation in Kandy MC. Inadequacy of proper disposal methods was identified as the main obstacle in waste management in the study area. According to the National Policy of Solid Waste Management the responsibility lies mainly

with KMC. Excessive amount of garbage dumping in the dumping site cause the life time of the dump to be over quickly but still the dumping is carrying on. Residents should be encouraged and given incentives to participate in an integrated solid waste management programme where waste is sorted at the point of generation. This would immensely reduce the generation of landfill gases as well.

Although an overnight change and improvement in the present-day waste management practices cannot be expected without more financial commitments, the present situation can be improved upon provided there is adequate understanding of the problem and willingness to do so.

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