
Waste Management in Sri Lanka: Challenges and Opportunities

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Abstract

It has been an unmitigated fact that in recent times, many developing countries have been faced with a critical issue in respect of the proper management of solid waste within their territories, due to increasing urbanization leading towards many a menace of disease, odour, nuisance, fire hazards, atmospheric and water pollution, aesthetic nuisance and so on and so forth thereby leading towards many social and economic losses. In 2012, cities world over, generated 1.3 billion tons of solid waste per year, amounting to a footprint of 1.2 kilograms per person, per day needless to say that with the rapid population growth and urbanization, municipal waste generation is expected to rise up to 2.2 billion tons (MT) by 2025. Inadvertently with the current trends continuing, it is likely to rise from 3.5 MTs to 6 MTs per day, each person generating around 0.64 kg waste per day in Sri Lanka with an estimated 4.8 billion MT of waste collected per annum in the country.

The main objective of this study is to examine the present situation of solid waste management in Sri Lanka in determining the nature and extent of the problem, thereby identifying the challenges and opportunities towards maintaining a sustainable waste management system in the country. as a result, the respective study has identified that, several challenges such as the absence of waste segregation, poor waste collection mechanisms and lack of public commitment on waste management etc. to be the underlying causes of the prevailing issue. Thus the prevailing system on waste collection, transportation and disposal aspects is nevertheless believed to be an issue yet to be resolved, due to the lack of education and awareness of the public on waste management, the lack of technical knowledge and the absence of applying 3R principles and so forth.

In this context, awareness through educating and changing the attitude of the public can be specified as precautionary methods towards maintaining a sustainable waste management system in terms of which, the participation of the public is to be quoted as essential and it should be borne in mind, that this is not something that can be accomplished via a limited operation and soon be forgotten, but rather one which needs to be

continued and maintained by ongoing continual efforts in keeping the menace at a minimum. Thus, a new model for waste management is required for collection, transportation and the disposal of waste, which should not be harmful to the society nor to the environment. The existing waste management policy of the country should be further developed by considering the concept of zero waste, alternative waste management approaches like waste to energy, sanitary landfills and the acceleration of composting methodology etc. thereby leading the pathway towards more sustainability.

Keywords: *Waste management, segregation, zero waste and sustainability.*

Introduction

Solid Waste Management (SWM) has been becoming a major issue of economies and priority should be given to overcome the issue due to the rapid growth of the population as well as the increases of waste quantities in the Developing countries. Although the quantity and quality of solid waste generated by urban areas in developing countries are low compared to Western developed and industrialized countries, the municipal solid waste management still remains inadequate (Ilic and Nikolic, 2016). However, developed countries have already been applying different approaches such as composting, land filling and waste to energy etc. to overcome the issues. In this respect, it is appropriate to examine the strategies that they have applied to overcome the issue.

Waste is any subsistence materials derived from primary use or a useless defective. Solid Waste (SW) or garbage comprises of unwanted and discarded materials from houses, street sweeping, and commercial and industrial operations. The increase in the urban population and changing life styles lead to the generation of solid waste. Generally, solid waste is heterogeneous in nature such as the mixture of vegetables, food items, paper, plastics, rags, glass etc. If solid waste is disposed of on land in open areas, then it causes a negative impact on the environment, ground water and on health (Mundhe, Jaybhaye & Dorik, 2014). On one hand 'waste' has a value for someone while it doesn't for another. If it is possible to convert 'waste' into a valuable thing then no more would the 'waste problem' persist in the world.

Most of the countries in the world, in particular, developing countries, face the problem of proper management of solid waste within their territories. It has been creating different issues such as diseases, odor nuisance, fire hazards, atmospheric and water pollution, aesthetic nuisance,

social and economic losses. There have been many turgidity stories on collapsing waste dumps in several countries including Ethiopia and Sri Lanka. Many have pointed out, that, the developing countries haven't appropriate technology, with the lack of proper management and lack of leadership being the major defects of SW management of these countries.

Around the world, waste generation is being raised. The amount of waste generated by a country is proportional to its population and the mean living standards of the people (Grossmann et al., 1974). Further, Medina (1997) indicated that the waste generation rates have a close relationship with the income levels of people. In addition socio economic factors such as persons per dwelling, cultural patterns, education, and personal attitudes also play a role (Nilanthi Bandara, 2008). In 2012, the worlds' cities generated 1.3 billion tons of SW per year, amounting to a footprint of 1.2 kilograms per person per day. With rapid population growth and urbanization, municipal waste generation is expected to rise to 2.2 billion tones (BT) by 2025. If current trends continue, we are likely to go from 3.5 MTs to 6 MTs per day by that point. In South Asia, approximately 70 BT of waste is generated per year, with per capita values ranging from 0.12 to 5.1 kg per person per day and an average of 0.45 kg/capita/day (World Bank). The continuous indiscriminate disposal of SW is accelerating and is linked to poverty, poor governance, urbanization, population growth, poor standards of living, low level of environmental awareness (Rachel et al., 2009; Ogu, 2000) and inadequate management of environmental knowledge. However the waste generation rates will more than double over the next twenty years in lower income countries.

Even though human health and safety have been major concerns over waste management in the past at present, the society demands more than expected as in the past. society expects sustainable waste management which incorporates feedback loops, is focused on processes, embodies adaptability and diverts wastes from disposal. At a policy level decision making process, environmental consideration has played a major role in this sustainable system. Transitioning from a traditional unsustainable system to a sustainable waste management requires to identify and apply of leverage points which effect change (Jeffrey K. Seadon, 2010). Failure to do so may lead to ill-designed solutions that may not be effective enough to give any productive and sustainable results in waste management. Therefore, a system is required to control generation, storage, collection, transport or transfer, processing and disposal of solid waste materials in a way that best addresses the range of public health,

conservation, economic, aesthetic, engineering, and other environmental considerations.

Objectives

The major objective of this paper is to examine the present situation of the SW management in Sri Lanka and identify the challenges and opportunities for maintaining a sustainable SWM system in Sri Lanka. In addition, alternative strategies will be identified for better SWM in the country.

Waste Issue of Sri Lanka

Wastes have been an issue when an absence of or a weak management system for collection, transporting and disposal. Mostly, it generates at a household level while the rest from industries or other. The Waste problem is not a big issue in rural and sub-urban areas where space is available to dispose waste unlike urban areas of the country. It is a significant issue in the urban areas especially in the western province of the country.

A survey on Waste amount and Composition Surveys (WACS) done by the University of Peradeniya in 2014 revealed that nearly three fourth of total waste is generated from kitchens. It is a noted feature that, more than 85 percent of the total waste is degradable at the source (Table 01).

Table No. 01 shows the composition of the waste collection at the point of waste generation of Sri Lanka. However, the figures differ with the study conducted by the Central Environmental Authority (CEA) in 2014. Figure 01 shows the waste composition of Sri Lanka.

A Similar study done by the CEA also pointed out that, the waste composition of the source at the generated point is more or less comparable with the study done by the WACS. According to Fig. 01 about 62 percent of the waste is categorized as bio-degradable, while 7 and 6 percent belong to paper and wooden items which also come under bio-degradable waste respectively. Altogether three fourth of waste could be categorized as bio-degradable which is capable of being decomposed by the action of microorganisms. This study further identified that about 6

Category	% in wet basis
Kitchen wastes	74.6
Garden wastes	4.8
Paper and cardboard	7.8
Soft plastics	4.2

Hard plastics	0.9
Textiles	1.0
Rubber and leather	0.4
Metal	0.9
Glass	1.7
Ceramics	0.5
Hazardous wastes	0.4
E wastes	0.2
Miscellaneous	2.7

Table 01: Waste amount and Composition in Sri Lanka
 Source; Waste amount and Composition Surveys (WACS), 2014

and 2 per cent of waste are polythene & plastics and glass items which fall under non-degradables respectively. Non-degradable waste like polythene and plastic do not break down for several decades, if not centuries, and have a general tendency to poison the ecosystem, as they are petroleum based.

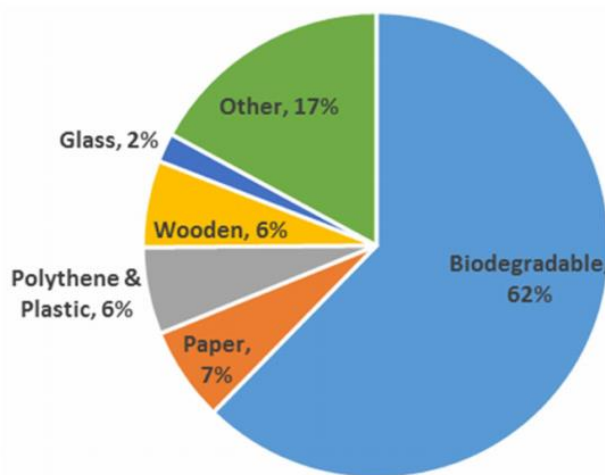


Fig. 01: Waste composition in Sri Lanka
 Source; Central Environmental Authority (2014)

Sri Lanka has 309 local authorities of which 15 are Municipal Councils, 37 are Urban Councils and 257 are Pradeshiya Sabas. Approximately Sri Lanka generates 7,000 MT of solid waste per day. Most of the waste generated at the Colombo Municipal Council which is the largest local government authority in Sri Lanka covers a resident population of over 600,000. The Following table shows the waste generation by different local authorities of the country.

Provinces	Kg's p/p
Colombo Municipal Council	0.80
Municipal Councils	0.75
Urban Councils	0.60
Pradeshiya Sabas	0.40
Average	0.64

Table 02: Daily waste collection

Source; Central Environmental Authority (2014)

According to table 02, each person generates about 0.64 kg's per day in Sri Lanka. It is higher in urban areas such as Colombo and Gampaha. Most PS do not collect all the waste generated from their territories but part of it is collected. It may be estimated that about 4.8 billion MT of waste is collected per annum in Sri Lanka. However, the actual figure may be higher than the given figure. Table 03 shows the waste collection of the country by provinces.

Provinces	Generation amounts (ton/day)		Collection amounts (ton/day)		Collection rates	Number of final disposal sites
1. Northern	566	5%	178	5%	31%	16
2. Eastern	785	7%	347	10%	44%	40
3. North-central	616	6%	91	3%	15%	35
4. North-western	1,134	11%	187	5%	16%	45
5. Central	1,585	15%	304	9%	19%	47
6. Sabaragamuwa	835	8%	178	5%	21%	30
7. Uva	587	6%	116	3%	20%	24
8. Western	3,502	33%	1,793	52%	51%	52
9. Southern	1,158	11%	264	8%	23%	60
Total	10,768	100%	3,458	100%	32%	349

Source: Moratuwa University and NSWMSC, 2013

Table 03: Provincial level waste collection and Disposal sites

Table 03 shows the provincial level waste generation, collection and the final disposal sites of Sri Lanka. Accordingly, more than half of the total waste is collected by the Western province. Even though the Western province generates 33% of the total waste it collects more than 52% of the total waste of the country. All other provinces contribute less than 10% each. The Uva province occupies the lowest share of waste generation amounting to 6% while the Eastern, Central, North central and Southern Provinces produce more than 7% each of the total waste of the country.

According to table 03, it was estimated by the University of Moratuwa and the NSWMSC that 3,458 tons of SW are collected from the island per day. About 1,800 tons of SW are collected from the Western province per day. However, another study done by the CEA, revealed that, the total collection of solid waste by local authorities in Sri Lanka is around 2900 tons per day (CEA, 2014). Another study done by Hikkaduwa, and others of University of Moratuwa (2016), "Sustainable Approaches to the

Municipal Solid Waste Management in Sri Lanka” the collection of solid waste by all local bodies amounts to 3423 mt per day. Approximately 60% (1663 tones) of the total waste is collected in the Western Province which has about 30 percent of total population in Sri Lanka.

It is an interesting factor that a total of 349 sites have been selected for the final disposal of waste. Most of the sites do not provide a total solution for waste. Some of them have recycling facilities but it does not function in a proper manner.

Responsibilities of Waste Management in Sri Lanka

The Responsibility of waste collection from generated point to disposal sites are vested in local government authorizes such as Pradeshiya Sabha (PS), Town Councils (TC) and Municipal councils (MC). In Sri Lanka 111 local authorities have been functioning by the elected members of the particular area. These authorities are responsible for the collection, transport and the disposal of solid waste in a proper manner. The following table shows the range of waste collect by a number of local authorities.

It is clearly indicated in the Municipal council ordinance in 1947, the Unban council ordinance in 1939 and the PS Act in 1987. In addition, all disposal activities should be handled according to the national Environment Act no 47. However, several Ministries are also responsible for waste management in the country. They are Local Government and Provincial councils, Mahaweli Development and Environment, and Megapolis and Western Development. The Western province has a separate arm to handle solid waste within their province. Apart from the Ministries, several authorities are also responsible for different stages such as giving environmental concern by the Central Environmental Authority and providing approval by the Urban Development Authority and so on.

Ranges [Tones/ Day]	Number of local authorities
Up to 1	111
1-2	48
2-5	76
5-10	26
10-20	23
20-50	19
50-100	5
110-150	2
>150	1
Total number of local authorities	111

Table 04: Different Ranges of Daily SW Collection [tones/day]

Source; Central Environmental Authority (2014)

Further, the relevant Ministry of the Provincial Councils have the overall responsibility for the enforcement of rules and regulations in the Provinces. Further they are also responsible to regulate the operation of and the transportation and processing of Municipal Solid Waste and the management of final waste disposal facilities of waste without being a nuisance to the general public and/or to the flora and fauna of the Province.

Several waste management steps have been already identified by the Waste management Authority, of the Western Provincial Council (See; Municipal Solid Waste Management Rules-2005) for better handling and cleaning the environment of their area. They are as follows;

- A. Properly Manage the SW at Source i.e. segregation, reduction, reusing and recycling and prohibiting the dumping of solid waste on streets or public places and open burning of wastes are being considered,
- B. Proper Collection/Acceptance of MSW from the Source of Generation,
- C. Cleaning of Streets and Public Places,
- D. Abolition of Open MSW Storage Bins Abolishing of open storage waste bins from main roads, public places and introducing of close type appropriate waste receptacles are considered,
- E. Improving a System for Mass Transportation of MSW Under this step prohibition of waste transportation in open vehicles and optimizing the efficiency of the vehicle usage for waste transportation are considered,
- F. Treat the Collected MSW as a “Resource” Under this step encourage recovering of resources from collected MSW through re-using of MSW for composting, Power generation, production of biogas, bio-fuel, electricity, bio-gas and use of state of- the- art technologies for this purpose and also recycling are considered,
- G. Improving a System for the Final Disposal of MSW Under this step establishing of engineered and/or sanitary landfills and use of the state- of- the- art technologies for such events at zonal and/or regional level are considered.

Challengers of Waste Management in Sri Lanka

One of the biggest problems in Sri Lanka is to manage the MSW in a sustainable manner. The prevailing system on waste collection, transport and disposal are yet to be resolved. It is possible to identify these issues which are discussed below as the challenges of WM in Sri Lanka.

- a. **Waste segregation:** Segregation is the systematic process that waste is separated into different types. It can be done manually at the household level or mechanically. Basically, waste could be divided as dry and wet waste. Then it could be further divided into solid waste, bio-degradable, non-biodegradable, toxic waste and recyclable waste. Thus far we do not have a proper system or proper practice of segregation at the generation or collection points. Every individual has the responsibility to practice such a segregation system but only a few are practicing it

- b. **Waste collection and transport:** Waste collection, storage and transport are essential elements of any WM system and can be major challenges in towns and cities. As mentioned above, the collection of SW are done by the PS, TC and MCs. All 111 local bodies have been collecting waste to keep clean on their territories. The Waste management Authority (WMA) of the Western Province is responsible for more than 60% of the total waste collection of the country. The Collection of waste from House to house and entire industries, commercial areas and public areas have to be transported and unloaded either into processing sites or sanitary landfills by the above authorities. However it has not been done in a proper and sustainable manner.

- c. **Waste disposal:** The Absence of a proper arrangement for the disposal of garbage in towns and cities create many more challenges in the face of financial, technical and administrative incapacities of the relevant local bodies. From an individual to the top level institutions or Ministries related to WM should pay a good role in this regard. A few sanitary landfills and organic compose yards are available for the sustainable disposal of garbage. Unfortunately at present, solid waste is collected in a mixed scale and disposed in environmentally sensitive areas such as abundant arable land, marshy land, forests, wild life habitats, near water bodies, isolated hilly areas and so on. Most of the local bodies collect garbage and dump it at open lands which create many problems.

- d. **Pollution:** Different types of pollution arises when the waste collected in dumping sites keeps rotting, spreading odour, water and soil pollution, health related problems and aesthetic pollution is caused in the surrounding areas. Most of the dumping sites are located in open

spaces. They are burnt sometimes and cause the emission of toxic gases like carbon dioxide and carbon monoxide which create health issues.

Garbage from household and other sources fall into rivers and water bodies. It makes the water of the water bodies polluted. The Blocking of the drainage system in towns and cities create breeding sites for mosquitoes and other vectors which spread diseases such as Malaria, Dengue, Filarial and other health problems. In addition, the improper garbage spreading from place to place and dumping it could increase the population of flies and rats which create many more health issues.

Increasing garbage at households and outside or water bodies has become a serious problem to air, water and soil. Accordingly, physical properties of the soil could be changed, and thereby the growth of plants and other factors affect soil nutrition and could be badly affected.

Inappropriate and unsustainable waste dumping would also destroy or reduce the worth of the aesthetic value and the scenery and beauty of the surrounding areas.

- e. **Institutional set-up:** Several authorities i.e. Local government authorities, Waste Management Authority, Central Environment Authority, Ministry of Environment, Ministry of Megapolis and Western Development etc. have been dealing with the SWM in the country. In addition, several projects were also set up to support and to manage the WM issue in Sri Lanka. The Lack of coordination between institutions, the lack of Institutional capability with technical expertise and the lack of adequate funds etc. may belong to the whole.
- f. **Public commitment:** The Literacy of the Sri Lankans are much higher than other developing countries. It means that the literate people should work in a systematic manner in WM. Beginning, at the school level all students were being given training in systematic practice in WM in their surrounding environment. Unfortunately, when they became adults, most of them do not follow the principles of WM. It has become a serious issue in the country.
- g. **Political arena:** The lack of commitment of most of parties that involve in WM in the country. There are many obstacles arising when the

ruling party of a particular local body work on the waste issue. Simultaneously, the same in a different way will arise when the opposition takes over the next time in the same local body. Ultimately issues of WM will be stagnated in most of the local bodies.

The challenges would be able to be overcome by the commitment of the collaborative attendance of the public and private sector, government interference and the mindset change of the people of the country. The Following opportunities may be useful to overcome the identified challenges of WM in Sri Lanka.

Opportunities of Waste Management of Sri Lanka

- a. **Education and awareness:** Knowledge from education and awareness has been seen as a key factor affecting environmental action. It is a vital fact that, the environmentally relevant knowledge plays a significant role in changing environmental activities and human behaviour. A Change in habits, behavior and the participation of the people on 'what do you/ people think about waste' is a significantly important aspect of SWM. As all knew, most information and practices about WM start at school and influence their households. The WM process at a school level is focused to keeping the environment clean and recycling the bio-degradable items. This process would help to increase awareness and attitudes towards solid WM among children and their parents.
- b. **Improvement of technical knowledge:** The adoption and transfer of the technologies of WM either from developed countries or some others to the local level authorities and the people who are responsible for WM at the grass root level would be immensely useful for better practice. Technical aspects for a WM would have to be taken into account in many points from bottom to top, for planning and the implementation of different activities. Provisions of better technical knowledge would be directly supporting for sustainable WM practice in the country.
- c. **Apply 3R principles:** The principles of 3R i.e. reduce, reuse and recycle can be applied in an acceptable manner to cut down on the amount of waste people throw away. The simple logic behind the principle is easy to understand, if there is less waste, then there is less waste to recycle or reuse. Any items that can be used again for another purpose or in a different way is called 'reuse'. The people can reuse most items such as plastic bags, furniture, toys and repair some broken items that they

used. On the other hand they can sell or give to others for charity. Recycling is a process which will be transformed again into raw materials that could be shaped into a new product. All materials could be recycled or transformed except for a few items in the world. About 38% of the waste such as glass, paper, wood items and so on could be transformed into recyclable items in Sri Lanka.

- d. **Waste segregation:** Waste segregation is essential as the amount of waste being generated day today causes many more problems. Most of the bio-degradable waste could be transformed into fertilizers and only a small proportion of the waste has to be discarded. Unfortunately, the bulk of waste is not being segregated yet by the responsible people and the quantity of waste would be much higher. In particular, household waste can be separated into different baskets for the different categories of waste such as degradable and non-degradable which should be disposed separately.
- e. **Attitudinal changers:** Waste could be identified as 'two sides of a coin', which highlight the idea of the environment as a gift and a responsibility. People were open minded on the environmental impact on improper waste management.. Everybody should understand that waste is from nobody, it belongs to everybody. Therefore all have a responsibility to manage waste in a proper manner.
- f. **Independent Authority:** At present, there are many institutions which deal with WM in Sri Lanka. Therefore, a strong and independent authority is required to regulate WM if WM is to improve and be kept in a sustainable manner in the country. The Absence of clear regulation and enforcement will make improvement not activated in a timely and in a proper manner. The WM sector needs to include attractive and profitable businesses models with clear performance requirements imposed, with financial penalties applied when WM services are not working effectively.
- g. **Adequate funds:** Finance for WM authorities and funding for other WM activities should be raised through Waste Management Tax (WMT) which comes through Polluter Pay Principle (PPP). All polluters must be paid for, keeping the environment clean and fair. An average WMT of 1 Rupee per any transaction of non-degradable wrapped items sold by merchants to buyers would generate huge amount of money and

the collected funds could be used for proper waste management in Sri Lanka. In addition, PPT policy could be applied for the person who violates the waste management system of a particular city.

- h. Alternative strategies:** Several alternative strategies are being implemented by the respective authority in the country. Zero waste, Waste to Energy, sanitary landfills and large scale composting. At present there are several landfills being constructed at Aruwakkaru, Keeramale, Medirigiriya and Keerakkulama. In addition, two waste to energy project plants of 10 megawatts each, to incinerate, were started in the Western province. The Ministry of local government is also establishing several mega composting machines in selected districts.

Alternative Strategies for better WM practice

It is an important fact that the education on WM should be further expanded for all the sectors which start at the kindergarten schools. The role and responsibilities of WM of each individual should be communicated and instructed in a proper way. It may be one way of forming responsible citizens who manage waste as resources and also applying 3R principles and creating a zero waste or waste less society in the future.

It is a vital requirement that WM must involve waste segregation at sources such as households, market or industries to allow more efficient value extraction and recycling. It should be separated into dry/ wet or bio degradable/ non-degradable etc. Then the waste would have significant benefits for waste collectors and the people who are involved in the WM field.

Innovative and practical waste management regulations could be imposed. The WM sector needs to include attractive and profitable models with financial penalties from polluters and WM discipline breakers. Then the WM services include collection, transport and disposal which will be sustained effectively and efficiently.

Short term and long term comprehensive WM planning requires to overcome the WM issues in the country. The private sector involvement should be strengthened for most of the WM activities. Local level Provincial councils and the Ministry of Local Government could monitor and evaluate the WM practices. To achieve the targets, training and capacity building is required from the grass root to the top level people who are engaged in WM.

Conclusion and recommendations

The quantity of waste has been generating continuously due to the growing population and increase in development. The Modern way of life has led to serious waste problems in the country. Easy products require more packaging and habits of the people are also associated with generating larger quantities of waste, discarded wrappers from the inevitable fast foods, and the modern day waste contains a higher proportion of non-degradable materials which have caused an acute waste issue. The problem has been further worsened due to the extensive use of plastic products such as plastic bottles.

Despite the huge amounts of waste produced, the standards of waste management in the country are still poor. These include outdated and the poor management of waste and, the inefficient handling, and collection, transportation systems, disposal of hospital wastes and hazardous waste and also disposal or dumping of wastes. Waste at the roadside, drains blocked up with garbage and plastic items and rivers filled with filthy garbage indicate that solid waste is a major environmental problem in Sri Lanka.

This situation has been diminishing our environmental quality to sustain life. If the present rate of solid-waste production goes on without a proper waste management system, there will be significant negative impacts on the quality of our environment. In addition, the inadequate awareness and knowledge about solid waste management issues, and being ignorant about the effect that improper SWM has definitely worsened the problem.

Sri Lanka needs a long-term goal to establish a sustainable and effective SWM that are cost effective, economically viable and environmentally sound. Strategies that have been recommended for waste minimization are part of the waste management hierarchy and involve 3R principles such as reduce, reuse and recycle.

The situation could be managed in a sustainable manner through several implications. Providing awareness from schools up to the higher education level in different scales and standards would be ideal. It may be able to change the attitude and awareness of the masses through formal and informal education. Finally, everybody should think and understand that waste is from nobody, it belongs to everybody.

The Appropriate technical knowledge and equipment should be provided to the local government institutes. Technical training is also an essential component for the people who practically engage in SWM at the field. WM requires not only technological knowledge but also public

participation, consultation and stakeholder mutual understanding and dialogue on activities.

Waste segregation is a vital part of SWM and attention should be paid to impart all stakeholders to follow the principles of waste segregation. It should be practiced from the household level to top level institutions of the country.

It is necessary to establish an apex independent institution to regulate SWM in the country. The institution should control all other institutions which deal with SWM. The institution could apply a good market model for managing SW in a profitable manner. The Legal framework should also be established to raise the required additional funds for the efficient management of the institution and also the PPP would be an ideal concept to strengthen SWM.

The Available WM policy of the country should be further developed by considering the concept of zero waste, alternative WM approaches like waste to energy, sanitary landfills and accelerating composting methodology etc. which is required to manage the waste in a sustainable manner. Finally, making responsible citizens who regard waste as 'our waste' and 'our resources' would easily manage the waste and achieve the sustainability of the country.

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