NATIONAL SOLID WASTE MANAGEMENT FRAMEWORK

2004

NATIONAL SOLID WASTE MANAGEMENT COMMISSION
DEPARTMENT OF ENVIRONMENT AND NATURAL RESOURCES
2nd Flr. HRD Bldg., DENR Compound, Visayas Avenue, Diliman, Quezon City, 1116
Tel Nos. (632) 920-2252, 925-4796 / 925-4797 loc. 3

Table of Contents

LIST OF TABLES..... iii
LIST OF FIGURES..... iii
ABBREVIATIONS.....
iv
EXECUTIVE SUMMARY.....vi

I. INTRODUCTION.....**1**

A. The rationale of an Ecological Solid Waste Management Framework.....1

II. SOLID WASTE MANAGEMENT ACT AND ITS IMPLEMENTING RULES AND REGULATIONS.....**2**

A. The Salient Aspects of the Act and its IRR.....
2

III THE STATE OF SOLID WASTE MANAGEMENT IN THE PHILIPPINES.....**3**

A. The current state, trends, projections of solid waste management on the national, provincial and city/municipality levels.....
3

B. Characteristics and conditions of collection, storage, processing, disposal of solid waste.....
6

1. Waste composition *6*
2. Recycling and composting *7*
3. Solid waste collection
7
4. Transfer and transport
8
5. Diposal and treatment of collected waste
8

C. Profiling of sources.....
8

D. Inventory of Existing and Permitted Solid Waste Management Facilities.....8

2. Critical actors and partners for implementing the activities (Who) *12*

3. Means for implementing the SWM objectives (How) *13*

V. PREPARATION OF LOCAL GOVERNMENT SOLID WASTE MANAGEMENT PLANS **15**

A. PREPARING THE LOCAL GOVERNMENT SOLID WASTE MANAGEMENT PLANS 15

1. Constitute the SWM planning team *16*

2. Organize the planning work *16*

3. Gather/collect information *16*

4. Preparing the plan *17*

5. Presenting the SWM plan to the constituencies *18*

VI. ALTERNATIVE ORGANIZATIONAL STRUCTURE FOR LOCAL GOVERNMENTS IN PREPARING SWM PLANS **19**

A. LGU CLUSTERING 19

B. INVOLVEMENT OF THE PRIVATE ENTERPRISE 20

VII. SOME RELEVANT CONSIDERATIONS IN PREPARING LOCAL GOVERNMENT SOLID WASTE MANAGEMENT PLANS **20**

A. VOLUME REDUCTION AT SOURCE 20

B. RECYCLING AND REUSE GENERATORS OF RECYCLABLES 21

1. Yard Waste Composting *21*

2. Recycling and Reuse *21*

3. Generators of Recyclables *21*

C. MATERIAL COLLECTION AND TRANSPORT 22

D. MANAGEMENT OF CLOSED OPEN AND EXPIRED CONTROLLED DUMPSITES 22

E. DISPOSAL IN LANDFILLS 22

VIII. INFORMATION AND EDUCATION **23**

ANNEXES

Annex A Waste Analysis and Characterization Survey (WACS)……..……..…..26

Annex B Clustering of Common Solid Waste Management Facilities ……..…34

List of Tables

Table 1.
Distribution of waste generated per region (2000).....4

Table 2.
Projected estimates of waste generation per region (2000-2010).....4

Table 3.
Municipal waste composition (Metro Manila and Philippines).....6

Table 4.
Summary of inventory of existing solid waste management facilities (2002).....9

Table 5.
Scope of interest of identified actors for SWM.....10

Table 6.
Summary of elements of an SWM Plan.....13

Table 7.
Sample logical framework for a SWM Plan.....18

LIST OF FIGURES

Figure 1.
Solid Waste Management System prescribed under RA 9003.....3

Figure 2.
Estimated SW generation of selected Highly Urbanizing Provinces.....5

Figure 3.
Estimated SW generation in selected Highly Urbanizing Cities.....5

Figure 4.
Estimated SW generation of selected cities in NCR.....6

ABBREVIATIONS

ARMM	Autonomous Region for Muslim Mindanao
CAR	Cordillera Administrative Region
DA	Department of Agriculture
DENR	Department of Environment and Natural Resources
DOH	Department of Health
DOST	Department of Science and Technology
DPWH	Department of Public Works and Highways
DTI	Department of Trade and Industry
EMB	Environmental Management Bureau
HUCs	Highly Urbanizing Cities
HUPs	Highly Urbanizing Provinces
IRR	Implementing Rules and Regulations
JICA	Japan International Cooperation Agency
LGUs	Local government Units
MRFs	Materials Recovery Facilities
m.ton	Million Tons
NAMRIA	National Mapping and Resource Information Authority
NCR	National Capital Region
NCSO	National Census and Statistics Office
NGOs	Non-government organizations
NIMBY	Not-in-my-backyard
NSWMC	National Solid Waste Management Commission
NSWMF	National Solid Waste Management Framework
ODA	Overseas Development Assistance
PIA	Philippine Information Agency
RA	Republic Act
SWM	Solid Waste Management
TESDA	Technical Educationand Skill Development Authority

EXECUTIVE SUMMARY

Three key trends characterize solid waste management issues in the Philippines – increase in shear volume of waste generated; change in the quality or make-up of waste generated; and the waste handling methods. These trends have been evident as solid waste or "basura" has been one of the most visible environmental priorities, particularly in cities and urbanizing centers, over the past thirty years. This has led to the enactment of Republic Act (RA) 9003 (or referred herein as the Act) which is deemed to be a broad based and comprehensive approach for solid waste management (SWM).

General trends: The country generate between 0.3 and 0.7 kilograms of garbage daily, depending on the socio-economic level and degree of urbanization. Provinces that have greater urban population and larger economic activities also generate greater volume of solid waste. In 2000, estimates show that the country generated 19,700 tons of garbage daily. The National Capital Region (NCR) accounts for twenty five percent of the total solid waste generated followed by the Southern Tagalog region (Region IV), Central Luzon (Region III) and Central Visayas (Region VII) which accounted for twenty percent (20%), fourteen percent (14 %) and eight percent (8 %) respectively. Forecasts indicate that by 2010 the country's waste generation shall have increased by forty seven percent (47%). The trend also shows that as the country's urban areas further expand, NCR's share will decline while Regions III and IV will register increases in waste generation.

General state of solid waste management: The Philippine solid waste composition is generally characterized as highly organic (biodegradable) and recyclable. Based on the JICA Study (1999), yard, wood and kitchen wastes account for fifty percent (50%) of the total waste composition generated by an average household in the country. Even in Metro Manila, forty nine (49%) percent are kitchen and garden wastes.

> *Recycling and recover:y* The high percentage of biodegradable waste suggest that composting these materials have great potentials especially in municipalities that are within or near agricultural zones. The potentials for recycling are also good considering that the remaining wastes are made up of recyclable materials such as paper and cardboard, plastics and some metals. The key to recovery of these materials lies in segregation which must be practiced at the household level. However, household segregation is not widely practiced and wastes are disposed of as mixed garbage. From the total volume of garbage generated, only a small portion is recycled or composted, despite the potentially large market for compost and used products coming from recycled plastics, glass bottles, used paper, and scrap metals.
>
> *Collection and transport*: The responsibility of collecting municipal solid wastes rests primarily with the local government units (LGUs). Estimated country wide collection effciency is placed at forty percent (40%) with major cities able to collect as much seventy percent (70%). The remaining balance are either unserved or under-served, which may be common in poorer areas of cities or municipalities and in rural barangays. Most of the uncollected wastes, particularly in the slum areas end up in the waterways and creeks which causes another critical problem during the rainy and monsoon season – that of flooding.
>
> *Disposal:* The single and most dominant issue for solid waste management is where to bring the wastes collected. With the closure of the San Mateo and Carmona Sanitary Landfill, Metro Manila's waste is now dumped in the following disposal facilities: Rodriguez, Rizal; Payatas, Quezon City; Lingunan, Valenzuela; Tanza, Navotas; Pulang Lupa, Las Piñas; Baseco Area, Manila. One transfer station in Pier 18 in Manila is also being utilized to transfer wastes to Tanza, Navotas. Nationwide, the prevalent practice of solid waste disposal is still through open dumping.

The results of the inventory clearly indicate that communities particularly urban and urbanizing areas do not have sufficient capacity for present and future volumes of wastes generated. Not one of the existing facilities can even meet the present level of regulations as required by the Act. The inventory also highlights the urgency of streamlining efforts towards full compliance of the Act. There are 726 open dumpsites that will have to be closed in the near future. At the same time there is also a need to immediately process the approval and opertations of the proposed controled disposal facilities. A look at the figures would indicate that of the fourteen regions, only Regions I, IV, VIII, and Caraga can accommodate the wastes diverted from

There are also 220 proposed sites for sanitary landfills. Aside from Region VI, Regions III and IV have the largest areas proposed for landfill sites as these include areas that will service the needs of Metro Manila. Taking into account the forecasted generation of waste in the country, within the next two or three years at least twenty five percent of these proposed landfills should already be established. There are greater prospects also for the MRFs. A total of 842 MRFs are listed to be operating in the country.

The National Framework: The framework is built along three principle dimensions of: (a) scope of waste management activities (answering the question "What"); (b) critical actors and partners in implementing the activities (Who); and (c) the means for implementing the SWM objectives (How). Surrounding these principles are dimensions which every LGU or planner should always consider i.e. political, institutional, economic, technological and socio-cultural.

Scope of the framework (What): The scope of the framework based on Sections 15 and 16 of the Act, encompass the following aspects:

a) Planning and Management

- Strategic planning
- Organization and delineation of responsibilities for implementation
- Legal and regulatory mandate
- Means for eliciting public participation including private participation
- Siting of disposal facilties
- Mobilizing resources for SWM investments
- Public education and information campaign on SWM

b) Waste generation

Characterization of waste according to source, distribution, rates and composition

- Strategies for waste or volume reduction, source separation, and recyling.

c) Waste handling and transport

- Waste collection
- Transfer, recovery, treatment and disposal
- Handling of special waste (medical, biohazard, and other types of waste covered under RA 6969

Critical actors and partners for implementing the activities (Who): The Act explicitly reiterated that a wide range of individuals, groups, entities and organizations must be involved in the activities of SWM as users, service providers, intermediaries and or regulators. Given the varied agenda, interest and concerns of these actors, Table 5 summarizes the scope of their interest in the context of the SWM.

Means for implementing the SWM objectives: The complete success of implementing the SWM strategy depends largely on the clarity of its objectives, the identification of appropriate measures with regard to the political and institutional, soco-cultural, economic (including financial) and technical considerations, and the degree of public support to implement the plan. Its sustainability hinges on the engagement of these entire range of aspects. A summary of the minimum elements which LGUs can cross-check with respect to identifying the means for implementing the SWM objectives is presented in Table 6. Converging all of the above elements the configuration of the National Solid Waste Management Framework thus appears as Figure 7 detailing the elements and responsibilities of every critical actors in implementing an ecological solid waste management.

Updating the framework: This framework plan should be viewed as a dynamic document, which requires periodic updates due to changes in laws, ordinances and regulations, technologies associated with waste management practices and the social and economic conditions. Considering that many of the regulations and subsequent guidelines that will fully operationalize this Act are still to be issued or finalized, this framework plan should be updated every two years following its initial five years.

NATIONAL FRAMEWORK FOR AN ECOLOGICAL SOLID WASTE MANAGEMENT

I. INTRODUCTION

Solid waste is an environmental problem that has reached critical proportions that seek immediate attention from government at all levels. With a growing population and a rapidly increasing consumption coupled with increasing urbanization, three key trends characterize solid waste management issues in the Philippines – increase in shear volume of waste generated; change in the quality or make-up of waste generated; and the waste disposal methods. These trends have been evident as solid waste or "basura" has been one of the most visible environmental priority, particularly in cities and urbanizing centers, over the past thirty years. Efforts have been taken to address the issue with the promulgation of laws, local ordinances and designing specific programmes for solid waste management. However, the impact of these efforts were mixed. In the late 1990s it was acknowledged that efforts taken were not sufficient to respond to the growing waste problem. This has led to the enactment of Republic Act (RA) 9003[1] (or referred herein as the Act) which is deemed to be a broad based and comprehensive approach for solid waste management (SWM). The Act essentially covered the social, economic, technological, political and administrative dimensions of SWM. The social dimension of solid waste management involved the minimization of of waste generation from the source; the economic dimension covered waste recycling; and the technology dimension discussed the effective and acceptable ways for waste disposal. Cutting across these three dimensions are political and administrative dimensions of waste minimization, recycling and disposal. This national framework hopes to provide the nuances of these dimensions with the intent of guiding the critical actors achieve the objectives set forth under Republic Act 9003.

A. The rationale of an Ecological Solid Waste Management Framework

As a national policy, the Act declares that the State will adopt *"a systematic, comprehensive and ecological solid waste management program" (italics supplied)* which is further defined by ten policy principles.[2] In ensuring that this policy is effectively carried out, Section 15 of the Act calls for the formulation, with public participation, of a National Solid Waste Management Framework (NSWMF). The importance of developing this national solid waste management framework cannot be overemphasized especially its significance in guiding local government units (LGUs) prepare and plan an ecologically sound solid waste management strategy. It is in this context that this framework is prepared - to provide a comprehensive but practical guide for LGUs and other sectors concerned involved in the implementation, in part or in whole, of RA 9003 and its Implementing Rules and Regulations (IRR).

[1] Republic Act 9003 is *"An Act Providing for an Ecological Solid Waste Management Program, Creating the Necessary Instituional Mechanics and Incentives, Declaring Certain Acts Prohibited and Providing Penalties, Approaching Funds Therefore, and for Other Purposes."*

[2] RA 9003, Section 2. Declaration of Policies.

II. SOLID WASTE MANAGEMENT ACT AND ITS IMPLEMENTING RULES AND REGULATIONS

A. The Salient Aspects of the Act and its IRR

RA 9003 is considered by many as one of the landmark legislations in the environment sector. It consolidated a number of past laws and issuances pertaining to waste management, which generally were disjointed in its approach and covered only specific aspects of waste management.[3] None of the past laws however, viewed solid waste from a perspective as promoted in RA 9003. Essentially, the Act promotes a paradigm that emphasizes waste as a resource that can be recovered, which is one of the key tenets of sustainable development. This philosophy is to be achieved by following the principles of reduction, reuse, recycling and recovery as means for minimizing and eventually managing the solid waste problem. A critical aspect of the legislation is in the definition of the roles of the primary actors responsible for the Act's implementation. At the crux of defining the roles of the actors is the continuing emphasis that effective solid waste management begins at the household level where people should learn how to conserve resources. Consciousness on resource conservation should impel people to reduce the volume of waste generated coming from all sources i.e. industrial, commercial and respective household levels. In summary, the following are the salient features of the Act and its Implementing Rules and Regulations (IRR):

(a) Defined clearly the key objectives for solid waste management in the country that is embodied under Section 2 of Chapter I. The declaration of policies summarily set the goals of ESWM in the country which is: to protect public health and environment; encourage resource conservation and recovery; promote greater public participation in the formulation and implementation of the SWM programs; encourage the private sector in SWM to be complemented by greater use of market based instruments and strict enforcement of the provisions of the law; supporting research on effective technologies and techniques for efficient SWM and the promotion of environmental awareness.

(b) Explicitly defined the institutional mechanisms for implementing the Act, which identified the responsibilities of the key institutions and their respective parameters for accountability of actions at all levels of governance. The Act highlighted that local governments (i.e. from provincial, municipal/cities and barangay levels) have the responsibility of enforcing and implementing the law in their respective jurisdictional areas. On the other hand, the Executive Branch through the National Solid Waste Management Commission headed by the Department of Environment and Natural Resources (DENR) and composed of representatives from the following agencies: Department of Science and Technology (DOST), Department of Health (DOH), Department of Agriculture (DA), Technical Education and Skill development Authority (TESDA), Department of Interior and Local government (DILG), Department of Public Works and Highways (DPWH), Department of Trade and Industry (DTI), Metro Manila Development Authority (MMDA), and Philippine Information Agency (PIA) have the responsibility of providing all the necessary support that would enable the LGUs carry out their mandated responsibilities.

(c) The Act placed especial importance to planning as a basis for the rational implementation of the SWM strategy. The preparation of the national framework and the requirement for LGUs to prepare their respective SWM plans emphasizes the indispensability of planning in the entire spectrum of strategy implementation.

(d) RA 9003 placed legislated mandatory targets for solid waste diversion. This is a significant provision for ensuring that reduction, recycling, reuse and recovery is carried out at least at the barangay level. The law mandates the mandatory diversion of at least 25 percent that would progressively increase after five years. An important provision that is projected to significantly reduce garbage is the placement of restriction on the use of non-environmentally

[3] Prior to RA 9003 several laws were enacted on solid waste management through the issuance of Presidential Decrees (PD). The most relevant of these were: (a) PD 825 entitled: "*Providing Penalty for Improper Disposal of Garbage and Other Forms of Uncleanliness and for Other Purposes"* issued in 1975; (b) PD 1152 entitled "*Philippine Environment Code"* specifically on Title V which is on Waste Management issued in 1977; and (c) PD 856 entitled *"Code on Sanitation of the Philippines"* issued in 1975. Other laws that were enacted that included provisions on solid waste management included RA 7160 or the *"Local Government Code"* legislated in 1991 and RA 6969 on *"An Act to Control Toxic Substances and Hazardous and Nuclear Waste Providing Penalties for Violataions Thereof, and for Other Purposes"* enacted in 1990.

(i) Popular participation is underscored to be an important element in the implementation of the Act. Apart from requiring a broad based approach to the formulation of strategies, the law also allows the citizen to file suits to any person, government entities or official who violates or fails to comply with its provisions.

As an illustrative summary of the salient features of the RA 9003 **Figure 1** presents a diagram of the solid waste streams and how it is to be managed according to levels.

III THE STATE OF SOLID WASTE MANAGEMENT IN THE PHILIPPINES

A. THE CURRENT STATE, TRENDS, PROJECTIONS OF SOLID WASTE MANAGEMENT ON THE NATIONAL, PROVINCIAL AND CITY/MUNICIPALITY LEVELS.

The World Bank[4] estimates that the country generate between 0.3 and 0.7 kilograms of garbage daily, depending on the socio-economic level and degree of urbanization. As a general trend, provinces that have greater urban population and larger economic activities generate greater volume of solid waste. In 2000, estimates show that the country generated 19,700 tons of garbage daily. The National Capital Region (NCR) accounts for twenty five percent of the total solid waste generated followed by the Southern Tagalog region (Region IV), Central Luzon (Region III) and Central Visayas (Region VII) which accounted for twenty percent (20%), fourteen percent (14 %) and eight percent (8 %) respectively. **Table 1** presents the complete distribution of waste generated on a regional basis.

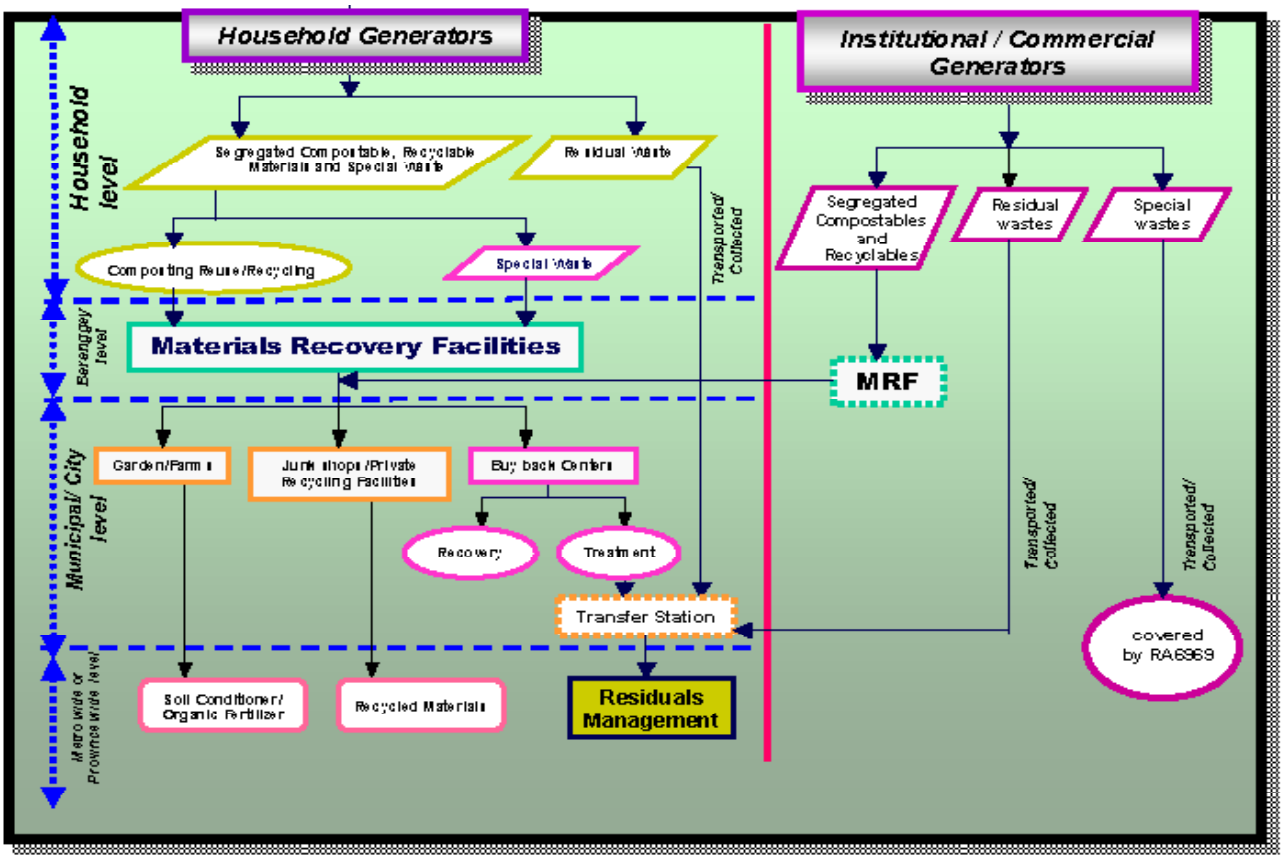


Figure 1. SWM System Prescribed under RA 9003

[4] World Bank,2001. *Philippines Environment Monitor 2001.* http://www.worldbank.or.ph/monitor

Table1: Distribution of waste generated per region (2000)

Region	2000	
	Tons/day	%
NCR	4,953	24.60
CAR	223	1.11
Region I	873	4.33
Region II	271	1.35
Region III	2,729	13.56
Region IV	3,935	19.55
Region V	654	3.25
Region VI	969	4.81
Region VII	1,607	7.98
Region VIII	336	1.67
Region IX	417	2.07
Region X	748	3.72
Region XI	986	4.90
Region XII	432	2.14
ARMM	253	1.26
Caraga	314	1.56
PHILIPPINES	***19,700***	***100***

Sources: Population Statistics, NCSO 2003, and Waste Generation rates EMB, 2002.

Projected estimates indicate that by 2010 the country's waste generation shall have increased by forty seven percent (47%). **Table 2** presents the waste generation and its distribution in years 2005 and 2010. The trend also shows that as the country's urban areas further expand, NCR's share will decline while Regions III and IV will register increases in waste generation.

Table 2. Projected estimates of waste generation per region (2000-2010)

Region	2000		2005		2010	
	Tons/day	%	Tons/day	%	Tons/day	%
NCR	4,953	24.60	5,869	24.39	6,844	23.70
CAR	223	1.11	259	1.07	300	1.04
Region I	873	4.33	1,026	4.26	1,195	4.14
Region II	271	1.35	317	1.32	370	1.28
Region III	2,729	13.56	3,410	14.17	4,188	14.50
Region IV	3,935	19.55	5,126	21.30	6,582	22.79
Region V	654	3.25	754	3.13	851	2.95
Region VI	969	4.81	1,094	4.55	1,245	4.31
Region VII	1,607	7.98	1,962	8.15	2,354	8.15
Region VIII	336	1.67	384	1.60	430	1.49
Region IX	417	2.07	493	2.05	572	1.98
Region X	748	3.72	881	3.66	1,017	3.52
Region XI	986	4.90	1,190	4.94	1,407	4.87
Region XII	432	2.14	610	2.54	706	2.45
ARMM	253	1.26	325	1.35	409	1.42
Caraga	314	1.56	361	1.50	406	1.41
PHILIPPINES	***19,700***	***100***	***24,059***	***100***	***28,875***	***100***

Sources: Population Statistics, NCSO 2003, and Waste Generation rates EMB, 2002.

Other significant trends are as follows:

- Among the highly urbanizing provinces, Cebu registered to have the highest waste generation producing 1,060 tons of garbage daily as of 2000. However, by 2009 Cavite shall have overtaken Cebu's waste generation followed closely by the provinces of Bulacan and Rizal. These trends are significant in the context of planning for waste disposal facilities particularly for the provinces that are near Metro Manila. **Figure 2** shows the trend of waste generation for the seven highly urbanized provinces from 2000 to 2010.

- For highly urbanizing cities outside of Metro Manila, Cebu City has the highest waste generation rate of 359 tons daily. This can further increase if Mandaue city's waste is included inasmuch as it is part of Metro Cebu. It is projected that Cebu city will increase its waste generation by thirty-one percent (31%) by 2010. Cebu is followed by Cagayan de Oro, Davao and Bacolod. An interesting trend also shows that by 2005 Davao shall have surpassed Cagayan de Oro in waste generation. Likewise, Mandaue if considered individually, shall surpass Bacolod City in waste generation by 2007. **Figure 3** presents the trend of waste generation for the highly urbanizing cities in the country.

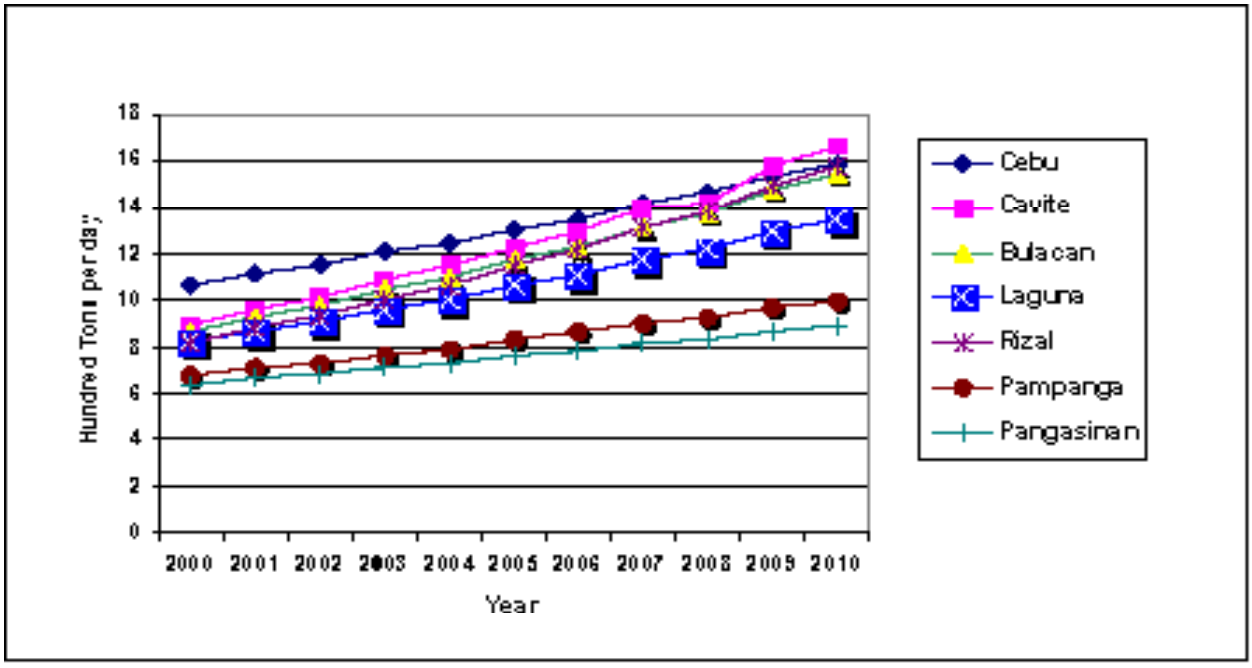


Figure 2 . Estimated SW generation of selected Highly Urbanizing

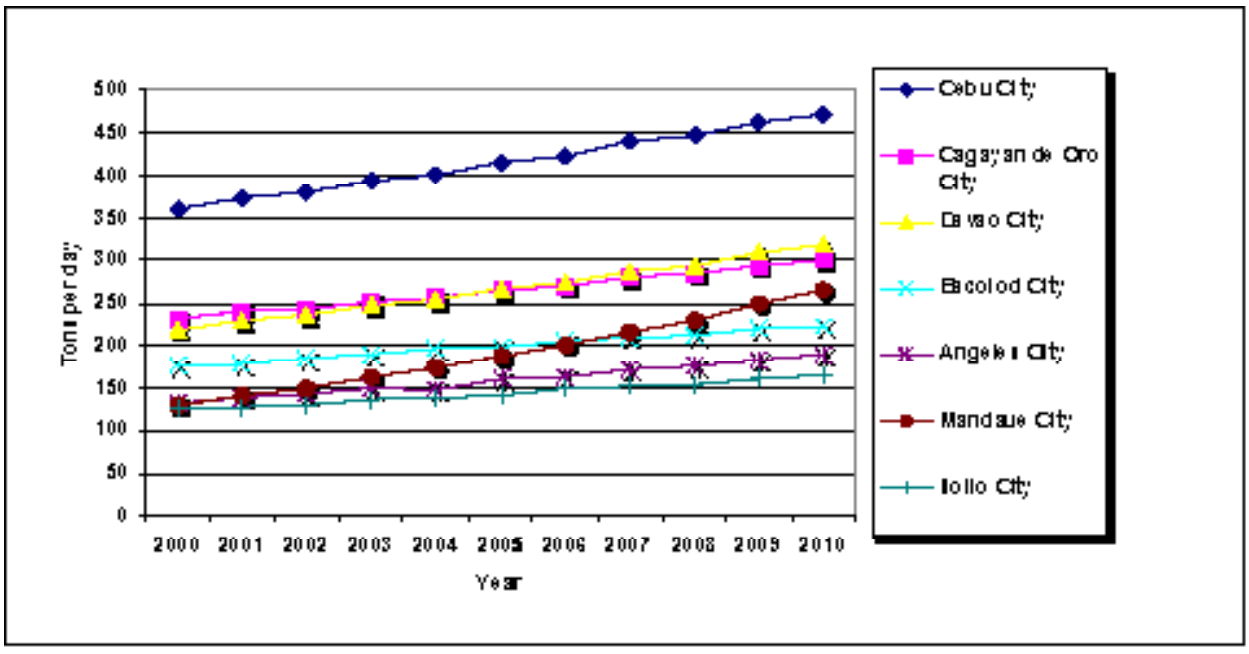


Figure 3 . Estimated SW in selected Highly Urbanized Cities (HUCs)

- Within Metro Manila, Quezon City produces the most waste generating 1,087 ton per day. It is projected to increase by thirty three percent (33%) by 2010. Following Quezon City are Manila, Caloocan, Pasig, Valenzuela, Las Pinas, Paranaque and Makati. Collectively, the other cites in Metro Manila (i.e. Mandaluyong, Marikina, San Juan,

- Malabon, Navotas, Muntinlupa, Pasay, Pateros and Taguig) generates waste slightly over than what Quezon City produces alone. **Figure 4** shows the trend of waste generated in Metro Manila.

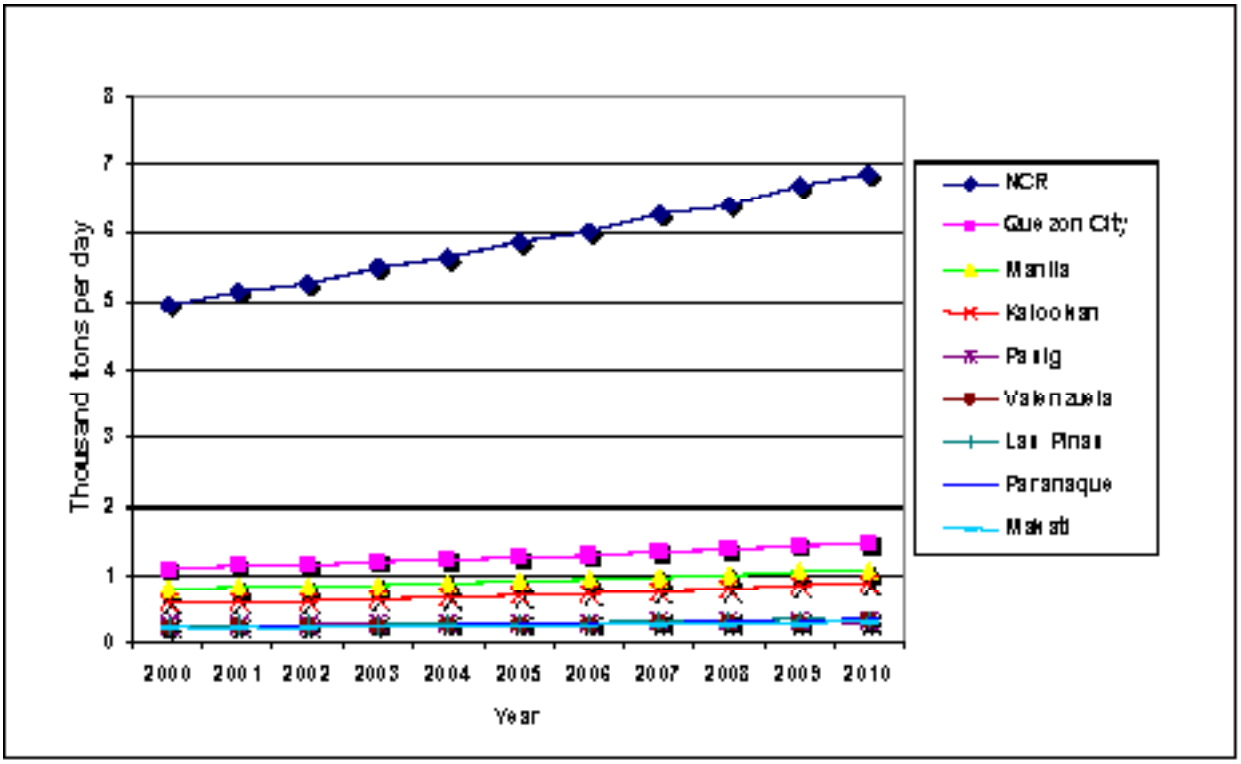


Figure 4. Estimated SW of selected cities in NCR

B. CHARACTERISTICS AND CONDITIONS OF COLLECTION, STORAGE, PROCESSING, DISPOSAL OF SOLID WASTE

1. Waste composition

The Philippine solid waste composition is generally characterized as highly organic (biodegradable) and recyclable. Based on the JICA Study (1999) yard, wood and kitchen wastes account for fifty percent (50%) of the total waste composition generated by an average household in the country. Even in Metro Manila, fourty nine (49%) percent are kitchen and garden wastes**. Table 3** presents the comparative waste composition between Metro Manila and the average household.

Table 3. Municipal waste composition (Metro Manila and Philippines)

Waste Chararacter	Metro Manila*(%)	Philippine Average (%)
Other Organic Wastes (Yard/field waste)	17	11.3
Wood		
Kitchen	33	45.4
Paper and cardboards	12	16.8
Plastic	25	15.6
Metal	5	5.2
Fine and inerts	4	2.3
Others	4	3.4**

* Average of results from a waste characterization done in five LGUs in Metro Manila conducted through the Metro Manila Solid Waste Management Project, by the Asian Development Bank

** comprised of glass

This high percentage of biodegradable waste suggest that composting these materials have great potentials especially in municipalities that are within or near agricultural zones. The potentials for recycling are also good considering that the remaining wastes are made up of recyclable materials such as paper and cardboard, plastics and some metal. The key to recovery of these materials lies in segregation which must be practiced at the household level. However, household segregation is not widely practiced and wastes are disposed of as mixed garbage. The World Bank study points out that recycling opportunities even in urban areas such as Metro Manila are not fully harnessed despite the existence of a huge market for compost and used products from recycled plastics, glass bottles, scrap paper and scrap metals.

1. Recycling and composting

a) Recycling

From the total volume of garbage generated, only a small portion is recycled or composted, despite the potentially large market for compost and used products coming from recycled plastics, glass bottles, used paper, and scrap metals. As generally practiced, recovery of recyclable materials can occur at three levels: household level, at the collection level and at open dumsites. Junk shops support roving collectors to buy recyclable wastes at household levels. In open dumpsites and transfer stations, waste pickers sort and collect recyclable materials which are then sold to the junk dealers. Garbage trucks through their helpers (known as *paleros)* also recover some materials to augment their incomes. However, not much information are available as to the volume that is recovered or even in terms of income derived from sorting.

It should be noted that with the passing of the Act recycling efforts, particularly in Metro Manila as well as other urban areas, are on the rise. World Bank cited that in 1997, only 6% of solid waste was recycled in Metro Manila. By 2002, recycling has increased to twenty-five percent (25%) recovered by Linis Ganda network at a cost of P 230 Million. (Final Report MMSWMP TA 3848-PHI) MMDA has also made operational municipal recycling facilities (MRFs) which handles 200 tons of waste daily. It is anticipated that private sector involvement in recycling will increase in the coming years. As reported by the Metro Manila Federation of Environment Multi-purpose Cooperative in 2001, trade in recyclable materials increased in volume by thirty nine percent (39%) and value by forty seven percent (47%) in 2000 compared to 1998.

b) Composting

Domestic waste are characteristically high in moisture and organic content and low in calorific value making it suitable for composting. By and large, composting has usually been a community-based activity supported by NGOs or LGUs through the barangays. The scale of composting range from simple backyard pits to larger mechanized operations. Until recently interest have increased in the commercial production of organic fertilizers in the light of growing demand for organically grown food. Interest have also been heightened following implementation of successful pilot projects in Metro Manila in barangay Sun Valley, Paranaque. The Act recognized this potential and mandated the Department of Agiculture (DA) to collaboratively work with DENR in setting standards for the production of organic fertilizers from biodegradable wastes. At the moment no demand estimates are available to project the market need for the compost product.

2. Solid waste collection

The responsibility of collecting municipal solid wastes rests primarily with the LGUs. Estimated country wide collection effciency is placed at forty percent (40%) with major cities able to collect as much seventy percent (70%). The remaining balance are either unserved or under-served, which may be common in poorer areas of cities or municipalities and in rural barangays. Most of the uncollected wastes, particularly in the slum areas end up in the waterways and creeks which causes another critical problem during the rainy and monsoon season – that of flooding. Municipal solid wastes are collected either by administration or contracted out to private contractors. There are cases however, wherein residents are the ones making the collections. There are no specific standards for collection services. As a result, collection efficiency and efficacy are not considered critical parameters for improving service. The manner and frequency of collection and the type of equipment used is dictated by affordability, the density of population and existence of road network. In areas where six wheeler dump trucks can not pass (especially in high density slum areas) a system of collection is established where residents dump into communal receptacles that are accessible to the trucks.

3. Transfer and transport

By intent, transfer and transport systems are designed to reduce hauling distances for collection trucks thus lowering hauling costs. The establishment of transfers system is suitable for large cities like Metro Manila where there are long hauling distances to the final disposal sites. In the 1990's Metro Manila had a transfer station system built in Las Pinas intended for the Carmona landfill. With the closure of Carmona and San Mateo landfills, the Las Pinas transfer station has been converted to a materials recovery facility. Apart from Las Pinas, the other transfer station is in Vitas. Consideration for transfer and transport sytem is most likely to be made in the future planning of solid waste facilities for Metro Manila. As options for locating a sanitary landfill near Metro Manila are becoming narrow, the location of future landfills are now most likely more than a hundred kilometers farther. Critical to the decision for the location would be the transfer and transport cost for hauling the collected garbage.

4. Disposal and treatment of collected waste

The single and most dominant issue for solid waste management is where to bring the wastes collected. Presently all collected wastes are disposed in controlled dumpsites. The country has two sanitary landfills – Capas, Tarlac and brgy. Inaywan, Cebu City. The landfills servicing Metro Manila were closed following complaints of residents hosting the sites. With the sites closure, Metro Manila's waste is now dumped in 6 controlled dumps (Rodriguez, Rizal; Payatas, Quezon City; Lingunan, Valenzuela; Tanza, Navotas; Pulang Lupa, Las Piñas; Baseco Area, Manila). Nationwide, and except for areas with Sanitary Landfill, the prevalent practice of solid waste disposal is still through controlled dumping (see also discussions in section D below). In the face of mounting problems on solid waste, particularly in the urbanizing centers, some local governments have signified their intention to upgrade their present mode of disposal to more environmentally acceptable methods.

Section 37 of the Act explicitly mandated the immediate closure of open dumpsites and ordered the shift to controlled dumpsites. These areas are to be operational within a prescribed duration of five (5) years which will serve as a transitional period and should be closed by the end of the said period. At the current rate of implementation full compliance of this provision may be difficult to achieve. A host of factors such as insufficient budgetary resources, absence of an ecological solid waste management plan, difficulties in finding suitable landfill sites and the continued predominance of the NIMBY (not-in-my-backyard) syndrome in potential landfill sites are real obstacles in complying with the law. In the light of these factors, the continued operation of open dumpsites and controlled dumpsites are imminent.

C. Profiling of sources

The current trend indicates a linear growth in the generation of solid waste in the country. Forecasts were based on population growth rate and the daily generation rate per capita (kg/person/day). In the absence of a nationally supported collection of empirical data for waste generation, averages from other developing countries in similar state as the Philippines were used. However, in cities where studies have been conducted, the results were utilized in the projection. This situation presents difficulties in profiling the rates of generation according to domestic, industrial and commercial sources. Such profiling would require resources and the LGUs who are in the best position to undertake this exercise would necessarily have to upgrade their capacities in undertaking the task. While at this stage presenting a profile of sources cannot be done, it is also evident that commercial and industrial zones generate substantial amount of waste, which may or may not be of the same composition and characteristic with domestic waste. For this reason, the imperatives for undertaking the profiling of waste sources cannot be overemphasized. The National Solid Waste Management Commission (NSWMC) needs to mobilize resources that will support LGUs undertake this profiling along with the waste characterization studies.

D. Inventory of Existing and Permitted Solid Waste Management Facilities

A summary of the inventory of existing solid waste management facilities in the country is presented as **Table 4.** The results of the inventory clearly indicate that communities particularly urban and urbanizing areas do not have sufficient capacity for present and future volumes of wastes generated. Not one of the existing facilities can even meet the present level of regulations as required by the Act. The summary also highlights the urgency of streamlining efforts towards full compliance of the Act. The 726 open dumpsites will have to be closed in the near future. At the same time there is also a need to immediately process the approval and operations of the proposed controlled disposal facilities. A look at the figures would indicate that of the fourteen regions, only Regions III, IV and NCR can accommodate the wastes diverted from the

closure of the open dumpsites.

There are also 220 proposed sites for sanitary landfills. The proposed sanitary landfill areas in Metro Manila (4, 232.6 has.) are actually sites located within the adjacent provinces covered by the Regions III, CALABARZON and VI. Other than those areas reflected at the NCR, it could be noted that Region VI has the largest area proposed for SLF given the assumed viability of accommodating municipal solid waste from the Metropolitan area. Taking into account the forecasted generation of waste in the country, within the next two or three years at least twenty five percent of these proposed landfills should already be established. There are greater prospects also for the MRFs. A total of 842 MRFs are listed to be operating in the country.

Table 4. Inventory of Solid Waste Management Facilities (as of Dec. 2004)

REGION	Open Dump Sites	Controlled Disposal Facilities		Sanitary Landfill		MRF	
	No.	No. (operating)	No. (proposed	No. (existing)	No. (proposed	No.	No. of Barangays Serviced
NCR		7				223	126
CAR	15	2	1		16	53	19
REGION I	67	16	6		14	106	99
REGION II	54	16	1		2	35	94
REGION III	82	10		1	27	32	192
CALABARZON	92	64	2		17	61	75
MIMAROPA	20	6			8	20	127
REGION V	50	18	20		2	37	88
REGION VI	31	2			39	52	54
REGION VII	93	19	12	1	21	48	48
REGION VIII	29	2	14		3	8	17
REGION IX	15		20		3	26	27
REGION X	45	19	14		31	41	45
REGION XI	37	10	24		17	62	53
REGION XII	24	12			14	9	26
CARAGA	71	12	19		5	29	50
ARMM	1				1		
Philippines	**726**	**215**	**133**	**2**	**220**	**842**	**1140**

IV. THE NATIONAL SOLID WASTE MANAGEMENT FRAMEWORK: CONCEPT AND ITS ELEMENTS

The tasks involved in solid waste management are complex depending largely on the cooperation of household and communities, the organization of the LGU, systems employed and the application of appropriate technical colutions to collection, transfer, treatment and disposal of wastes. Due to the interplay of these factors, there is a compelling need for LGUs to develop their respective SWM plans in order to rationalize efforts and optimize limited resources that are available[5]. However, before proceeding to preparing the plans it is important that the principles, concept and elements of a solid waste management framework is clearly understood. This section will elaborate on these aspects in the context of RA 9003 and relate it to the Natinal Solid Waste Management Framework.

[5]Most LGUs in the Philippines do not fully account the actual solid waste management cost. Usually the cost that is monitored covers only collection and transport and do not include the cost of managing disposal sites.

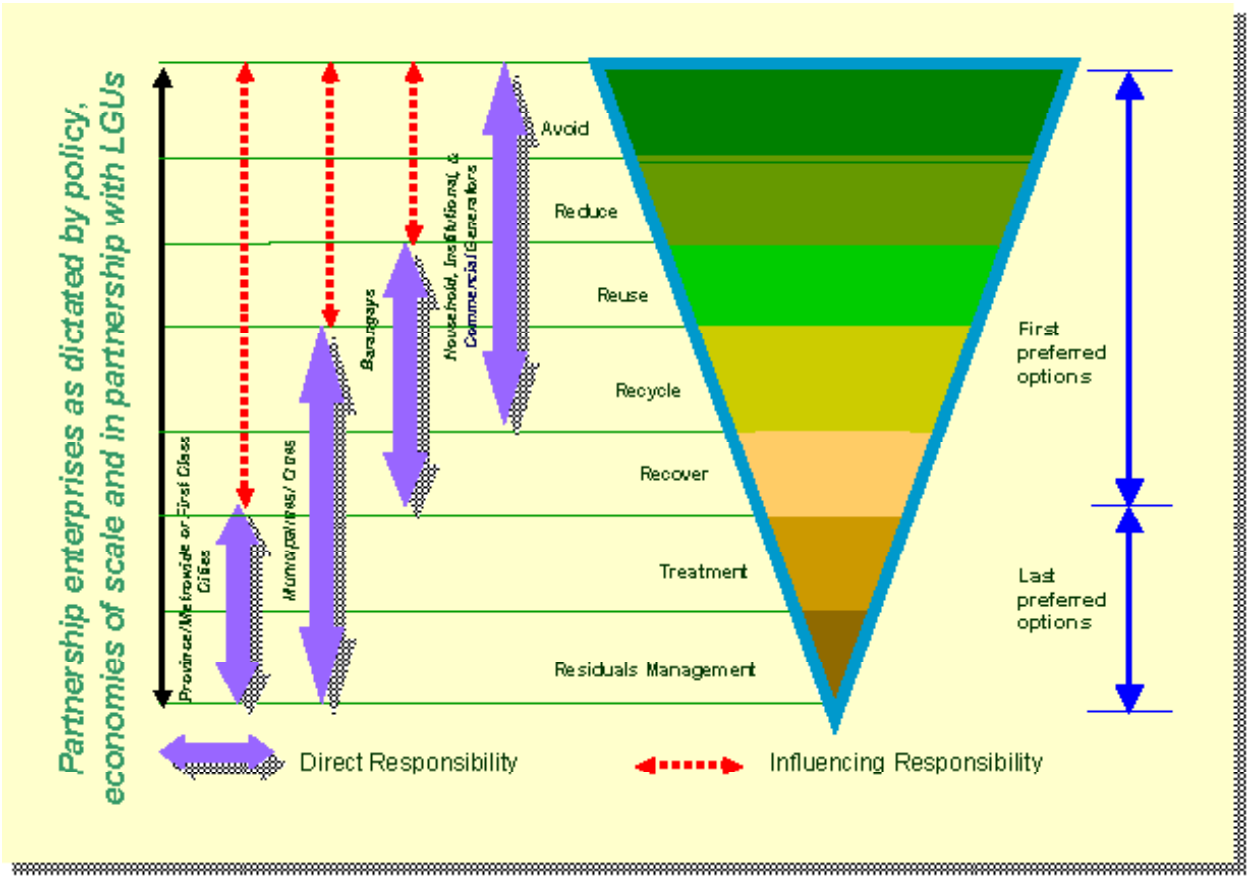


Figure 5. SWM Hierarchy

A. The Ecological Solid Waste Management Hierarchy

RA 9003 promotes solid waste management following a hierarchy of options. These options cover the entire range of activities involved in waste management starting from volume reduction and ending up to the final disposal of waste. Correspondingly, the hierarchy also matches with the levels of governance starting from households up to the province or metro wide level of political organization **(See Figure 5).**

As illustrated, the base of the heirarchy triangle is avoidance and reduction of waste. The objective is primarily to reduce the amount of materials and products entering the waste stream. The basic approach to to volume reduction covers avoidance, product reuse, incresed product durability, reduced material use in production and decreased consumption. Volume reduction is generally a voluntary waste reduction effort and household and commercial generators holds the choice in what manner they can reduce the generation of wastes.

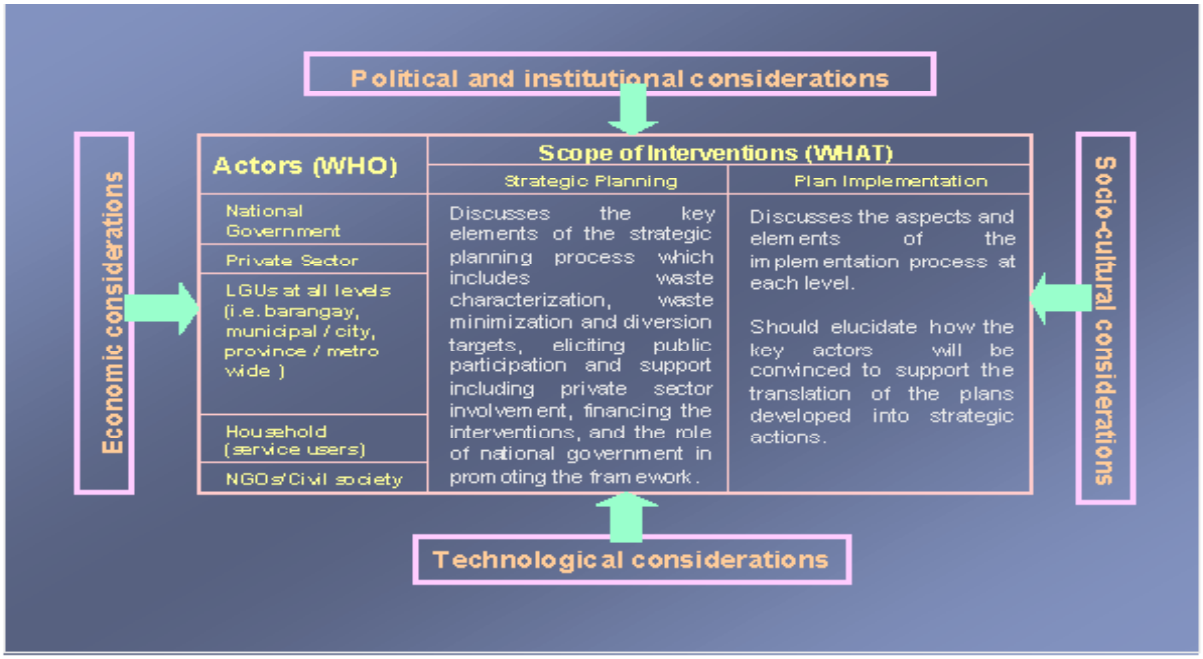
The next level of the heirarchy is recycling and recovery, which differs from volume reduction since it involves the recovery of products from the waste stream. Recycling and recovery generally involves material collection and transport. Thus, the collection methods used to transfer recyclable and recoverable material from the point of collection (either by domestic or commercial/industrial sources) to a processing center where the materials are sorted are integral part of the recyling program. A critical facility at this level of the heirarchy is the MRF which will separate, clean and prepare the recyclables for marketing, or segregate only the biodegradables for commercial composting. These five levels from volume reduction to recycling and recovery constitute the first preferred options under the waste management heirarchy.

The last two levels of the waste heirarchy is treatment and disposal. Even with volume reduction and recycling are actively pursued, a considerable amount of waste would remain which would have to be disposed in an environmentally acceptable manner. Only two options for treatment and dispoasl are allowed – through the use of non-burn technology as incineration of solid waste is prohibited under the Clean Air Act of 1999[6] and sanitary landfills. Even with sanitary landfills a recovery option can be explored focusing on the energy value of waste materials. Landfill gas recovery and utilization offers a promising approach to energy recovery. Treatment and disposal are considered the last preferred option under the waste management heirarchy.

[6] Section 20 of Republic Act 8749 "The Philippine Clean Air Act of 1999

B. Structure and Context of the Framework

Figure 6 presents the general structure and context of the framework that can guide the preparation of ESWM plans. The framework is built along three principle dimensions of: (a) scope of waste management activities (answering the question "What"); (b) critical actors and partners in implementing the activities (Who); and (c) the means for implementing the SWM objectives (How). Surrounding these principles are dimensions which every LGU or planner should always consider i.e. political, institutional, economic, technological and socio-cultural.



Adapted from Peter Schübeler, (UNDP/UNCHS(Habitat)/World Bank/SDC Collaborative Programme on Municipal Solid Waste Mngt.), 1996

Figure 6. Structure and Context of the National SWM Framework

1. Scope of the framework (What)

The scope of the framework based on Sections 15 and 16 of the Act, should at least encompass the following aspects:

a) Planning and Management

- i. Strategic planning
- ii. Organization and delineation of responsibilities for implementation
- iii. Legal and regulatory mandate
- iv. Means for eliciting public participation including private participation
- v. Siting of disposal facilties
- vi. Mobilizing resources for SWM investments
- vii. Public education and information campaign on SWM

b) Waste generation

- i. Characterization of waste according to source, distribution, rates and composition
- ii. Strategies for waste or volume reduction, source separation, and recyling.

c) Waste handling and transport

- i. Waste collection
- ii. Transfer, recovery, treatment and disposal
- iii. Handling of special waste (medical, biohazard, and other types of waste covered

[7] RA 6969 *"Toxic Substances and Hazardous and Nuclear Wastes Control Act of 1990".*

under RA 6969[7]

2. *Critical actors and partners for implementing the activities (Who)*

The Act explicitly reiterated that a wide range of individuals, groups, entities and organizations must be involved in the activities of SWM as users, service providers, intermediaries and or regulators. Given the varied agenda, interest and concerns of these actors, **Table 5** summarizes the scope of their interest in the context of the SWM:

Table 5. Scope of interest of identified actors for SWM

Actors	Scope of interest and agenda
Households and community service users including commercial, institutional and industrial establishments.	These segment of actors are primarily interested in an effective and dependable waste collection service at reasonably low price. Where the waste these actors generate end up are not their priority concern for as long as the quality of their own living environment is not affected by dump sites. However, when their awareness are raised on the health implications and the broader objective of an enviornmentally sound waste disposal, these groups can be mobilized to become influential forces for its effective implementation. Commercial and industrial establishments have different motivation for carrying out ecologically acceptable practice for waste disposal. Most of the time it is dicated by reliability, economics (does waste disposal cut significantly into their operating costs) and sensitivity of their products to public and market perception.
Barangays	The barangay is the basic level of governance in a community. These units have the mandate to upgrade their respective local environmental conditions, improve delivery of basic services and petition municipal/city and even provincial governments for service improvements. The barangay is the most valuable partner of an LGU for local solid waste management. When sufficiently organized, the barangay can be tapped to manage and operate local collection services and waste recovery and composting activities. As solid waste management deals directly with protection of health and maintaining the integrity of the environment it is an important agenda item that can be used by communities in selecting the next barangay head.
Municipal Executives/City Executives (Mayors, Vice Mayors and other local government officials)	As mentioned in earlier discussions, LGUs specifically municipal /city executives are primarily responsible for the provision of solid waste collection and disposal services. Their responsibilities and authorities have been mandated under the Act and its IRR as also reinforced by RA 7160. More than the authority however is the political motivation for providing these services. User satisfaction of the provided service, greater allocation from national government, and national recognition are enough incentives for local executives to seriously attend to solid waste management matters. Local executives also acknowledge that effective SWM programmes depends largely on their constituencies active participation and support and therefore recognize the value of enhancing public awareness.
Provincial Executives (Governors and vice governors) including the MMDA	While municipal/city executives assume significant responsibilities, provincial executives and region wide authorities are also mandated to ensure the effective implementation of the Act. Its key functions, through a Provincial SWM Board, is to provide support to municipal executives under their jurisdiction carry out their responsibilities and also coordinate the planning, implementation and operation of SWM facilities. If the economics of operating a single or common SWM facility has been agreed, the Provincial Executives are given resposibility to oversee and supervise the said facility. Similar to municipal executives, the political motivation serves as the key driving force for provincial executives to provide these services to their constituencies.

Private sector	Private sector participation are deemed critical actors for SWM. Considering that LGUs may not necessary have sufficient resources and funds to support the operation of an environmentally acceptable SWM collection, transfer, treatment and disposal facility, the private sector are potential service providers that can fill in the gap. Operating under various partnership arangements with LGUs , private sector can provide more effective and better service at even lower costs.The different partnership modality the private sector offers with LGUs can cover capital infusion, management and organizational arrangements, labour and technical support. Another type of private sector are the informal private sector which comprise of unregistered or least regulated activities of solid waste management which are carried out by individuals, families, groups or small enterprises. Their basic motivation is self –organized revenue generation such as the informal garbage pickers, junkyard dealers, and scavengers. Usually the motivation for this group is simply survival in the absence of regular employment. Informal private sector genrally work under substandard and unhealthy condition exposing them to the hazards of health, no social and economic security, and lack of access to basic services such as health care, sanitation, and education. As this sector have no other alternative means for livelihood, they welcome any opportunity that will improve their lot.
Non-governmental organizations (NGOs)	NGOs operate between the private and government functions. The motivations for their involvement in SWM vary from humanitarian reasons to providing support for development through service improvement. Some NGOs are even involved in generating sustainable employment targeting their assistance program to the informal private sector. Given their strength in social mobilization, NGOs can significantly contribute to increasing awareness on SWM, organizating grass root SWM activities, catalyzing access to credit for informal private sector, and consolidating voice and position in the planning of SWM plans at local and provincial level.
National government	National government agencies are responsible for establishing the the institutional and legal frameworks for SWM and ensuring that the LGUs have the capacity to implement them. As part of their support mandate, the national government agencies are to provide guidelines, standards, capacity building programmes in the areas of administration, financial management, technical capability and public awareness programmes. National government are also supposed to provide the venue for cross jurisdictional conflict resolution. They also serve to catalyze greater public-private partnership for SWM.

1. Means for implementing the SWM objectives (How)

The complete success of implementing the SWM strategy depends largely on the clarity of its objectives, the identification of appropriate measures with regard to the political and institutional, soco-cultural, economic (including financial) and technical considerations, and the degree of public support to implement the plan. Its sustainability hinges on the engagement of these entire range of aspects. **Table 6** presents a summary of the minimum elements which LGUs can cross-check with respect to identifying the means for implementing the SWM objectives.

Table 6. Summary of elements for a SWM Plan

Aspects	Elements
Strategic goals and priorities	✓ Reflect an articulation of demand of the service in order to express its full value to the society. For the plan to be sustainable, the goals and priorities must be formulated clearly for easier mobilization of broad popular support.

Political and institutional aspects	✓ Clear definition of jurisdictional arrangements for the tasks identified with clear distribution of functions, responsibilities and authority at all levels. ✓ Elaboration of the regulatory and legal framework of the Act at operational levels ✓ Clear organizational structure of the units tasked to implement the SWM plan ✓ Transparent procedures and methods for planning and management ✓ Assessment of capacity and capability of stafff to implement the plan
Socio-cultural aspects	✓ Oriented towards providing real service needs and demands of the con stituencies. ✓ Encourage patterns of waste handling and disposal that would contribute to the effectiveness and efficiency of the waste management service ✓ Development of the constituency awareness program with the purpose of mobilizing support and reflect effective demand for the service. ✓ Promote avoidance, reduction, reuse and recycling and self management of local waste collection ✓ Provide assistance to protect the health of the informal waste workers.
Economic and financial	✓ Warrant that waste management service provided will improve productiv-ity and development of the economy of the municipality or province. ✓ Guarantee the economic effectiveness of the waste management sys-tems at low cost. ✓ Promote conservation and efficient use of materials and resources. ✓ Ensure that the waste management system will create more employment and income generation for the constituencies. ✓ The waste management system implemented have transparent budgeting and cost accounting systems and have features for cost recovery and operational financing.
Technical	✓ The system will achieve optimal life-cycle cost –effectiveness of the equipment anf facilities used taking into account its operation and maintenance requirement and dependability. ✓ Introduces coherent technical systems appropriate to the requirements of the service users and all actors. ✓ The system used which begins at recycling, collection, transfer, recovery, treatment and disposal will guarantee that threats to local pollution, health threats from the proliferation of disease carrying vectors (mosquito, rats, cockroaches) are fully addressed. ✓ Protect the aesthetics and integrity of the environment of the munici palities / provinces.

Converging all of the above elements the configuration of the National Solid Waste Management Framework thus appears as **Figure 7** detailing the elements and responsibilities of every critical actors in implementing an ecological solid waste management.

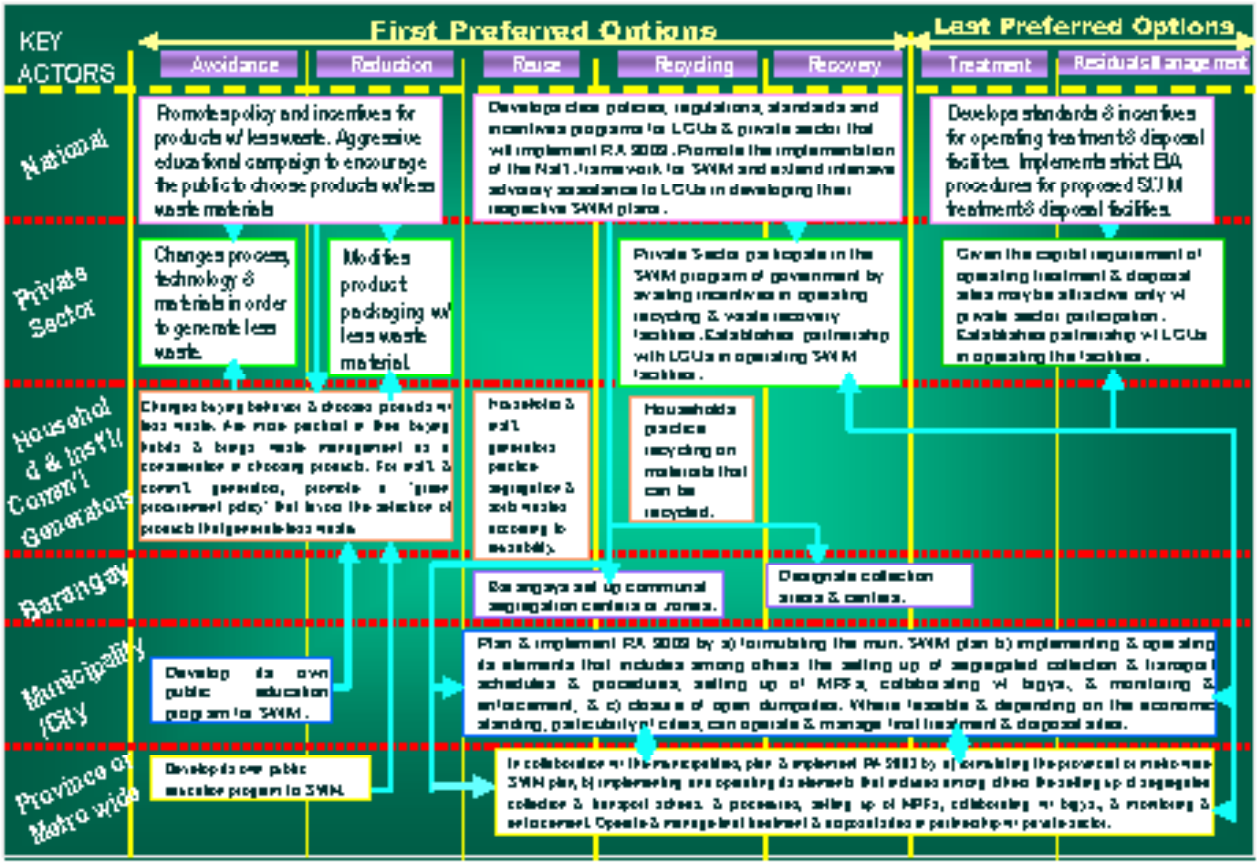


Figure 7. National Solid Waste Management Framework

V. PREPARATION OF LOCAL GOVERNMENT SOLID WASTE MANAGEMENT PLANS

The Act, under Section 17 (and Annex B of the IRR), stipulated the key components of the local government SWM plans. Given the scope and extent of the coverage of the plan, many LGUs would need technical assistance in its preparation. The following discussion outlines the necessary process by which LGUs can be guided in preparing their respective SWM plans.

A. Preparing the Local Government Solid Waste Management Plans.

By virtue that the components of the local government solid waste management plan was explicitly mentioned in the Act, one can consider that these are the minimum elements of an SWM plan. Looking at the scope of the contents, although many of the information required may already have been gathered by LGUs, there are still information which would have to be collected firsthand. These include waste characterization and differentiation according to sources, technical information on recycling, deciding the adequate location, design and construction of facilities associated with solid waste management practices including considerations of regional, demographic and climatic factors, market for the recycled products and others. The degree of information will vary according to LGUs depending largely on the degree of urbanization, demographic size and distribution and their location. At this initial stage of plan preparation, it may be difficult to prescribe specific standards as most of the information gathered are initial efforts in compliance with the Act. As experience are gained, local government solid waste management plans are expected to vastly improve. Taken in this light the following are process guides for LGUs to base on in preparing their SWM plans.

1. *Constitute the SWM planning team*

The local SWM planning team needs to be multidisciplanary group comprised of professionals or trained personnel having background on technical, social, and economic aspects. The Local Executive can constitute the team from its own planning unit (Municipal/City planning officers or the Provincial planning officers) or can contract the preparation to a group of competent consultants which have experince in undertaking such task. Regardless of its composition it is important that the planning team should be responsible to the local executives and the respective SWM Boards.

2. Organize the planning work

The constitued team tasked to prepare the local SWM plans will have to formulate a work plan which should have the expressed approval of the local executives and the SWM Boards. The scheduling and organization of the planning work must take into account the capacities of the team and what they can deliver at a reasonale period of time. But the planning exercise should also not take a long period otherwise its value and usefulness will be negated. Everyone should acknowledge that an SWM plan is an evolving and dynamic document and therefore are subject to change periodically especially as activities are implemented or new sets of valuable information are generated. It is also important to underscore that at this stage barangay involvement is critical to the process. Efforts should be made to include barangay officials in the early stages of planning up to study implementation. For better insight of how barangays can be included in the process kindly refer to the Socio-Economic Feasibility Study of a Cluster-Barangay MRF system in Barangays Palingo, Linga and Sampiruhan Calamba city, Province of Laguna.[8]

3. Gather/collect information

a) Collecting basic demographic and geographic information

All LGUs have demographic and geographic information base. What is needed is to update and vali date its realibility. Demographic data can be verified with NCSO. Geographical information can be validated with DENR/NAMRIA. Other basic information that will be needed are:

i) socio-economic data
ii) health data (mortality, occurrence of diseases etc)
iii) basic services (sanitation, water distribution)
iv) revenue data (earnings of the LGU for the past five years) and
v) expenditure data (allocation of budget/expenditures for the LGU)

b) Conducting waste characterization and source differentiation

The IRR of the Act (under Annex E of the IRR) set the general guide for conducting waste characterization surveys or studies. A more detailed guide for its conduct is set as *Annex A*. Its applicability will have to be suited to the conditions of the locality. Waste characterization surveys will have to be conducted according to source for differentiation.

c) Conduct survey of waste recycling facilities, treatment and disposal sites

A survey of waste recycling facilities, treatment and disposal sites will also have to undertaken. This survey is intended to determine where these facilities are located, the volume of waste that is processed and can be accomodated, the market (including the demand), the source of materials, and other relevant technical information necessary for preparring a comprehensive SWM plan. The information gathered are critical in formulating the strategy and alternatives for achieving the objectives of the plan.

[8] The study was supported by United Nations Development Programme (UNDP) under the Public & Private Sectors Convergence

4. Preparing the plan

a) Set the goals and priorities

The provision of an effective and efficient solid waste management has the character of being a “public good” wherein the full value of the services to society is considered high even if the economics for such a service may not give a profitable return. For this reason in preparing an SWM plan, it is important to set the goal and priorities of the plan since it connotes a public process that must articulate the demand of the constituencies and express its full value to the society. Settings goals for SWM focuses effort where everyone is commited to achieve. The Act has already expressed these goals under Section 2 when it elaborated the ten principles. In summary the primary goals of an SWM are: i) to ensure the protection of public health, and ii) promoting the quality of the environment. A subsequent focus is supporting effort for attaining efficiency and improving productivity of the economy and generate more employment. From these articulation of goals, a heirarchy of activities are flexed out to ensure the attainment of these stated ideals.

b) Waste diversion goal pursuant to Section 20 of the Act

This framework establishes the premise for waste reduction goals to limit the amount of materials in the waste stream for the next 20 years. The database used to calculate these reductions are taken from population, the estimated rates of waste generated by the population inclusive of those that are being generated by commercial and industrial establishments. The targeted goals for waste reduction are as follows: (a) twenty percent (20%) by the first five years; (b) twenty-five percent (25%) by the second five years; (c) thirty percent (30%) by the third five years; and (d) fifty percent (50%) by the fourth five years. The major responsibility of volume reduction rests with the consumer. Local governments, national government agencies can facilitate the volume reduction program by requiring all agencies to use recycled products and the encouragement of a concerted effort involving all consumers. Government agencies can take lead in waste diversion by adopting a “Green Procurement Policy” which promotes the acquisition of materials with less packaging, coming from recycled products and are durable for longer use.

c) Set scenarios

Scenario analysis as a methodology for planning is a powerful tool in decision making and concensus building. Building scenarios helps critical actors get a clearer picture of the options and alternatives that can be taken to achieve the same goal. It also brings home the message of the implications of certain decisions. In the context of SWM, the scenarios to be built are the implications of options against a situation where no action or *status quo* is pursued. **Figure 8** below illustrates the value of setting scenario in the preparation of local SWM plans.

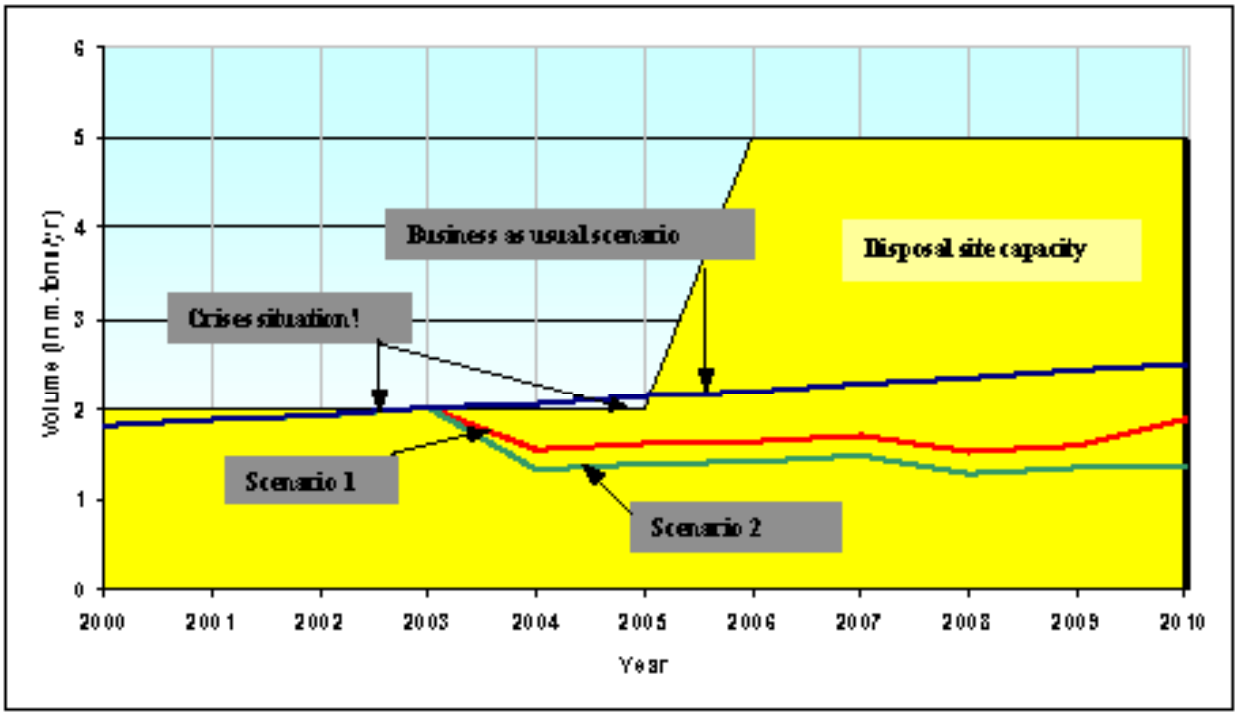


Figure 8. Illustrative example of scenario of SWM option

This illustration is a hypothetical case. Assume that city M generates 1.8 million tons of solid waste a year. A linear forecast of waste generation using a daily generation rate per capita of 0.5 would show that by 2010 the city shall have generated 2.5 million tons of solid waste. Assuming also that the city has a disposal facility (either as open dump or controlled dump site) that can accommodate 2 million tons of waste per year up to year 2006 and from thereon it can accommodate 5 million tons per year. Under a business as usual scenarion (status quo scenario) City M would be having a garbage crises situation from mid of 2003 uo to 2006 since their generated waste shall have already exceeded the disposal facility capacity. *Scenario 2* projects that if 25% of waste is diverted starting at 2004 and further increased by 10 % in 2007, even at current capacity of 2 million tons per year the waste generated by City M can be accommodated. *Scenario 3* is further more appealing as it targets a 10% volume reduction plus 25% waste diversion to start in 2004 and an additional 10% diversion by 2007. As used in this case, applying such an approach can galvanize positions on the best alternatives and mobilize public support for addressing SWM issues.

1. *Presenting the SWM plan to the constituencies*

a) Using the logical framework approach in the SWM plan

It is important that the plan should be presented to the public to mobilize their support to the proposed strategies reflected and at the same time firm up ownership of the plan as that of the municipality or local government and not just of the local executives. The approaches to presenting the plan can vary depending on the actors and the purpose of the presentation. For greater ease and more coherent approach to SWM planning it is suggested that the logical framework (logframe) approach to planning be used by LGUs. Capacity building can be programmed for the use of the approach. **Table 7** below presents a sample of a logframe of for a SWM plan.

Table 7. Sample Logical Framework for a SWM Plan

Plan Description/ Intervention logic	Objectively verifiable indicators (OVIs)	Means of Verification (MOV)	Assumptions and preconditions
Goal: To contribute to improved community health on a sustainable basis.	Establishment of a comprehensive municipal solid waste management strategy (Measures to verify to what extent the goal are fulfilled)	Sources of data information necessary to very status of objective level indicator	
Specific Objectives: To provide a clean reliable sustainable solid waste management service to the entire municipality	Establishment of a comprehensive municipal solid waste management strategy (Measures to verify to what extent the goal are fulfilled)	Sources of data information necessary to very status of objective level indicator	Important events, conditions or decisions outside the control of municipalities which must prevail
Output: 1. Volume reduction of waste generated by household/ commercial establishments	1.1.Households and commercial establishments shall have reduced volume of waste by 10% 1.2. (other measures)	Survey and solid waste management record	Important events, conditions or decisions outside the control of municipalities which must prevail
2. Recycling of waste is promoted	2.1. Twenty five percent (25%) of waste generated is recycled, reused by household and communities. 2.2.	Survey and solid waste management record	Important events, conditions or decisions outside the control of municipalities which must prevail
3. Efficient collection of waste in XXX barangays	3.1. All XXX barangays will have a 100% collection service that is efficient and regular. 3.2.	Solid waste management records	Important events, conditions or decisions outside the control of municipalities which must prevail

4. Establishment of ___ MRFs	4.1. Municipality have XXX MRFs operating 4.2.	Solid waste management records	Important events, conditions or decisions outside the control of municipalities which must prevail
5. Management of disposal facilities	5.1. Closed and rehabilitated XXX open dumpsites 5.2. Operate XXX closed dumpsite 5.3.	Solid waste management records	Important events, conditions or decisions outside the control of municipalities which must prevail
Activities 1.1 1.2 2.1 2.2	Means for carrying out the tasks. Reflect necessary physical and non-physical resources to include: • Investment requirements (covers equipment and capital costs) • Operational expenses • Personnel • Source of revenues	Management and transaction records	Important events, conditions or decisions outside the control of municipalities which must prevail

VI. PREPARING SWM PLANS

A. LGU CLUSTERING

The Act recognizes that while major responsibilities are bestowed to LGUs certain flexibility is also afforded them to find the most optimal configuration for ensuring the delivery of solid waste management service. Given the diversity of population densities, there may be a need to cluster LGUs according to common parameters. Population distribution, distances between population centers and the cost of owning and operating an engineered disposal system are considerations that must be acknowledged. In addition, the cost of transporting the waste from distant points to centralized facilities is compared against the cost of individually owning, siting, operating and closing many individual SWM facilities (particularly, open and controlled dumpsites).

In several parts of the country certain clustering has already occurred because multigovernment entities have realized the economy of scale in jointly sharing SWM facilities. Many of the large facilities are already accepting solid waste material from neighboring communities. This practice will result to the closure of small, poorly managed and below standard facilities and those which had reached their capacity but do not have the resources to expand. In order to accomplish the goal of clustering, adjoining municipalities need to agree on which service can be accommodated in their respective areas. Once this agreement has been formalized, an organizational plan will have to be developed containing a map depicting the boundaries and a written agreement signed by all LGUs within the district stating their approval of the plan. *Annex B* presents a guide in clustering common solid waste management facilities.

To ensure that smaller communities are not isolated or left out, the province wide comprehensive SWM plan formulated must guarantee that the needs of these communities are reflected in the plan. As a rule of thumb, based on population, each municipality must have a facility. One province depending on its size should have a province wide recycling center that is privately or publicly owned. In addition, municipalities adjacent to another province that have SWM facilities may wish to transport their solid waste to a facility nearby them, provided that an agreement is entered into by the municipality and the other LGU operating the facility. The province wide plan would not be implemented unless each of the LGUs choose not to develop a plan or unless other areas are left out of the plan. The comprehensive province wide SWM plan can recommend that the siting of SWM facility should be near the areas with the largest population.

B. Involvement of the private enterprise

Many options are available for interacting and allowing the private sector to participate in the implementation of the plan. LGUs are given the leeway to establish their own guidelines regarding the involvement and use of the private sector in whichever aspect of the SWM operations it deems appropriate. The LGU has the option to contract out all of its services to the private sector and maintain only management and oversight responsibilities unto themselves. On the other hand, the LGU can also elect to set up and operate its own facilities provided they comply with the requisites of the national oversight agencies.

The tapping of private sector to perform recyling and collection services is quite common and the preferred service. It offers several advantages such as it avoids many of the capital and labor costs associated with the start up and operating a recycling facility and second it simplifies the LGU responsibility. Similarly the LGU is not required to build the skills for establishing and maintaining markets for collected recyclable materials and for providing storage facilities if the markets disappear. The majority of landfills are however owned by some type of governmental operations. Each LGU should have the authority to allow private firms to own and operate a landfill.

VII. SOME RELEVANT CONSIDERATIONS IN PREPARING LOCAL GOVERNMENT SOLID WASTE MANAGEMENT PLANS

A. Volume Reduction at source

Volume reduction at source is the first priority of the comprehensive and ecological solid waste management approach. Volume reduction should be promoted at the consumer and industry levels by providing financial incentives or disincentives, through regulations, programs that promote voluntary waste reduction efforts and by example of governmental efforts to reduce wastes.

The first step in organizing an effective volume reduction program is to develop an awareness program directed at consumers, commercial and industrial operations . Through public awareness programs for the general public and special campaigns designed for commercial, institutional and industrial sectors information can be conveyed regarding volume reduction methods that have been effectively used or applied in household or by similar types of commercial/industrial endeavours. Dessemination of best practices and simple housekeeping practices are valuable information that can be promoted.

The next step is to consider offering incentives to consumers as well as commercial/industrial generators, to participate in volume reduction programmes. Some of the more commonly used incentives are the following:

- Financial incentives for commercial and industrial sectors that provide ideas for volume reduction and recyling.

- Offering economic incentives is one way of enticing consumers to use voluntary programs. One incentive economic that is commonly used is a deposit system for materials that are usable such as refillable beverage containers or those made out of recyclable materials. With this system comes handling responsibilities for retailers. A second economic incentive is to assess the local resident a user charge for refuse collection based upon the level of service provided. Collection fees are determined by the number of waste containers a particular resident use. Those who generate more waste require more disposal containers and pay more for the additional service. A third type of incentive is a product charge incentive where the goal is to encourage manufacturers to use more recyclable materials and also encourage consumers to use these products.

To complement these steps in developing a volume reduction program is to establish regulations that place various restrictions or standards on the manufacturing and/or use of consumable products. Regulations have the advantage of being direct and have immediate impact. However, they have a disadvantage of relatively being costly and sometimes impractical to implement.

Volume reduction is the most preferred waste management alternative. However, barriers exist in developing or expanding volume reduction efforts because of difficulties in quantifying costs for implementing such

programs and for measuring the trade-offs inherent to those programs. Also lifestyle demands often times favor convenience over conservation without consideration of the long term consequences. Despite these existing difficulties, volume reduction can be effective in minimizing the final disposal needs.

B. Recycling and Reuse Generators of Recyclables

1. Yard Waste Composting

Landfill operators and owners should be discouraged from accepting yard waste for disposal. Once separated from the rest of the waste stream, the yard waste may be accepted at the landfill and processed in a designated area for soil conditioning or composting. If possible LGUs may have to develop ordinances that would encourage the development of yard waste separation and composting.

Composting operations vary in manner in which yard wastes are separated and collected as well as the composition of the material. The material content of the yard waste can affect the effectiveness of the composting process. Citizens need to be informed about the need to keep unwanted materials out of the yard waste collection system to avoid handling and processing problems at the compost facility.

Yard waste can be bagged and left at the curbside for collection and they can be transported to a centrally located collection point of to the composting site itself. The choice of collection methods largely depends upon the cost, convenience, household participation rate, and amount and type of yard waste separated and collected. Yard waste composting can also take place through backyard composting methods where the homeowner composts his own yard waste. Another homeowner option is to mulch organically degradable materials and allow them to mulch in backyards. Any combination of these approaches can be allowed provided the activity do not cause any nuisance or attract vector carrying diseases in the areas.

2. Recycling and Reuse

Many issues need to be addressed when designing a materials recovery system. The first is to determine whether the generator of the materials represents the residential or the commercial sectors, because each has different type and quantities of waste streams. The second is the diversity of the communities. These demographic and housing factors present important issues and problems in terms of offering recycling services. Another consideration is how to best utilize the existing collection equipment and processing facilties.

3. Generators of Recyclables

a) Commercial Generators

The term “commercial generators” is a broad classification of businesses, industries, and institutions, which essentially includes all facilities, not used exclusively as residences and which generates waste and recyclable materials. Given the collective volume of solid waste generated by the commercial generators, planning for the collection and disposal of wastes generated from these establishments must be accounted for. The responsibility of formulating segregation and recycling schemes falls squarely in the owners of these establishments. The LGU in collaboaratin with the NSWMC may have to issue corresponding guidelines for owners of these type of enterprises to establish their recycling centers.

b) Residential Generators

The composition of recyclable materials from residential units is generally uniform regardless of whether that residence is located in a rural, or urban area. The major differences between urban and rural areas are the type of housing units and amounts and type of convenient packaging. Urban areas generate more fast food packaging and other convenience items many of which are disposable because of consumer demand and availability. Rural areas have less access to this type of food packaging and their houses are wide spread and have spaces where they can actually undertake some recycling of their own.

C. Material Collection and Transport

The collection methods used to transfer recyclable materials from the home and workplace to a processing center where the materials are sorted and marketed are integral part of the recycling program. Collection issues directly affect citizen participation, program costs and ultimately the success of the program. The collection methods selected must reflect the demographics of the area and address the existing waste collection system.

The collection program suitable for a specific area can be determined by types and quantity of housing units and particularly by the type of waste collection service presently provided. The initial program should utilize a collection system currently provided for solid waste. The convenience of using a similar system should enhance residential participation but will definitely require modification in later stages.

The functions of an MRF are to separate, clean and prepare recyclables for marketing. This light manufacturing operation relieves the generator (whether business or residential) from that responsibility. Ideally, the MRF should be located near the population center within the area being serviced and should have the capability to prepare and market different recovered materials such as waste paper grades, and different types of food and beverage containers. MRFs typically employ various combinations of mechanical and manual separation depending on the materials and quantities. Recyclables are sold to end users of the different materials who manufactire them into usable products for consumers to purchase.

D. Management of Closed, Open and Expired Controlled Dumpsites

There are prescribed methods for closing open dumpsites and managing them to allow the sites' eventual rehabilitation. The technical guidelines for the management of closed, open and expired dumpsites will be issued by the NSWMC and DENR in the future. However, preparations would have to be done now on existing open dumpsites scheduled for closure. While awaiting the guidelines, LGUs would now have to set up contingencies for the closure of this site and allocate budget resources for the management of the closed sites.

E. Disposal in Landfills

Cities and municipalities are responsible for providing solid waste facilities for their constituents. The operation of landfill facility either by LGUs or private entities are mandated to be in accordance with all the permit conditions as required by DENR, and will require the services of a well trained staff properly equipped to successfully manage the facility. The operation of landfill sites are also to be closely monitored prescribing fully to the monitoring plan that is to be set by DENR. Considering there are standards that will be set, LGUs must have the discipline to comply with these prescribed standards. LGUs need to also embrace the value of self-monitoring and proper maintenance to minimize operational costs and expensive clean up activities. As a guide for operating landfills, a description of levels of performance and appropriate methods and degrees of control that are provided, at the minimum, must be adhered to for the protection of public health and welfare. More specifically attention should be given in the:

a) Protection of the quality of groundwater and surface waters from leachate and run-off contamination;

b) Disease and epidemic prevention and control;

c) Prevention and control of offensive odor; and

d) Safety and aesthetics.

VIII. INFORMATION AND EDUCATION

A. Venues for public participation from all sectors at all phases/stages of the waste management program/project.

In order to implement an effective integrated waste management system, including volume reduction and recycling programs, it is imperative to formulate educational programs directed at commercial and industrial operators and households. The long term goal is to educate the youth and set behavioural modification of adults in the future as the integrated waste management system for solid wste is implemented.

The multi-faceted educational program would have include the integration of waste management curriculum material into the school systems, provision for adult seminars, newsletters and speaking engagements within various organizations, provisions for technical training for municipalities, cities, barangays, private operators and officials and the utilization of news media willing to participate in the program. To accomplish the tasks, local governments and several entities must share in the many responsibilites the program will identify.

B. Information and education campaign strategies

Public information and education programs inform consumers as to the amount of waste generated from different types of consumable products. With this information, consumers may change their consumption and purchasing habits to favor those products that are more durable and have longer useful life or purchasing of products that are reusable.

The goal of public education program is to develop an understanding of the intent of the integrated waste management system. The public should be made aware of the solid waste problems that exist, the alternatives available to manage solid waste more effectively and of the importance of their participation in solving identified problems. The public does not generally realize that their participation in waste reduction programs can make a difference and it is in this regard that information and education campaign strategies need to be developed along with engineering and the strict implementation program that penalizes proven violators.

1. Responsibilities of National Agencies

The DENR through the National Ecology Center are tasked to collect, prepare and distribute information and conduct educational and training programs that will help in the implementation of the solid waste management programs. The Center is also expected to inform the public of the relationship between the generation of different types of wastes and quantities of solid wastes, alternatives available to handle these wastes and the implementation of the solid waste management hierarchy. The information shall be made available with the following audiences in consideration:

(a) Barangays, municipality, city and province officials and private owners/operators;
(b) Kindergarten through post-baccalaureate students and teachers;
(c) Private solid waste scrap brokers, dealers and processors;
(d) Business that use or could use recycled papers or produce products from recycled materials, and persons who support or serve these business;
(e) Businesses interested in implementing source reduction internally;
(f) Civil society and organizations that are willing to promote the program; and
(g) The general public as a whole.

The Center may provide or secure curriculum material, public service announcements, advertising, promotional items such as stickers, posters, educational brochures, videos, newsletters, and speaker's bureau.

2. Local Government Responsibilities for Education Drive

Public education is an essential element of a successful development of local recycling, composting, or proposed sanitary landfill projects. The success of these projects will require a very strong public commitment to public education on SWM. As local solid waste are within the purview of local government authorities, local executives through their appropriate offices should see that solid waste awareness program is supported.

IX. FINANCIAL ASSISTANCE AND LINKING ODA TO SUPPORT SWM INITIATIVES

A. Incentives

Implementing an integrated waste management system requires that economic assistance and incentives are initially available to LGUs, probably in the form of grants or loans from the national government. Although each LGUs have sufficient leeway to source or finance their respective SWM operations through bond flotation, taxes, and assess fees for the service they provide, an initial infusion of funding would still be required to assist them during the organization and initial start up periods. As a matter of principle however, the incentives program to be designed should be premised on the full cost accounting for collection and disposal services provided to the consumer, a product charge or preference incentive to encourage the use of more recycled or recyclable materials by government and private users or other economic incentives that best encourage best waste management practices.

B. Grants Program

The Act has established opportunities for a grants program provided they are to be accessed through the normal appropriations channel of government. The grants program is to be administered by the NSWMC under the rules established for solid waste management grants.

C. Linking ODA to SWM initiatives

The preceding discussions described the strategic aspects for preparing a SWM plan bearing in mind that the plan can be practically implemented. Effective and sustainable SWM cannot be achieved by focusing on one or two aspects that were elaborated in the earlier sections. One acknowledges that a huge amount of resources would be needed to ensure that the ideals of the framework plan will be implemented all over the country. Precisely, this framework is prepared to focus efforts where the interventions will bear greater impact and produce or contribute to the production of the desired results. Essentially, the framework may not guarantee infusion of the needed resources to implement an SWM plan prepared by LGUs. However, the framework can assist in identifying the critical areas for implementation and match them with resources that are available. Overseas Development Assistance resources, which may come from bilateral or multilateral donor institutions are usually significant sources of funds that can be tapped by LGUs. The preparation of an SWM plan conveys a message to potential donor countries the readiness of LGUs to accept assistance in SWM. This framework envisions to catalyze ODA sources with SWM initiatives planned by LGUs.

X. RECOMMENDATIONS FOR PLANNING PERIOD

A. Framework Updates

This framework plan should be viewed as a dynamic document, which requires periodic updates due to changes in laws, ordinances and regulations, technologies associated with waste management practices and the social and economic conditions. Considering that many of the regulations and subsequent guidelines that will fully operationalize this Act are still to be issued or finalized, this framework plan should be updated every two years following its initial five years.

ADB, 2002., ***Technical assistance on Metro Manila Solid Waste management [TAR:PHI-35764]***

DENR, 2001.Republic Act 9003: ***An Act Providing for an Ecological Solid Waste Management Program Creating the Necessary Institutional Mechanism and Incentives, declaring Certain Acts Prohibited and Providing Penalties, Appropriating Funds therefore and for Other Purpose.***

DENR, 2002. ***Implementing rules and Regulations of Republic Act 9003.***

Hennepin Country solid Waste Management Master Plan, 1998 available at http://www.co.hennepin.mn/environmental/programs/MasterPlan_Final.pdf

JICA, 2001. ***Study on Hazardous Waste Management in the Republic of the Philippines.***

Llorin, R. 2002., the Policy Analyst Report. *RA 9003: the Ecological Solid Waste Management Act: a dissection into Policy Issues.* available at http://www.plcpdfound.org

MMDA, 1999. ***The Study on Solid Waste Management for Metro Manila. Main Report II(Feasibility Study)***

PPUE-SWM. 2003., ***The Socio-Economic Feasibility Study of a Cluster Barangay MRF System in Barangays Palingon, Linga, and Sampiruhan, Calamba city, Province of Laguna, Philippines*****.**

Shübeler, P., 1996. ***Conceptual Framework for Municipal solid waste Management in Low-Income Countries.*** **UMP Working Paper 9, Switzerland.**

World Bank. 2001a. *The Philippine Environment Monitor 2001: Solid Waste* available at http://www.worldbank.or.ph/monitor

Annex A

Procedures for Field Work to Determine Composition of Waste

General Scheduling/Logistics

1. Determiner schedule for sampling. The project schedule should consider calendar dates which will not impact how representative the field data actually are. Care should be taken to avoid, if possible, weekly periods that include holidays or sampling periods that occur immediately after major holidays.
2. Notify all affected parties in writing and via telephone. City representatives, haulers, and disposal site operators should be contacted to confirm any special operations that might be conducted during the period in question.
3. Hire/assign personnel to assist in the conduct of the sort.
4. Secure necessary heavy equipment.
5. Identify and locate emergency services nearest to the site. Acquire the name, address, and phone number of the nearest hospital and ambulance service, as well as map indicating directions to the hospital, other emergency facilities, or both.
6. Identify the generator types to be surveyed. The generator types may be divided by type of waste (e.g. residential, commercial, market, light industrial, hospital, etc.). The residential sector may be further divided by economic status. Determine the number of samples to be taken from each type of waste stream. Identify sources of each of the types of waste.

PERSONNEL

The following personnel are recommended:

1. 8 personnel for sorting 8 hours per day.
2. 2 personnel for collecting the samples.
3. Bulldozer operator (if bulldozer is available).
4. Driver for vehicle used to transport samples (as required).
5. 2 supervisors (one at the disposal site and one at the sorting area).

EQUIPMENT AND MATERIALS

1. Temporary use of warehouse or similar building to perform the sorting process.
2. Front-end loader or bulldozer with a grapple attachment to aid in sample collection. Alternatively, samples can be collected with shovels and containers.
3. Weigh scale capable of reading from 0 to 60 kg, preferably in 0.1-kg increments.
4. Two shovels, preferably wide-mouth shovels
5. Two rakes.
6. Twenty 120 to 200-leter drums and twenty 60 to 80-liter pails to store segregated materials for weighing.
7. A 2.5 m x 3 m section of 2 cm plywood and two saw horses (or use 55 gallon drums as legs for the table) to be used as sorting table.
8. A 2 m x 1 m sheet of 2 cm plywood for use as a base on which to set the weigh scale or a solid, level area in a building).
9. Safety equipment for the sorters including; hard hats (if sorting takes place outdoors).
10. Drinking water.
11. A minimum of six orange cones (or stakes and tape) to delineate the working area (if sorting takes place outdoors).
12. Vehicle and operator to transport samples from disposal site to sorting area.
13. A supply of 100-liter plastic bags.
14. A 5 m x 5 m tarp to place on the ground under the sorting table.
15. Two dust pans with brushes.
16. Two three-finger claw-type garden tools to assist in opening plastic bags and segregating food residues.
17. A section of 1 m x 1 m metal screen (2.5-cm mesh) to sort the fines.

18. Safety equipment for the sorters including: vests (if sorting takers place outdoors), gloves, fiber masks, and a first aid kit.

The area for collecting the samples should be approximately 20 meters by 10 meters to accommodate the stockpiling of 2 or 3 vehicle loads of waste and continually grab samples. The constant collection of samples is important in order to maintain the sorters busy.

TRAINING

A training session for inexperienced sorters should be carried out at the start of the "official" sorting work. The sorting methodology to be followed should be delineated, stressing the importance of safety and the accuracy of the work. The different components to be sorted should be clearly explained and, preferably, shown to ensure reliable data from the sorting procedure. A practical sorting demonstration performed by the sorters, at least on a small sample portion, should be performed to allow them to fully understand the tasks to be conducted. At all times the supervisors must check that the sorting and related work is properly done, explaining any detected mistakes to all the crewmembers.

Even if the crew is experienced in sorting or in scavenging, safety precaution and sorting procedures should be reviewed with disposal site and sorting personnel prior to the conduct of the field study.

SAMPLING PROCEDURES

The following procedure is adopted from the Method for Determining the Composition of Unprocessed Solid Waste promulgated by the American Society for Testing and Materials (ASTM), Method D5231.

PREPARATION

1. Secure a flat and level area for discharge of the vehicle load. The surface should be swept clean or covered with a clean, durable tarp prior to discharge of the load. It is important to select a location for discharge of designated loads, manual sorting activities, and weighing operations that is flat, level, and away from the normal waste handling and processing areas.
2. Position the scale on a clean, flat, and level surface and adjust the level of the scale if necessary.
3. Check the accuracy and operation of the scale with a known (i.e., reference) weight. All weigh scale equipment should be calibrated according to the manufacturer's instructions. Take appropriate corrective action if the readings are different than the calibration weights.
4. Weigh all empty storage containers and record the tare weights. Storage containers should be weighed each day, or more frequently if necessary, in order to maintain an accurate tare weight.
5. Label the storage containers according to the type of waste that will be placed into them.
6. Arrange for delivery of waste to sorting location. Coordinate selection of the vehicles and routing method to the sorting area with traffic monitors, supervisors, etc., at the facility, as required, in order to assure that selected vehicles will find their way to the location where the sampling will take place. The number of samples for each waste source should correspond to the test plan. The field supervisors should obtain the vehicle information and instruct the driver where to discharge the load. Maintain at least one load in inventory so that the sorting crew will not be idle waiting for materials to sort. Weights of 100 to 150 kg for sorting samples of unprocessed solid waste are recommended.

SORTING

1. Vehicles for sampling will be selected at random during each day of the sampling period. Vehicles will be selected which have been assigned to collect waste form specific areas on a given day. The waste will be selected depending upon the economic groups and type of generator.
2. Direct the designated vehicle containing the load of waste to the area secured for discharge of the load and collection of the sorting sample.
3. Direct the vehicle operator to discharge the load onto the relatively flat, clean surface in one continu-

ous pile, i.e., to avoid gaps in the discharged load.

4. Collect any required information from the vehicle operator prior to the vehicle leaving the discharge area and label the discharged load for the purpose of maintaining its identification as other loads are discharged nearby.
5. The bulldozer operator will be asked to collect 100 to 150 kg samples from two different sections of the load and deposit them on the floor/tarp. If a bulldozer is not available, the samples can be collected manually. If samples are collected manually, the laborers can be instructed to collect samples from various sections of the load and deposited on the floor/tarp.
6. Once the samples are on the ground, the sampling crew will divide the mix in half, collect one of the halves. If an oversized item constitutes a large weight percentage of the sorting sample, add a notation on the data sheet and weigh it, if possible.
7. Place the sample to be sorted in a plastic bag or other type of container and label the container (include sample number, origin, truck number). The container will be stored and additional samples collected. The containers with the samples will be transported to the area where the sorting is to take place.
8. All handling and manipulation of the discharged load, longitudinal samples, and sorting sample should be conducted on previously cleaned surface. The sample will be transported to the secured and sheltered manual sorting area. The sample will be placed on a clean surface for sorting. For the convenience of the sorting personnel, the surface should be at table height. The sorting area should be previously cleaned, flat, and level surface.
9. Position the storage containers around and conveniently close to the sorting sample.
10. Empty all containers such as capped jars, paper bags, and plastic bags of their contents.
11. The sorters will be instructed to remove the various categories of materials (i.e., components and subcomponents) and place them in their respective containers.

    a. In the case of composite items found in the waste, separate the individual materials where practical and place the individual materials into the appropriate storage containers. Where impractical, segregate and classify the composite item according to the following order:

    1) If there are many identical composite items (e.g., plastic-sheathed aluminum electrical conductors), place them into the waste component containers corresponding to the materials present in the item and in the approximate proportions according to the estimated mass fraction of each material in the item.
    2) If there are only a few identical composite items, place them in the storage container corresponding to the material which comprises, on a weight basis, the majority of the items (e.g., place metal beverage cans in the ferrous container).
    3) If composite items represent substantial weight [percentages of the sorting sample, a separate category should be established, (e.g., tar and gravel roofing material).
    4) If none of the previous procedures is appropriate, place the item(s) in the “Other/Composite” storage container for the type of component.

12. Once all of the large particles are removed, the sorters will use a shovel, brush, dust pan and screen to remove the fine material from the residue. The material that passes through the 2.5 cm screen (the overs) will be further segregated into the various categories. Continue sorting until the maximum particle size of the remaining waste particles is approximately 1 cm.
13. Apportion the remaining particles into the storage containers corresponding to the waste components represented in the remaining mixture. The apportionment should be accomplished by making a visual estimate of the mass fraction of waste components represented in the remaining mixture.
14. Record the gross weights of the storage containers and of any waste items sorted but not stored in containers.
15. Empty the storage containers in a designated area and weigh them again, if appropriate.
16. Re-weighing is important and necessary if the containers become moisture-laden (e.g., from wet waste).
17. Clean the sorting site and the load discharge area of all waste materials. Maintaining a clean work site at all times will allow easier operation and contribute to the accuracy of the analysis.

TIME PERIOD

Procedures for Field Work to Determine Bulk Density of Waste Fractions

RAW MIXED SOLID WASTE

Materials

1. Type of containers and required volume: wood, metal, or plastic; 0.5 to 1 cubic meter (500 to 1,000 l)
2. Mechanical or electronic scale capable of measuring up to 500 kg with 0.5 or 1 kg precision.
3. Shovels and/or small front-end loader to load waste into container.

Procedures

1. Weigh the empty container to determine its tare weight.
2. Select a representative sample of 2 to 4 cubic meters from the load of waste. Cone and quarter the sample, using shovels and/or front-end loader, down to a sub-sample of 0.5 to 1 cubic meter (500 to 1,000 l) of waste that will subsequently be loaded into the tare container. Retain the residual sample material pending successful completion of the procedures on the initial sub-sample.
3. Fill the container with the sub-sample of material to a level that is slightly above the rim of the container (to allow for settlement of the material). Do not compact (pack) the waste but try to minimize void space caused by oversized objects (or note on the data sheet and remove oversized objects from the sub-sample if encountered). Shake the container or drop one edge of the container (a drop of about 3 to 5 cm) three times to slightly settle the material in the container, if necessary place more waste material in the container to bring the contents level with the rim.
4. Weigh the filled container to determine its gross weight.
5. Calculate the net weight of the sub-sample by subtracting the tare weight from the gross weight.
6. Calculate the bulk density of the sub-sample by dividing the gross weight of the sub-sample by the volume of the container.
7. Empty the sub-sample from the container and re-weigh the empty container to determine the container tare weight for the next sub-sample. If an error is encountered during the procedure, select another sub-sample from the residual sample material and repeat the process.

SEGREGATED COMPONENTS OF SOLID WASTE

Materials

1. Types of container and required volume: wood, metal, or plastic; 0.1 to 0.5 cubic meter (100 to 500 l). Containers with a smaller capacity (volume) can be used to determine the bulk density of small-sized components such as glass, metal, and plastic containers; dirt/ash, or food waste. Larger-volume containers may be required for large objects/materials, such as cardboard or wood waste, etc.)
2. Mechanical or electronic scale capable of measuring up to 500 kg with 0.5 or 1 kg precision.
3. Shovels and/or small front-end loader to load waste into container.

Procedures

1. Weigh the empty container to determine its tare weight.
2. From a representative sample volume of 0.25 to 0.5 cubic meters 250 to 500 l) of the segregated component of interest. Cone and quarter the sample, using shovels and/or front-end loader, down to a sub-sample of 0.13 to 0.25 cubic meter (130 to 250 l) of materials that will subsequently be loaded into the tare container. Retain the residual materials pending successful completion of the procedures on the initial sub-sample.
3. Fill the container with the sub-sample of material to a level that is slightly above the rim of the container (to allow for settlement of the material). Do not compact (pack) the waste but try to minimize void space caused by oversized objects (or note on the data sheet and remove oversized objects from the sub-sample if encountered). Shake the container or drop one edge of the container (a drop of about 3 to 5 cm) three times to slightly settle the material in the container, if necessary place more waste material in the container to bring the contents level with the rim.

4. Weigh the filled container to determine its gross weight.
5. Calculate the net weight of the sub-sample by subtracting the tare weight from the gross weight.
6. Calculate the bulk density of the sub-sample by dividing the gross weight of the sub-sample by the volume of the container.
7. Empty the sub-sample from the container and re-weigh the empty container to determine the container tare weight for the next sub-sample. If an error is encountered during the procedure, select another sub-sample from the residual sample material and repeat the process.

Procedures for Field Work to Determine Moisture Content of Waste Fractions

AIR-DRY MOISTURE CONTENT

Air-drying of samples if performed outdoors in an area that is or can be protected from wind and rain. Direct sunlight facilitates the drying process.

The sample can be air-dried on a clean, level surface or in drying trays. If drying trays are used, they should be of metal or plastic because these construction materials will not absorb water. Additionally, if drying trays are used their tare weigh must be determined.

Materials

1. Weigh scale of capacity of about 100 kg and a precision of 0.1 kg.

Procedures

1. Ideally, the air-dry measurements should be performed on fresh waste as soon as possible. If there will be delays in the performance of the drying procedures, the sample material should be double-bagged in plastic bags. The time elapsed between sampling and commencement of the drying procedures should be noted on the data collection forms.
2. For determination of air-dry moisture content, use the material from the bulk density determinations; or alternatively, cone and quarter 0.25 to 0.5 cubic meters (250 to 500 l) of material, using shovels and/or front-end loader, down to s sub-sample of 0.13 to 0.25 cubic meters (130 to 250 l). This material will subsequently be spread on the clean surface or place in a tare tray for the air-drying process.
3. Weigh the sub-sample to determine its wet weight if the sample is to be place on a clean surface; or measure the total weight of the sub-sample and drying tray and the tare weight of the drying tray if on is used. Set the sub-sample out to air-dry if the sub-sample is very wet (e.g., food waste or paper), care should be taken to spread the material out in a thin layer, e.g., no more than 7 cm. So that it will dry quickly. Stirring wet material at intervals during the drying process (carefully making sure not to lose sample material) facilitates the drying process.
4. Allow the material to dry until it reaches a constant weight as evidence by no additional loss of weight through repeated weightings. The material is approximately “air-dry” if one can observe air-borne dust particles when a handful of the material is picked up and dropped a few centimeters. However, constant weight is only accurately determined using a weigh scale. The air-drying process can take several days depending on the moisture content of the waste and meteorological conditions.
5. Record the meteorological conditions (temperature, rainfall, humidity and cloud cover) on the data sheets.
6. Calculate the moisture loss (weight) from the sub-sample by subtracting the tare weight (if any) from the initial (i.e., wet) weight of the sub-sample.
7. Calculate the air-dry moisture content by dividing the moisture loss (weight) by the wet weight of the sample and multiplying by 100.

Oven-dry Moisture Content

The oven-dry determinations should be performed on fresh waste as soon as possible. The sample should be dried in an oven of sufficient volume to easily accommodate the quantity of material. The over must be equipped with a system to ventilate the oven air space for purposes of moisture removal and with a system to measure and control the over temperature.

Materials

1. Weight scale of capacity of about 100 kg and a precision of 0.1 kg.
2. Drying oven with temperature monitoring and control, and ventilation system.

Procedures

1. If there will be delays in the performance of the drying procedures, the sample material should be double-bagged in plastic bags. The time elapsed between sampling and commencement of the drying procedures should be noted on the data collection forms.
2. For determination of oven-dry moisture content, use the material from the bulk density determinations; from air-dried samples, or alternatively, cone and quarter 0.25 to 0.5 cubic meters (250 to 500 l) of material, using shovels and/or front-end loader, down to s sub-sample of 0.13 to 0.25 cubic meters (130 to 250 l).
3. Weigh the sub-sample to determine its wet weight (or air-dry weight). Place the sub-sample in the oven. The oven temperature should be within the range of 100 to 105 degrees C. If the sub-sample very wet (e.g., food waste or paper), care should be taken to spread the material out in a thin layer, e.g., no more than about 2 cm, so that it will dry quickly. Stirring wet material gently at intervals during the drying process (being carefully making sure not to lose sample material) facilitate the drying process.
4. Allow the material to dry until it reaches a constant weight as evidence by no additional loss of weight through repeated weightings.
5. Calculate the moisture loss (weight) from the sub-sample by subtracting the tare weight (if any from the initial (i.e., wet) weight of the sub-sample.
6. Calculate the percent moisture content by dividing the moisture loss by the wet weight of the sample and multiplying by 100. This is the oven-dry moisture content if the initial sub-sample was not air-dried prior to oven drying. If an air-dried sub-sample was oven dried, then the percent oven-dry moisture content of the sub-sample is the sum of the moisture losses from air-drying and oven drying multiplied by 100 and divided by the wet weight of the sample prior to air-drying. For example, if the wet weight of the sub-sample prior to air-drying is 50 kg and 5 kg and 10 kg are the moisture losses, respectively, due to air-drying and subsequent oven drying, then the percent oven-dry moisture content is (15 x 100/50, or 30%).

Safety Procedures and Guidelines

1. All personnel will conduct themselves in a careful and proper manner at all times.
2. Being under the influence of intoxicants, narcotics or controlled substances is prohibited.
3. Smoking, drinking, or eating is only allowed in designated area. Avoid any practice that may increase the probability of hand-to-mouth transfer and ingestion of waste materials. Prescription drugs should not be taken where the potential for contact with toxic substances exists.
4. Proper care must be taken to avoid contact with hazardous or contaminated or potentially contaminated substances. Do not stray from designated work area. Do not walk through puddles. Do not kneel on the ground. Do not lean or sit on equipment, drums, containers, vehicles, or on the ground.
5. Stay within the marked off or the designated work site. Permission must be given by field supervisor before leaving the site.
6. All injuries (no matter how minor) must be reported directly to the field supervisor. Depending on the severity of the injury, first aid will be administered and/or transportation to the nearest medical facility will be provided. A list will be maintained by the field supervisor containing all relevant medical information regarding emergency procedures.
7. Always use sampling, handling, and container-opening techniques demonstrated at the safety and orientation meeting.
8. Always pick waste material from the top of the pile. Never dig into the pile with your hands.
9. No personnel will be admitted into the work facility without the proper safety clearance and understanding of all safety procedures. All personnel must comply with the established procedures. Anyone not in compliance with all stated safety procedures will be dismissed from the area immediately. Report all suspicious or potentially dangerous waste (including sharp and hazardous wastes) to the crew supervisor prior to handling or sorting. The crew supervisor is responsible for the safe handling of potentially dangerous materials and for the handling of household hazardous wastes and their classification.
10. Tetanus immunization must be current.
11. The following work attire is mandatory: long-sleeve shirt, full length pants; strong shoes or boots with puncture resistant soles; gloves; long hair must be worn “up” or tied back; and no loose or hanging clothes or garments.
12. The following attire is strongly recommended and may be required depending on site conditions: eye protection (sunglasses, glasses, or goggles); dust masks; hard hats; gloves; and safety vest.
13. The following equipment is available to sorting personnel: gloves; dust masks; and a first aid kit.

Form 1

Waste Composition Data Sheet							
Sample #				Date:		Surveyor (Initials):	
City:				Source:			
Vehicle Type:				Vehicle #:			
Category		Gross Weight	Tare Weight		Category	Gross Weight	Tare Weight
Paper	Cardboard/Paper bags			**Other Organic**	Kitchen/Food Waste		
	Newspaper				Yard/Landscape		
	Office Paper/High Grade				Wood		
	Mixed Paper				Textiles		
					Leather		
Glass	Bottles and Containers				Tires		
	Other/Composite				Rubber		
					Animal Remains (dead animals)		
Metal	Tin/Steel Cans				Other/Composite		
	Other Ferrous				Fines		
	Aluminum Cans						
	Other Non-Ferrous			**Other inorganic**	Rock/Concrete/Brick		
	Other/Composite				Ceramic/Stone		
					Asphalt		
Plastics	PET				Soil/Sand		
	HDPE				Ash		
	Film Plastc/LPDE				Other/Composite		
	Diapers				Fines		
	Other/Composite						
				Hazardous	Paint		
					Oil/Oil Filters		
					Small Batteries		
					Other		
				Special	Medical Waste (syringes, sharps, gauze, etc.)		
					Electronic Appliances		

Comments:

Vehicle Count Data Sheet [a]

Date _____ LGU_____
Site_____ Surveyor _____

Vehicle No.	Type of Load [b]	Vehicle Capacity	Size Of Load [c]		
		(cu m)	Length (m)	Width (m)	Depth (m)

a) Vehicle Count Data Sheet can be used to determine the quantity of waste disposed when weigh scales are not available. All vehicle loads from the LGU should be recorded.
b) The type of load is based on the source of the material, e.g., low-income residential (res-low), medium-income residential (res-med), high-income residential (res-high), industrial (ind), commercial (com), or market (mrkt).
c) If the vehicle capacity (cu m) is not known, the size of the load should be measured. The load size is the height, length, and depth of the material inside the vehicle.

Annex B

CLUSTERING OF COMMON SOLID WASTE MANAGEMENT FACILITIES

I. INTRODUCTION

The issue on solid waste and its management has become a genuine concern of the nation. The economic activities as well as the urbanization growth and the swelling population, contributed to the generation of solid wastes, particularly in the urban centers and urbanizing areas.

Through the local government code (RA 7160), the responsibility for the enforcement of environmental laws on cleanliness, sanitation and solid waste management has been devolved to the local government units. Several measure and steps have been identified and adopted, among which are the expansion of SWM services, provision of more cost effective collection and hauling services, development and implementation of other solid waste disposal approaches. However, efforts are still hard put in coping with the problem on solid waste management.

Apart from the local government units, each and every individual is involved in the management of solid wastes. Solid waste management in the country is a collective and ecological endeavor because everybody, every person, group or institution is a waste generator and a service provider at the same time. All have roles to play in order that solid wastes will be managed properly, meaning beneficial to both public health and the environment.

The passage of the Ecological Solid Waste Management Act of 2000 or the Republic Act 9003 provided the country with the necessary institutional, technical, financial and penal mechanisms to respond to the garbage crisis it is currently facing.

The Act has put emphasis on adopting a systematic, comprehensive and ecological solid waste management program that includes the reduction of wastes at source, recycling and composting. The Act prohibits the use of open dumpsites and promotes the conversion or upgrading of such into a controlled facility within three years upon the effectivity of the Act. However, the Act also provided that controlled dumpsites shall no longer be allowed five years following the effectivity of the Act.

To facilitate implementation of the abovementioned provisions, the Act provides for the clustering of local government units. Specifically, Section 43 states that:

> For purposes of encouraging and facilitating the development of local government plans for solid waste management, the Commission shall, as soon as practicable but not later than six (6) months from the effectivity of the Act, publish guidelines for the identification of those areas which have common solid waste management problems and are appropriate units for clustered solid waste management services. The guidelines shall be based on the following:
>
> a) the size and location of areas which should be included;
>
> b) the volume of solid waste which would be generated;
>
> c) the available means of coordinating local government planning between and among the LGUs and for the integration of such with the national plan; and

d) possible lifespan of the disposal facilities.

II. OBJECTIVES AND BENEFITS

Clustering is a process whereby neighboring cities and municipalities or barangays pool efforts and resources to address localand common challenges. The Philippine Constitution provides that local government units may group themselves, consolidate or coordinate their efforts, services and resources for purposes commonly beneficial to them and in accordance with the law. For solid waste management, financial resources demanded by a waste management facility maybe in unaffordable amounts if shouldered by a single local government entity alone (i.e., sanitary landfill). Therefore, the clustering of local government units is seen as a viable option towards this endeavor.

The following are some benefits and/or advantages of clustering:

1. Enhanced economies of scale. The overall cost of financing SWM projects is spread among member LGUs in a cluster scheme. By joining efforts, local government units can implement a waste management project that maybe too expensive for a single LGU. Cost-effectiveness of resource recovery efforts could also be improved and widely used supplies and materials in large quantities that are needed in implementing projects could be purchased collectively in relatively lower prices.
2. More flexibility. With larger resource base and enhanced economies of scale, other opportunities on waste management could be holistically and multi-sectorally identified, planned and pursued which are sensitive to the specific needs and aspirations of the constituents of the clustered LGUs.
3. Overall environmental improvement. With inter-LGU partnership, the collective pursuit of common goals on waste management will achieve a sustainable and improved environmental management.

III. CRITICAL ISSUES TO BE ADDRESSED

1. Potential LGU partners may have different goals on solid waste management. This could be due to disparity in socio-economic and cultural development, population, geography and other unique characteristics of each partner. Such could serve as stumbling block towards clustering.
2. Varying regulations among LGUs. The presence of differing regulations (ordinances and policies) on waste management among potential partners could also pose as a serious obstacle towards clustering.
3. Potential inequities can exist among potential LGU partners. The cost and benefits of common projects, although shared, do not necessarily be identical for all partners. Equitable distribution of benefits and cost is a major concern that has to be clarified among and between LGU members of the cluster.
4. Potential conflicts in trans-LGU transport of wastes. Traffic, road maintenance and repair, pollution and congestion are some factors that could result to conflicts among potential partners.

IV. MECHANISMS AND PROCEDURES FOR CLUSTERING

Some few activities have been outlined hereunder to direct prospective LGUs who would like to pursue clustering arrangements, as they aspire to enhance the viability and thus somewhat ensure the success of the project/program that they would engage themselves in. The guidelines set herein are not intended to be rigid and detailed, but rather it shall provide the local government units the flexibility to achieve their goals in a manner where they could exercise good governance without necessarily violating the principles espoused herein. Clustering activities should be conducted in a manner that would promote greater public participation, transparency, and collective ownership and accountability and the willingness to sustain all efforts to optimize the benefits that can be derived from the program.

A. CRAFTING OF THE SOLID WASTE MANAGEMENT ORGANIZATIONAL STRUCTURE

An entity, which may be constituted by representatives from the member-LGUs and other stakeholders, should be created. The said entity shall be tasked to undertake the regional planning required for collective/collaborative projects/programs on solid waste management. Similarly, it shall ensure that the conduct of planning shall not favor a specific local government, but rather produce a set of plans that will be for the greater good of the cluster.

B. DEVELOPMENT OF AN INDIVIDUAL AND CONSOLIDATED INTEGRATED NATIONAL SOLID WASTE MANAGEMENT PLAN.

Planning is a crucial step in considering a regional approach to SWM. It is the process by which workable alternatives, programs and plans are developed to solve solid waste problem. It includes, among others, (a) forecasting, (b) setting of objectives, (c) identification of program steps, (d) budget, (e) policies and procedures.

As provided in RA 9003, each province, city or municipality through its solid waste management boards, shall prepare its respective 10-year solid waste management plans consistent with the National Solid Waste Management Framework. However, short-term plans shall also be identified for implementation.

It shall include implementable strategies and activities that encourage the re-use, recycling and composting of waste generated in their respective jurisdiction with specific schedules and timetables, targets and measurable indicators of achievement.

Consolidation of the local plans shall be the next step. This is to identify common solid waste management problems, and common strategies and solutions towards the achievement of a common goal.

In crafting a plan suitable for the entire cluster, a good number of considerations have to be analyzed. These are:

1. Geographic Location and Demographics. A good description of the terrain of the clustering entities as well as their respective road networks (and their conditions), and proximity of the LGU to the host of the facility, will all have their bearing in the transport costs of the wastes that are to be disposed. If the distance factor proves the non-viability of waste transport from the service area straight to the sire, then the concerned municipality(ies)/city(ies) may have to look into the establishment of a transfer station, prior to final disposal.

   The demographics of each LGU would provide ideas to the volume of the waste that the cluster would be dealing with (as the correspondence with their waste generation rates is established). Moreover, the concentration of different economic activities within an area could improve plans for the different activities associated to waste collection (i.e., manner and frequency, as well as the efficient routing scheme for collection). In addition, the proportion of low, medium and high-income families could furnish useful information whether a subsidy scheme could complement or strengthen the social acceptability of the entire project.

2. Waste Generation Rate. This information has to contain the generation rate of the study area, further categorized by income class (if possible) and types of economic activity (e.g., industry, commercial, institutional), including a characterization of these refuse materials grouped according to the aforementioned categorization.

3. LGU Classification and Solid Waste management Budget. The classification of each of the local

governments forming the cluster would help determine the amount of resources that are available at their disposal that can be utilized for this project, and perhaps even ascertain the allowable amount that they can loan to aid them in financing the capital investments involved in this undertaking.

4. Existing Ordinances on SWM. Assuming that the local governments forming the cluster have well-established ordinances on solid waste management (on all aspects thereof), they should in no way impede to the implementation of the agreed upon plans of the project, as well as the procedures by which it will be executed. Amendments to existing ordinances are necessary to establish cohesion of policies among the members of the cluster.

   If a set of ordinances is not yet in place for a particular local government, they are encouraged to do so, primarily to provide legal basis for their engagement in any solid waste management-related undertaking, as well as set the guidelines by which any solid waste management activities are to be lawfully conducted in their respective areas of jurisdiction. The formulation thereof should bear in mind the environmental soundness of its provisions, with due consideration to the pro forma ordinance to be established by the Commission.

C. SELECTION OF HOST

Selection and operation of solid waste management facility, specifically disposal sites, are complicated. The attempt to resolve concerns regarding the location of a landfill disposal site is often time consuming and may be unsuccessful. In addition, the greatest difficulties arise in the acceptance of communities in such disposal facilities.

Nonetheless, a host for the sanitary landfill has to be identified. Member-LGU of the cluster shall have to decide and agree among them as to who will host the solid waste management facility. However, selection of the site has to comply with the guidelines set forth by this Department.

Gabay Sa Pagtatayo Ng Cluster-Barangay MRF*

1. *Kinakailangang magkakalapit ang dalawa o higit pang mga barangay na magsasama-sama para magtayo ng isang **cluster-barangay MRF.***

2. *Mahalaga rin na may kasingtulad silang pagtingin na ang kanilang problema sa basura ay matutulungan sa pamamagitan ng pagka-**cluster.***

3. *Ang mga barangay na magsasama-sama ay kinakailangang magpasa ng isang resolusyon o kapasyahan na lalagdaan ng kani-kanilang mga punong barangay. Ito ay maglalaman ng mga sumusunod.*

    - *Na ang pagka-cluster ang pinaka-mabisa at pinakamatipid na paraan para tugunan ang kanilang problema sa basura;*
    - *Na ang bawat kasaping barangay ay mag-aambag ng kakayanan at pondo para sa pagbubuo at pagpapatupad ng **Cluster-Barangay Solid Waste Management (SWM) Program,** at sa pagpapatayo ng isang **cluster-barangay MRF.***

    Ang kontribusyon ng mga barangay ay kinakailangang konkreto at tiyak kung kailan ibibigay. Ang halaga ng kontribusyon ay maaaring ibase sa kakayahan o kaya'y sa dami ng basurang nalilikha ng mga kasaping barangay.

4. *Kung ang mga barangay ay walang kakayahang mag-ambag ng pondo, maaari silang magsagawa ng isang fund-raising activity o kaya'y mangalap ng donasyon.*

5. *Ang pribadong sector gaya ng mga mangangalakal, NGOs/POs o anumang organisadong grupo ay maaari ring makipagtulungan sa mga magka-cluster na barangay. Bago lumahok, kinakailangan nilang magpalabas ng board resolution na maglalahad ng boluntaryong pagsali. Pagkatapos, kasama ang mga magka-cluster na mga barangay, lalagda sila sa isang **memorandum of agreement** na magsasaad ng mga sumusunod:*

    - *Ang boluntaryong pakikilahok at pakikipagtulungan;*
    - *Ang maliwanag na tungkulin ng bawat isa sa pagbuo ng **cluster-barangay SWM Program** at sa pagtatayo ng **cluster-barangay MRF.***

6. *Bubuuin ng bawat kasaping barangay ang kanilang mga **Barangay SWM Committees** at mula sa mga komiteng ito, magtatalaga ng bubuo sa **Cluster-Barangay SWM Board.***

7. *Ang Cluster-Barangay SWM Board ang mangunguna sa pagbabalangkas ng **Cluster-Barangay SWM Program.** Ito rin ang mangunguna sa pagsasagawa ng **waste characterization survey** na magtatalakay sa mga sumusunod:*

    - *Uri at dami ng basurang nalilikha sa bawat kasaping barangay; at*
    - *Pangkasalukuyang pangangasiwa ng basura sa bahay-bahay at mga establisamiyento.*

8. *Magsasagawa rin ang **Cluster-Barangay SWM Board** ng malawakang konsultasyon sa mga mamamayan at organisadong grupo para ilahad ang resulta ng **waste characterization survey** at alamin ang kanilang opinion sa mga sumusunod:*
    - *Ang pinaka epektibong sistema para sa pamamahala ng basura; at*

- *Kung saan itatayo ang **Cluster-Barangay MRF.***

9. *Iaayon sa nasabing pag-aaral at konsultasyon ang ihahandang **Cluster-Barangay SWM Program** na magdidetalye kung ano ang pinaka-angkop na sistema ng pamamahala ng basura mula sa bahay-bahay at mga kalapit na establisamiyento, koleksyon, hanggang sa prosesong gagawin sa **cluster-barangay MRF.***

   Kasama rin sa plano ang mga sumusunod:

   - *Kung magkano ang pondong kakailanganin sa pagtatayo ng **cluster-barangay MRF** at sa panimulang operasyon nito;*
   - *Kung paano magtutulungan at maglilikom ng kinakailangang pondo; at*
   - *Kung paano gagawing **Self-sustaining** at **income-generating** ang operasyon ng **MRF.***

10. *Para mapasimulan ang pagpapatupad sa **Cluster-Barangay SWM Program**, kinakailangang magpalabas ang magkakasamang barangay ng isang ordinansa ukol dito at magsagawa ng malawakang kampanya para ipaalam ito sa lahat ng nasasakupan.*

11. *Kung nanaisin ng mga kasaping barangay at ng pribadong sector na gawing pangmatagalan ang pagtugon sa basura, iminumungkahi na dapat itayo ang isang **nonstock, nonprofit corporation**. Sa pamamagitan nito, hindi magiging sagabal sa operasyon ng **cluster-barangay MRF** ang pagpapalit-palit ng mga opisyales ng mga barangay.*

***Ang gabay na ito ay hango sa aktuwal na pagtatayo ng isang** *cluster-barangay MRF* sa siyudad ng Calamba sa pagtutulungan ng tatlong barangay na mas kilala sa tawag na **PaLiSam.** Pinaikling pangalan ng Barangay Palingon, Lingga at Sampiruhan, na bahagi ng proyektong **PPPUE- SWM** (Public and Private Sectors Convergence for Solid Waste Co-governance) **Project** ng Department of Environment and Natural Resources – NSWMC-Secretariat at ng United Nations Development Programme – PPPUE.