

Ecological Solid Waste Management Act of 2000 (RA 9003): A Major Step to Better Solid Waste Management in the Philippines

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***Abstract:** This paper presents practical analysis of the salient features of the Ecological Solid Waste Management Act of 2000 (Republic Act 9003). It also presents a number of constraints and somewhat imperfections, and the disadvantages in the implementation by the local governments. Accordingly, a number of recommendations for amendments are included so that the law can better address the solid waste problems of the entire Philippine archipelago. Likewise, it is hoped that this paper can provide some insights towards improvement of solid waste management in Southeast Asia.*

Keywords: Solid waste, management, dumpsites

1 INTRODUCTION

Nationwide, solid waste management (SWM) has not been among the top priorities in most local government units (LGUs). Generally, people think that as long as garbage is collected from their households, their garbage problem has been solved. For most local chief executives, SWM is about collection of garbage. As long as the mound of garbage is collected it is a problem of “out of sight and out of mind” (ADB, 2004). In many LGUs, solid waste is being managed to some extent as mandated by the Local Government Code of 1991 (Chan Robles Group, 1999). However, management here is limited to collection and dumping of garbage into an open dumpsite, oftentimes not properly situated and exposing the public to the risk of airborne infection; the environment, especially the groundwater; to the leaching of toxic chemicals coming from the constituents of the decomposing garbage; and many other such detrimental effects that may occur from exposed dumpsites. Oftentimes, scavengers or wastepickers, most of them families with little children, come to pick waste from the dumps without any means of protective accessories, exposing them to all kinds of disease-causing agents. These waste pickers would sometimes burn the garbage after all that has been gleaned, thus actively polluting the airshed. An example of such an open dumpsite is shown in figure 1.

The passage of Republic Act 9003 (RA 9003) puts solid waste management into proper perspective. It is hoped that this law will help to meet the growing need to improve the management of increasing volume of solid wastes generated in the Philippines. Since its signing into law, all local chief executives in the Philippines have been bothered by its implementation or lack of it. Foreign funding has been pouring in to help carry out its implementation. ADB (2004) has carried out a project

regarding SWM in Metro Manila. Problems on SWM implementation in Metro Manila have been highlighted by Bustamante (2001), while Mendoza (2004) outlines the challenges faced by the Arroyo administration in carrying out the provisions of the solid waste Act. The National Solid Waste Management Commission (NSWMC) (2005a) has been agog in trying to help out LGUs in the implementation. Lawsuits are slowly being filed against mayors who have not yet acted on any of its provisions. Peña (2005) reported some of these lawsuits being filed against some mayors for not implementing the law.



Figure 1. Open dumpsites: common disposal method in all LGUs, including Metro Manila

This paper aims to introduce the RA 9003 or the Ecological Solid Waste Management Act of 2000 of the Republic of the Philippines, highlight its most salient features, present some constraints of the law and provide insights on its implementation.

2 RA 9003: HISTORY OF THE PASSAGE

The volume of solid waste generated in every part of the Philippines has been constantly increasing. Nowhere has this been evident as the volume of solid waste being generated in Metro Manila. There had been several masterplans formulated by the then Metro Manila Commission to address the garbage situation in the Metro Manila since 1969, but had not been implemented for many reasons (Bustamante, 2001). The constantly growing volume of solid waste had been the target of media exposures. The growing protest of many residents surrounding Metro Manila's dumpsites prompted some lawmakers to file some house bills to address environment and sanitation problems, not only of Metro Manila but for the country as well. With the growing garbage crisis, the lower and the upper houses of the legislature were finally forced to accelerate their efforts in order to come up with a comprehensive law that will, once and for all, help solve the garbage crisis plaguing Metro Manila and the rest of the country. Thus, at the height of the impeachment trial of the then President Joseph Estrada, a new law was enacted. This law, a consolidation of House Bill No. 10651 and Senate Bill No. 1595, was finally passed by the House of Representatives and the Senate on

December 20, 2000 and December 12, 2000, respectively. This consolidated bill was signed into law by President Gloria Macapagal Arroyo on January 26, 2001 and is now known as the Republic Act 9003 or the Ecological Solid Waste Management Act of 2000.

3 KEY PROVISIONS OF RA 9003

The Ecological Solid Waste Management Act of 2000 (RA 9003) provides the legal framework for the systematic, comprehensive and ecological solid waste management program of the Philippines, which shall ensure protection of public health and the environment. It emphasizes the need to create the necessary institutional mechanisms and incentives, and imposes penalties for acts in violation of any of its provisions (NSWMC, 2005b).

The implementing rules and regulations of R.A. No. 9003 are contained in the Philippines Department of Environment and Natural Resources (DENR) Administrative Order No. 2001-34 (NSWMC, 2001).

The Republic Act 9003 specifically mandates all, especially the local government units, to adopt a systematic, comprehensive and ecological solid waste management program which shall ensure protection of public health and environment; utilize environmentally sound methods; set targets and guidelines for solid waste avoidance and reduction; ensure proper segregation, collection, transport and storage of solid waste; promote national research and development programs for improved SWM; encourage greater sector participation; retain primary enforcement and responsibility of SWM with local government units; encourage cooperation and self-regulation among waste generators; institutionalize public participation; and strengthen the integration of ecological solid waste management, resource conservation and recovery topics into the academic curricula.

4 STATUS OF IMPLEMENTATION OF RA 9003

In the Philippines, the most common method of solid waste disposal is through open dumping. Although some municipalities have started planning for the conversion and rehabilitation of their open dumps into controlled dumpsites while others are looking at a possibility of sharing a sanitary landfill with their neighbors in the provinces, most of these municipalities are still disposing in open dumpsites. According to the report of the National Solid Waste Management Commission, there are still about 734 open dumpsites existing nationwide; about 264 open dumps are beginning to be converted into controlled dumpsites in addition to the 142 areas proposed for development. Two hundred and fifteen LGU sites have also been identified as potential sanitary landfills in the entire country.

The Department of Environment and Natural Resources, through the Environmental Management Bureau (EMB) and the NSWMC Secretariat, has been tasked to carry out and implement the provisions of RA 9003. To date, since the Ecological Solid Waste Management Act of 2000 has been signed into law, the NSWMC has formulated the Guidelines on formulation and finalization of the National SWM Framework, National SWM Status Report and other Administrative and Technical Guidelines directed to support the implementation of the Ecological SWM system. It has also

conducted 92 seminars, trainings and lectures on solid waste management to LGUs, schools and other stakeholders.

Since the deadline of the conversion/ closure of all open dumpsites under Section 37 of RA 9003 was February 16, 2004, about 126 LGUs have complied with the conversion/ upgrading to Controlled Dumpsites (NSWMC, 2005b); and 976 Materials Recovery Facilities have been operationalized, servicing 1140 *barangays* nationwide. The NSWMC also conducted an initial "Estero (estuary) Clean-up" activity in Metro Manila, in collaboration with the DENR and other partners. It has established a partnership and cooperation with foreign/ international funding institutions in order to strengthen and establish the national and local support mechanisms.

5 KEY ISSUES AND CHALLENGES ON THE IMPLEMENTATION

While incentives are already being provided to the local governments by the national government, the implementation of the Act seems rather slow. Based on the report of the NSWMC regarding the implementation of RA 9003, there are three major issues to contend with. These are: (1) administrative/management issues, (2) economic and financial issues, and (3) technical issues.

5.1 Administrative/management issues

As in any case, political will of the local chief executives play a major role in the success of implementation of SWM programs. Although SWM awareness is high among them, there still seems a negative attitude from the local officials. This negative attitude as well as a lack of initiative and responsibility among officials in carrying out the provisions of the law definitely hinders its implementation. Without much support from the local officials, national programs and agenda such as the Ecological Solid Waste Management Act will not go any further than the existing method of collection and disposal of garbage in open dumps in their localities. In some localities, proper implementation of solid waste management does not seem to be a priority as opposed to infrastructure projects such as the building of a new market, bridge, roads or some other infrastructure facilities. Not all LGUs have complied with the creation of mandatory ten-year SWM plans. While most of them have tried to create their SWM boards, these are oftentimes not functional.

The term of office of the local officials also play a crucial role in the implementation of the provisions of the Act. A mayor has a very short term (3-years) of office. This short term could hinder implementation since he has his hands full of many other programs. A comprehensive SWM may not be sustained if he is not reelected due to some conflicting agenda of the succeeding official. Collection and disposal are the easiest method of SWM since implementation of waste segregation is a very difficult endeavor in terms of training the populace to compost, reuse, and recycle waste.

To answer the challenge, the NSWMC is trying to come up with some initiatives in order to facilitate the implementation of RA 9003. Also, the NSWMC, together with Integrated Bar of the Philippines, and the Philippine Bar Association has started to aggressively implement and enforce the law by filing suits against local chief executives for non-compliance of the law.

5.2 Economic and financial issues

Based on the report by the NSWMC (2005a), expenditures on SWM still remain small. These expenditures remain subsidized from the government. Also, very few LGUs collect fees for garbage disposal from households, resulting in limited revenue of the LGUs for solid waste management. The budget for SWM is mainly spent on collection of garbage from households, transportation and disposal. While the national government encourages full implementation of the law, it does not provide any cost-sharing grants to LGUs to help them address SWM issues. These in turn, have hindered the full implementation of a comprehensive solid waste management.

5.3 Technical issues

As mandated by the Act, each LGU, through its solid waste management board, is tasked to create a ten-year's SWM plan, in order to help them carry out the provisions of the law. However, according to the NSWMC, most LGUs have communicated that they do not have the technical capability to do this on their own. They need a lot of help in the formulation of their SWM plans from the national government in coordination with other agencies.

6 COMMENTS AND RECOMMENDATIONS

Looking at the abovementioned basic features of the law, it can be said that the lawmakers of the land have come up with a very comprehensive law on solid waste management. The law has emphasized primarily the waste diversion schemes such as waste segregation, composting, reuse and recycling. It can also be said that this law, if implemented properly, has the potential to effectively address the current problems on SWM in the Philippines. However, at this point, its implementation is far from being carried out. According to ADB (2004), implementation of the law is behind schedule, source reduction and segregation of waste are happening on an individual *barangay* level, and in other municipalities none at all, and there is little active participation from the general public. Also, accordingly the Solid Waste Management Fund has not been fully set aside.

Local officials do not put SWM implementation among their top priorities. Although this would seem preposterous, it is a fact that SWM projects are non-revenue projects. The national government should consider this situation and LGUs should be given reprieve on the sovereign guarantee where the national financial institutions (Development Bank of the Philippines and the Land Bank) charges around 7-8% interest surcharge for a 10-15 year amortization on loans to LGUs in their re-lending program. This is more often the rule even though overseas loan interest is only around 1% with amortization period of 20-30 years. This financing situation from local re-lending institution put too much burden on cash strapped LGUs, and put strain on compliance. The law should have addressed these financing issues as well.

Also, collection and disposal are the easiest method of SWM since implementation of waste segregation is a very difficult endeavor in terms of training the populace to compost, reuse, and recycle waste. Lack of technical capability and expertise, understanding of the techniques and non-familiarity with the processes or even lack of experience contribute to this situation. Education

campaign and exposure, and heightening of awareness level are necessary. Although the law is very clear on these aspects, it did not consider how this could be achieved in the socio-political set-up. It seemed that the law pre-occupied itself in putting technical details rather than preparing the society for compliance. The law somehow projected some negative posturing rather than encouraging environmental thinking. Although incentives are provided, penal provision outweighs it. The penalty provisions in the law are very light and seem to lack in seriousness such that “*it would seem to be more profitable to violate the law rather than to comply with it*”. Table 1 below summarizes the penalty provisions of RA 9003:

Table 1. Solid waste management guide pursuant to the Republic Act 9003 (2001)

Prohibited ACT	Penalties (Under Section 49)	Persons liable
Sec 48 (1): Littering, dumping of waste matters in public places, canals, estuaries, or permitting the same	Php300 - Php1,000 and/or community service of 1 day to 15 days [Sec. 49(a)]	Littering, dumping – generally by private persons Permitting – by public officials
(3): Open burning of solid waste	Php300 - Php1,000 and/or imprisonment of 1 to 15 days [Sec 49 (b)]	Private persons or public officials
(4): Causing or permitting the collection of non-segregated or unsorted waste	Php1,000 - Php3,000 and/or imprisonment of 15 days to 6 months [Sec. 49 (c)]	Private persons – who collect the waste (e.g. waste contractors; Local government officials –mayor, engineer – for failure to direct waste collector
(8): Mixing of source separated materials with other solid waste in any vehicle, box, receptacle	1 st offense: PhP500,000 plus 5% - 10% of income for the previous year; 2 nd offense: imprisonment of 1-3 years	Garbage contractors; Local government’s garbage collectors
(9): Establishment or operation of open dumpsite	1 st offense: PhP500,000 fine 2 nd offense: 1 to 3 years imprisonment	Private persons who allow their property to be used as open dumps; Public officials who master open dumps
Sec. 50: Administrative Sanctions Local Government officials who fail to comply with or enforce the law shall be charged administratively	Administrative, civil, and criminal liability	Public officials
Sec. 52 Citizen Suit: Any citizen may initiate a legal action against any private person or public official	Under the Legal Empowerment Program of the Integrated Bar of the Philippines, it will assist any citizen who will file a case against any person or public official who fails to implement the law	Mass action suit against private citizens; administrative, civil, and/or criminal charges against public officials

Php – Philippine pesos (1USD = 50 Php)

There are citizen suits already filed by private citizens in various parts of the country. However, due to slow action in the current judicial system of the country, these citizens' suits can serve little to improve the solid waste situation of the localities concerned.

Finally, as observed among LGUs visited by the author, the local chief executives have come to look at the law as equivalent to the setting up of a sanitary landfill which is very costly and therefore, almost unattainable in terms of their own LGU budgets. The cost of this seems to have not been fully deliberated in the formulation of the law. Normally, a landfill would cost about Php 20 million/hectare. Mayors are daunted by this cost. They would prefer to receive assistance to procure a dump truck than make a loan in millions of pesos for a landfill. The law, or lawmakers, should have considered these issues, rather than bringing dilemma on the LGUs. Although it was provided in the Act that cities and/or municipalities could form clusters to share a common disposal site, clustering for a common sanitary landfill has a lot of political, topographical, and geological constraints. The law should have given the LGUs more options on whether landfills should be provincial or regional and should have provided more provisions on this.

7 CONCLUSION

Gleaning from the above discussion, it is realized at this point that, on the surface, the provisions of the law seems to be the best for every LGU to start a comprehensive solid waste management program. It contains tough provisions for waste segregation, collection, and disposal. It also outlines the necessary provisions to carry out collection and disposal of garbage in the most sanitary manner possible. It has also outlined the responsibilities of every agency responsible for every aspect of the law. However, the law seems to be prohibitive in that it penalizes those who do not obey but does not give ample rewards and incentives to those who comply. Looking at the details, there are so many constraints in its implementation, especially in terms of budget to enable serious compliance, especially among local officials of lower class municipalities. The law has outlined so much on what should be done on solid waste management but does not give guidelines on how to do it. The LGUs are left on their own to carry it out as outlined in RA 7160. One of the most forgotten issues in the implementation is minimization at source. This means the manufacturing industries can create products and packaging products that are detrimental to the environment once discarded. Indeed, this issue would require a solution from a national level, such as the formulation of a national law that would minimize or ban products or packaging products from being manufactured or imported and espouse environment-friendly products as effective substitutes.

On the whole, RA 9003 is so far the most comprehensive law on solid waste management that the country has ever produced. It was created with the best motives in solving the solid waste crisis of the Philippines. Whether there are still loopholes that need to be mended, provisions that need to be reviewed and revised, the law is in place and therefore must be implemented in order to effectively manage solid waste and protect the environment.

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Development of Regional Solid Waste Management Strategy in Indonesia: Case Study of Greater Bandung Area

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Abstract: Presently, more than 14,000 m³ of waste per day is generated in Greater Bandung Area, while only around 46% is being collected. This study showed that the situation has caused serious detrimental effects on the environmental quality and public health. Several factors causing this situation have been identified. This study highlights the institutional arrangement of solid waste management in Greater Bandung Area related to the development of solid waste management strategy. At present, the solid waste management issue lies fully within the responsibility and the authority of local governments. However, this study showed that although the solid waste issue is managed locally, the problems found are mostly regional. Further, each local government unit in Greater Bandung has limited financial capacity in delivering SWM services. Therefore, solving the SWM problems in Greater Bandung Area requires inter-municipal cooperation and cost sharing between municipalities. Therefore, this study recommends that formulation of solid waste management strategy should not merely be based on administrative boundaries but regional as well. Thus, it was concluded that inter-municipal co-operation in solid waste management is crucial for Greater Bandung Area. Following this prerequisite condition, a Regional Solid Waste Management Strategy for Greater Bandung Area (consisting of 4 municipalities) has been formulated. The strategy includes: the system of new solid waste institutional arrangements, the type of waste to be managed, and the type of waste management activities.

Keywords: Solid waste, greater Bandung area, regional solid waste management strategy

1 INTRODUCTION

Greater Bandung Area (GBA) consists of four local authorities: Kota Bandung (urban area), Kabupaten Bandung (semi-urban and rural areas), Kota Cimahi (urban area), and Kabupaten Sumedang (semi-urban and rural areas). GBA is situated in West Java Province, Indonesia and covers an area of 2,340.88 km², and is inhabited by approximately 5.7 million people as in 2001 (Board Planning and Statistical Bureau of Bandung, 2002). Greater Bandung Area also has a unique feature as mountains surround it, with the city at the center of the valley. The weather is mostly affected by the mountainous climatic patterns, with high humidity and relatively temperate climate. The mean annual temperature is 23.5⁰ C and the average annual rainfall is 200 mm.

2 EXISTING SOLID WASTE MANAGEMENT DATA

Greater Bandung Area serves as the center of government, business, education, and small and large industrial activities in West Java Province. This has increased urbanization and attracted migration from other parts of Indonesia as more people work in the area and look for better opportunities. Based on the 2001 census, the population growth in Greater Bandung is relatively high with about 2.5% per year. As a result, more efforts are required to overcome the urban problems such as improvement of infrastructural conditions, including the services in solid waste management (SWM). It has been identified that solid waste generation in GBA has become a serious urban problem as it has negative impacts on public health and environmental conditions.

In terms of SWM authority, provision of SWM services is viewed mainly as “city cleansing” issue and not environmental concern. Thus the responsibility for the service provision lies in the hands of the local government. Further, the enactment of Act Nos. 22 and 25 in the year 1999 has brought about new paradigm in the Indonesian government and state administrative systems, as it has placed more emphasis on local government autonomy (decentralization) rather than a centralized government approach. Thus, almost all aspects of development, including environmental management, which includes the provision of SWM services, lies fully within the responsibility of the local government.

2.1 Solid waste generation: Source, volume and composition

The composition and generation of solid waste in Bandung is influenced by several factors such as the population, the society’s consumption patterns and economic growth. The breakdown of solid waste source and composition are shown in table 1 and table 2.

Table 1. Solid waste generation in Greater Bandung Area (in m³/day)

Source	Kota Bandung ¹	Kab. Bandung ²	Kota Cimahi ³	Kab. Sumedang ⁴	TOTAL
Household	3,978	2,767	830	123	7,698
Commercial	312	-	2	-	314
Industrial	787	2,189	200	-	3,176
Market	613	211	110	15	949
Public facility	1,361	-	24	3	1,388
Street sweeping	449	-	6	7	462
Others*	-	82	-	2	84
TOTAL	7,500	5,249	1,172	151	**14,072

Sources: ¹Solid Waste Corporation of Kota Bandung, 2003; ²City Cleansing Agency of Kabupaten Bandung, 2003; ³City Cleansing Agency of Kota Cimahi, 2003; ⁴City Cleansing Agency of Kabupaten Sumedang, 2004

*Note: Other sources include traditional market/street vendors and Small and Medium Enterprises

**Note: Recycled/Reused/Recovered waste is not included in the data

Table 2. Solid waste composition in Greater Bandung Area

Component	Percentage (%)			
	Kota Bandung ¹	Kab. Bandung ²	Kota Cimahi ³	Kab. Sumedang ⁴
Wet garbage	63.56	65	67.38	52.20
Paper	10.42	11	7.35	13.20
Textile	1.70	2	1.70	-
Plastic/rubber	9.76	13	18.18	14.20
Glass/crockery	1.45	2	0.99	2.10
Metal	0.95	1	1.16	3.10
Others	12.16	6	1.13	7.43

Sources: ¹Solid Waste Corporation of Kota Bandung, 2003; ²City Cleansing Agency of Kabupaten Bandung, 2003; ³City Cleansing Agency of Kota Cimahi, 2003; ⁴City Cleansing Agency of Kabupaten Sumedang, 2004

2.2 Solid waste management operation system

The type of solid waste handled by local authority is domestic, non-hazardous waste. As for the hazardous waste, its management is regulated by the central government. The city cleansing system deals with collection, transportation, treatment and final disposal. Cleaning services undertaken in GBA is divided into two types: 1) Cleaning services for residential areas; and 2) Cleaning services outside residential areas, such as streets, markets, and office areas.

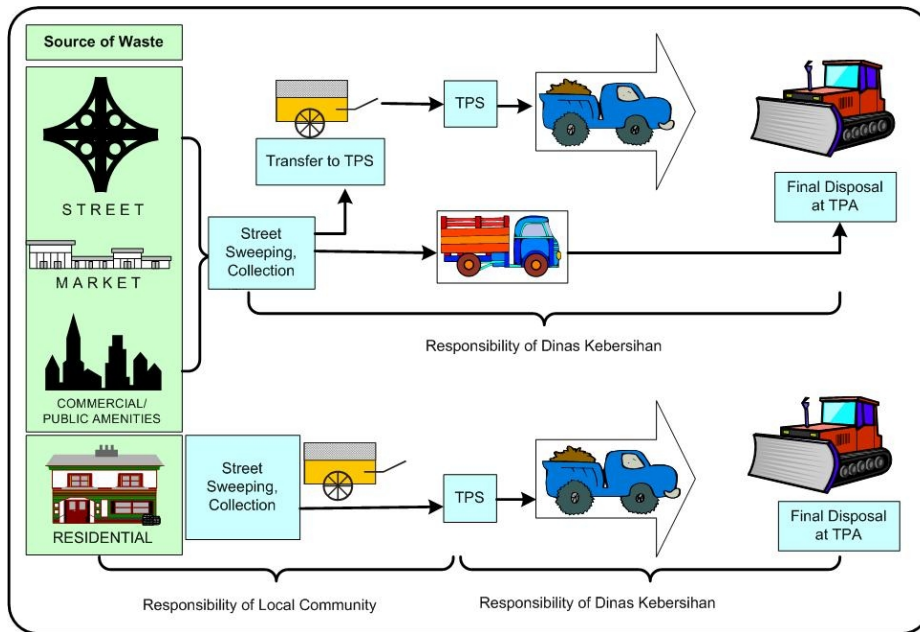


Figure 1. Existing waste management service operation in Greater Bandung (Modified from GBWMC, 2004)

Note: TPS: Tempat Pembuangan Sementara (Temporary Dumping Site)
 TPA: Tempat Pembuangan Akhir (Final Dumping/Disposal Site)

In housing colonies, communities are actively involved as organizers in containing, segregating, collecting and transporting waste to the temporary dumping site (called TPS). Transportation, treatment and final disposal (called TPA) are tackled by the local government's city cleansing authority, known as *Dinas Kebersihan*. A complete picture of SWM operational system in Greater Bandung is shown in figure 1.

3 SWM PROBLEM IN GREATER BANDUNG

As shown in table 1, total solid waste generation in Greater Bandung Area is around 14,000 m³/day. The main problem lies within limited waste collection and transportation capacity, as only around 46% of waste is collected by *Dinas Kebersihan*, the local city cleansing authority (Table 3). The remaining waste is managed by the local community, mostly in environmentally unfriendly manner. This study showed that 56% of the remaining waste is dumped into the river (Figure 2), 20% is burned (Figure 3), and 24% is buried in the backyards.



Figure 2. “River” of garbage in Bandung
(Source: Local Environmental Strategy Kabupaten Bandung, 2004)



Figure 3. Improper individual waste burning
(Source: Soemarwoto, 2004)

Table 3. Waste collected vs waste generated in GBA

Municipality	Waste Generated (m ³ /d)	Waste Collected (m ³ /d)	Percentage
Kota Bandung	7,500	4,535	60.5
Kabupaten Bandung	5,249	1,230	23.4
Kota Cimahi	1,172	560	47.8
Kabupaten Sumedang	151	142	94.0
TOTAL	14,072	6,467	45.9

Source: GBWMC, 2004

Table 4. Uncollected waste handling by the local community

Type of Waste Handling	Percentage	Volume (m ³ /day)
Dumped to the river	56	4,259
Burned locally	20	1,521
Buried in the backyard	24	1,825
Total uncollected waste		7,605

Further, the SWM in Greater Bandung Area heavily depends on the availability of land to be used as TPA (Final Disposal Site). The list of TPAs in GBA is presented in table 5.

Table 5. List of TPA (Final disposal site) in GBA

Municipality	Name of TPA	Area (hectares)	Volume (m ³ /day)	Type
Kota Bandung	Leuwigajah	17.5	+ 3,000	Open Dumping
	Jelesong	10	+ 1,500	Open Dumping
Kab.Bandung	Leuwigajah	6.5	750	Open Dumping
	Ciparay & Cikole	10 & 2.2	407	Open Dumping
Kota Cimahi	Leuwigajah	1	285	Open Dumping
Kab.Sumedang	Cibeureum	10	142	Open Dumping

Source: Environmental Protection Agency of West Java, 2004

From table 5, it is shown that GBA relies heavily on TPA Leuwigajah as it is the main final dumpsite, since it receives more than 4,000 m³/day of waste from three municipalities. The main problem lies in the operation of the TPA, as they are all operated as open dumps (Figure 4), although the initial design was for a sanitary landfill. Consequently, operation of TPA does not consider environmental best practices into account, such as leachate treatment (Figure 5).



Figure 4. Open dumping practice at TPA Leuwigajah (Source: GBWMC, 2004)



Figure 5. Untreated leachate from TPA Leuwigajah, polluting water and vegetation (Source: GBWMC, 2004)

Recently an environmental disaster occurred in February in 2005 when a series of heavy floods triggered one of the biggest landfill land slide in Indonesia. The disaster at TPA Leuwigajah claimed more than 140 lives, destroyed hundreds of houses and ruined acres of productive paddy fields (Figure 6). This incident has increased awareness about solid waste problems and thus the need for better and improved SWM system in Greater Bandung has been identified.



Figure 6. TPA Leuwigajah land slide disaster

(Source: Environmental Protection Agency of West Java, 2005)

4 REGIONAL CONTEXT OF SWM PROBLEM IN GREATER BANDUNG

As mentioned before, the existing environmental management authority stresses on the basis of administrative boundaries (sector-specific and/or partial). This is due to weak and incorrect interpretation of decentralization in the local government, which is regulated by Act Nos. 22 and 25 of 1999. This section will stress on the importance of emphasizing the need for a regional SWM in Greater Bandung Area. This will consider environmental issues related to the improper SWM practice (namely river and air pollutions) and management issue (SWM financial capacity). The conclusions derived will also be taking supportive results of other studies into account.

4.1 River pollution

In terms of ecological morphology, Greater Bandung Area is situated in the Upper Citarum Watershed Area. Citarum, the main river of the watershed flowing through it is being used as a drinking water source, for agriculture and fishery. It is also the main supply source for the existing three reservoirs (volume: 6,147 million m³) that provide water for 300,000 acres of irrigated rice fields and generates 5,000 Mega watt hours of hydropower and is an, important energy supplier for the islands of Java and Bali.

The pollution in Upper Citarum River based on Biochemical Oxygen Demand loading showed that the dominant pollutants come from domestic waste (44 - 54%). Of this, 20% pollution is caused by

degradation of organic household solid waste, as indicated by Wangsaatmaja and Sundana (2004). This is to be confirmed by the data gathered previously (Table 4) on the percentage of uncollected waste being dumped into the river (56%). Although identifying the correlation between those facts requires more studies, one can derive a conclusion that solid waste is one of the major factors causing the pollution of Citarum River.

Further, the negative impact of river pollution in the upstream (part of Kabupaten Bandung and Kabupaten Sumedang) is mostly felt by the people living in the downstream (Kota Bandung, Kota Cimahi, and a part of Kabupaten Bandung). When upstream and downstream areas are separated by the administrative boundary, problems in formulating solutions may occur when the management of river pollution is framed merely within the administrative jurisdictions. Therefore, in order to achieve integrated river pollution management in one particular area, management approach based on administrative boundaries is no longer adequate.

4.2 Air pollution

As indicated in table 4, 20% of the uncollected waste is burned locally. The study showed that emission of gaseous pollutants and particulates caused by waste burning in the southern part of Greater Bandung (lower altitude) had greatly affected the air quality in the northern part (higher altitude). As Greater Bandung is surrounded by mountains, the pollutants can not escape the area and thus form an inversion layer (mainly visible in Kota Bandung and Kota Cimahi). The study also found, as also supported by Soedomo *et al.* (1992) in BPLHD Jawa Barat (2004), that solid waste burning has contributed to the poor air quality in Bandung as presented in table 6.

Table 6. Contribution of solid waste burning in air quality

Air Quality Parameters	Emission (tons/year)	Solid Waste Burning Contribution
CO	96,300	2.4%
NO _x	2,800	3.0%
SO _x	2,092	0.7%
Hydrocarbon	220	17.5%
Particulates	1,121	19.4%

Source: Soedomo, et al., 1992 in Environmental Protection Agency of West Java, 2004

The data is also supported by the data from the West Java Health Department (2001) in BPLHD Jawa Barat (2004) and the major disease pattern in Greater Bandung area is upper respiratory infection disease. Again, although the statistical correlation between the emissions of pollutants caused by solid waste burning and the occurrence of disease will need further studies, one can conclude that solid waste burning has contributed to the degradation of environmental quality and impact on public health in Greater Bandung area.

Thus the results presented that although solid waste management issue may be local but the problems are generally regional. Therefore, solid waste management based on administrative boundaries is no longer efficient and need to emphasize more on regional approach.

4.3 Insufficient financial capacity for SWM

The following table 7 shows waste management costs in 2003 based on the costs of unit waste operations, namely collection, transportation, final disposal and overhead costs. As waste collection from residential and commercial activities are handled by the local community, the definition of waste collection is based on gathering of waste from street sweepings and public amenities. The data presented is the average data of all the four municipalities in GBA.

Table 7. The breakdown of waste management costs in greater Bandung (2003)

Waste Management Function	Waste Management Cost (million US\$)	Percentage
Collection	0.606	27.0
Transportation	0.807	36.0
Disposal	0.123	5.5
Overhead	0.705	31.5
Total	2.241	100.0

Source: GBWMC, 2004

The above table shows that most of the waste management cost is mainly spent for transportation and overhead costs, whilst for final disposal the cost is the least. This has represented an unbalanced view that improper waste management in TPA (final disposal site) is justifiable at the moment. The “real” direct cost of waste management has not yet been accounted for (investment, depreciation, etc); not to mention indirect costs, such as nuisance, public health problems and other environmental impacts. Therefore, it is proposed that an approach towards the implementation of Full Cost Accounting (FCA) in waste management should be taken in order to convey a realistic picture on waste management costs in Greater Bandung.

Table 8. Cost per ton of waste

Condition	Cost of SWM (US\$ per ton of waste)				
	Collection	Transportation	Disposal*	Overhead	TOTAL
Existing	1.39	1.96	0.30	1.72	5.37
Ideal	4.50	11.30	5.20	1.50	22.5

Source: GBWMC, 2004

Note: * Minimum Sanitary Landfill Requirements

From the above table 8, we can conclude that each local government in GBA has limited financial capacity in delivering SWM services. Thus, based on the context of regionalizing solid waste management in Greater Bandung Area, the findings in sub-section 4.3 above can enable one to conclude that to solve the SWM concerns in GBA would require inter-municipal cooperation and cost sharing between municipalities for effectiveness.

5 THE DEVELOPMENT OF REGIONAL SWM STRATEGY IN GREATER BANDUNG

5.1 Institutional arrangement

Having considered the above findings, it has been identified that solving SWM problems in Greater Bandung Area requires inter-municipal cooperation and cost sharing. However, the regional cooperation governance structure needed for effective inter-municipal action is still missing. It is temporarily concluded that the most effective type of institution to run the function of effective environmental management is a corporation. In justifying this, it is necessary to establish it as a 'business entity'. The logical consequence of activities run by a corporation is that it should be able to operate independently, and be sustainable and viable, both technically and financially. Therefore, it should be able to provide service performances based on the existing standard operating procedure or on the agreed requirements established by the participating municipalities. Further, it should also guarantee the availability of income sources, which will help ensure sustainability of operations. Thus, it can then be named as Greater Bandung Waste Management Corporation (GBWMC). However, further studies are required for the proposal.

Based on the above, the scope of GBWMC would consist of two main issues:

1. Types of waste to be handled; and
2. Types of waste management operational functions.

5.2 Types of waste

The types of waste to be handled is an important issue due to its relation with the corresponding waste management function to be operated by GBWMC, which in turn, will have technical and financial implications attached to it. The type of waste as the main scope of GBWMC is domestic non-hazardous waste produced by household and commercial activities (traditional markets and offices). Other sources of non-hazardous wastes, such as industrial and health care activities, that also generate it, will be considered as future potentials for GBWMC. Whereas hazardous waste, medical waste (both infectious and non-infectious), and radioactive waste will not be a part of the waste types handled by GBWMC initially.

Household activities are being considered as the main target for the waste management scope of GBWMC as they produce the highest volume of waste with varying composition and can be found in a mixed condition in almost any situation, thus creating problems and complexity in the management of the waste.

The potential problem that may arise is the possibility of hazardous waste being mixed with non-hazardous waste due to poor segregation at source. This will cause problems, as non-hazardous waste would be technically defined as hazardous waste when mixed with hazardous waste. This situation provides a hypothesis that waste management operational functions of GBWMC should also cover the activities at the source or upstream of waste generation which will be discussed in the following sub-section.

5.3 Types of waste management activities

In general, waste management operational activities are described as follows.

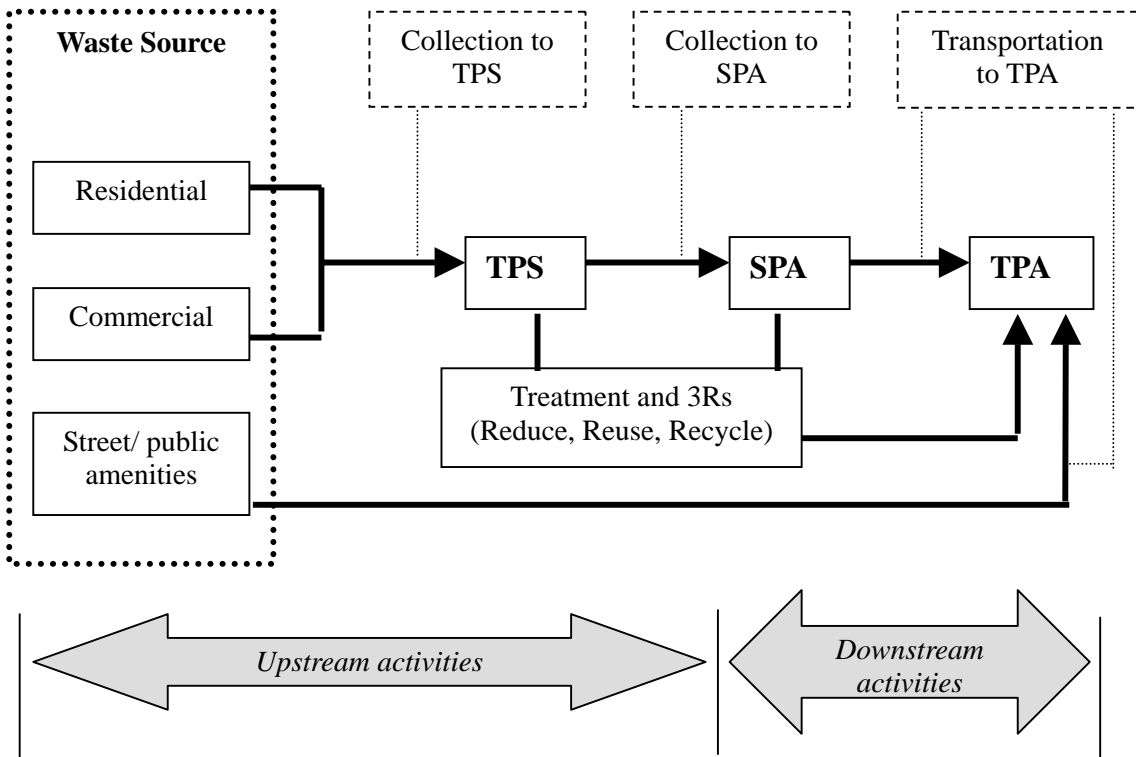


Figure 7. General solid waste management activities

The waste management operations can further be classified as follows.

- Upstream activities, which include primary collection (from source to TPS), the establishment and management of TPS, and secondary collection (from TPS to SPA)
- Downstream activities, which include the establishment and management of SPA, establishment and management of TPA, and the transportation from SPA to TPA.

5.3.1 Proposed GBWMC scope of operational activities

Based on the above description, it is necessary to further define the scope of waste management activities for GBWMC, i.e. whether GBWMC will cover all of the operational activities (from upstream to downstream), or it will include only either upstream or downstream activities.

The main consideration in defining the scope of the proposed GBWMC activities should be that GBWMC would be established as a corporation or a business entity, which is able to run its operations independently and in a sustainable manner, both technically and financially. Additionally, determination of GBWMC scope should also consider the potentials of providing significant contribution towards improving waste management performance in Greater Bandung, and thus can be beneficial for the participating municipalities.

For further discussions, and considering the technical and financial implications, it is pre-determined that the main scope of GBWMC's operational activities will be based mainly on downstream activities, which include waste management operations from SPA to TPA, including transportation. However, the importance of the waste management problem in the upstream is also recognized, and thus it is still recommended that GBWMC will also be involved in the upstream management in terms of financing and control.

The above statement is based on the following arguments. First, the management and operation of SPA is critical for inclusion in the scope of GBWMC as it has some specific strategic roles, such as documenting waste collection data, controlling collection vehicles (trucks) entering the TPA, controlling the 3R activities, improving waste management in the upstream, and monitoring the existence of hazardous waste (preventing them to be transported to the TPA). Further, in terms of business feasibility aspects, the SPA plays a strategic role as a reliable facility to collect and transport waste in order to ensure waste supply coming to TPA, as required (and calculated) in the business plan.

Secondly, transportation from SPA to TPA is also a critical waste management function and it is set as a part of GBWMC activities. This is to ensure the integration of operational activities in SPA and TPA; to prevent the practice of illegal dumping, as transportation operation will be fully under the control of GBWMC; and to ensure the flow of waste supply to TPA for meeting the business feasibility.

Lastly, operation and management of TPA is considered the most critical aspect in waste management in Greater Bandung and therefore, it is also included in the scope of GBWMC. This is due to the view that TPA is the most strategic waste management function that can be a potential entry point towards the possibility of inter-municipal waste management co-operation in GBA. Further, in terms of business feasibility aspect, operation of TPA will be a part of overall waste management which serves as the best potential in generating revenue for GBWMC by way of charging appropriate dumping fees to the participating municipalities, so that GBWMC will eventually be able to operate in a sustainable way.

Although the importance of waste management in the upstream is also recognized, it will not be considered the scope of GBWMC activities, as waste management in the upstream is generally very susceptible to social and political problems. Viewed from the business point of view, the area of uncertainties in the upstream is vast which can lead to an unsustainable operation. Further, in terms of technical waste management system, activities in the upstream are mostly related to the cleanliness issue in public facilities/amenities, and management should remain as the responsibility of the local government. Therefore, activities in the upstream (secondary collection) will still be the responsibility of local city cleansing agency in each municipality.

However, all of the above activities are still the possibility for close coordination with GBWMC (which can be involved in terms of financing and control), in order to maintain the integration of overall waste management functions in Greater Bandung.

6 CONCLUSIONS AND RECOMMENDATIONS

Improper management of uncollected waste has brought about environmental and public health problems in Greater Bandung Area. This study showed that environmental problems (such as river pollution and air pollution) in Greater Bandung, caused by improper solid waste management have occurred in a regional scale rather than local confinement. Further, each local government in Greater Bandung has limited financial capacity in delivering SWM services. Therefore, solving SWM problems in Greater Bandung Area requires inter-municipal cooperation and cost sharing between municipalities. Thus, this study concluded that the Solid Waste Management Strategy should be formulated more in a regional context rather than localized scenario.

Solid Waste Management strategies include: formulation and arrangement of a corporation as the institutional form of SWM in Greater Bandung; recognition of domestic waste as the main type of waste to be managed; and identification of SWM activities to be implemented, namely downstream activities (operation of SPA, transportation from SPA to TPA, and the operation of TPA).

Further studies are required to identify the correlation between environmental degradation and contribution to solid waste problem, and to identify potential problems in implementing Regional SWM in Greater Bandung Area.

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Current Practices and Instruments Used in Solid Waste Management in Vientiane, Lao PDR

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Abstract: *This study identifies and assesses the general practices and instruments used in solid waste management in Vientiane, including market and non-market based instruments as well as public education and training programs (moral suasion). It offers policy recommendations to the concerned authorities including effective instruments to lessen the polluting behavior of individuals and industries, and to recover the cost of pollution in the city. Interviews with key stakeholders, group discussions with city residents, and observations of existing practices in Vientiane revealed the following problems: weak financial status; insufficient number of staff and facilities; open burning of waste without segregation; use of open dumpsites that pose environmental health risks; dumping of waste on the bank of the Mekong River and its tributaries; and low awareness about solid waste management among the residents. The problems are further compounded by a high rate of rural-urban migration, the uncontrolled growth of industry and businesses as well as recent changes in consumption patterns of residents. To improve solid waste management in Vientiane, a combination of market-based and suasive instruments is recommended. The results of the study may be used by policy makers and agencies in Vientiane as well as by other smaller cities in the Greater Mekong Subregion.*

Keywords: Externality, market-based instrument, non-market based instrument, suasive instrument

1 INTRODUCTION

In many countries that are experiencing rapid economic development, problems associated with municipal solid waste (MSW) generation and management are not addressed well till they become a serious threat to the economic advancement. One of the adverse impacts accompanying the advancement in economic growth, industrialization and urbanization in the Greater Mekong Subregion (GMS) is the increasing rate of SW generation in urban areas exemplified by the lack of collection and proper disposal. Vientiane City is no exception, although its waste problem is not yet as severe as other large cities of the GMS countries. The population of Vientiane is about 0.6 million with an annual growth rate of 3.4%, which is higher than the national average (Table 1). It covers an

area of 180 km² and situates along the left bank of the Mekong River. The rate of MSW generation in Vientiane is higher than those of Hanoi, Phnom Penh and Yangon. Solid Waste Management (SWM) systems have been set up in all four urban districts of Vientiane, which have ever growing populations and correspondingly increasing levels of waste. Faced with shortages in resources (financial and human), the government has tried to involve local communities and the private sector to address the problem. Technical and managerial solutions to the problem often fail due to complex economic and cultural factors, lack of financial resources, institutional gaps and ineffective instruments. The waste collection capacity of Vientiane Municipality is about 120-130 tons/day, which is only one half of the total generated waste (Sanasisane, 2002). The other half of the waste therefore remains uncollected. Solid Waste Management in Vientiane has become a critical problem because of the following reasons (Sanasisane, 2002):

- As the largest city with a high rate of urbanization, it is the country's center for all important activities.
- It lacks resources and technical expertise to deal with the growing waste problem.
- The institutional and administrative structures are not well established to tackle it.
- A large portion of the MSW is uncollected and/or dumped into the river and existing drainages.
- Crude open dumping in the existing disposal sites causes numerous environmental problems.

Table 1. Population growth rate, urban population and MSW generation in the GMS countries

Country	Capital city	Population growth rate (%)	Urban population (%)	SW generation in the capital
Cambodia	Phnom Penh	2.5	27.7	0.46
Lao PDR	Vientiane	2.5	15.9	0.70
Myanmar	Yangon	2.3	21.6	0.79
Thailand	Bangkok	0.8	20	1.60
Vietnam	Hanoi	1.6	18.3	0.45
Yunnan Province	Kunming	1.2	24	0.79

Source: ADB-UNEP, 2004

UNDP (1997) warned that the environmental problems related to MSW especially in Vientiane are becoming more and more evident as the consumption patterns change and the economy expands. Municipal solid waste pollution of the Mekong River and its tributaries has created environmental problems. There is a great need to address these issues before it is too late to remedy the problems.

The overall objective of this study is to discuss different types of Environmental Management Measures in the current SWM practices in Vientiane, Lao PDR. Specifically, this study aimed:

- to assess general practices of SWM (collection, separation, dumping, treatment and disposal);
- to identify and assess effectiveness of the implemented Market Based Instruments (MBIs) and Non-market Based Instruments (Non-MBIs) for SWM;

- to identify public education and training programs used in SWM; and
- to present policy recommendations including effective instruments to minimize the polluting behavior of individuals and industries, and to recover the cost of pollution in the city.

During the research to collect data, interviews with the officials from Vientiane Municipality, Urban Cleansing Service Center, Department of Housing and Urban Planning, Division of Urban and Rural Development, Vientiane Urban Development Administration Authority, Solid Waste Management for Vientiane Poor Project and Improvement of Vientiane, Urban Environment Project were carried out. Observation of the landfill sites, interaction with recycling center personnel and some waste picker were also done. Household information was collected from the all the four urban districts of the Municipality. Secondary information were also collected and analyzed for the study.

2 EXTERNALITIES IN ENVIRONMENTAL MANAGEMENT MEASURES

Externalities are unintended and uncompensated side effects of a person's activities to another. When an individual throws solid waste, another person would have to bear the effects of this. In the same way, if the management of the command areas of Vientiane Municipality were given to the private sector or individuals, then the residents would have to buy the right to pollute the city. Negative externality could be depletable or non-depletable. MSW is depletable because if one person removes it, others are no longer subject to it. The odor of MSW is non-depletable because exposure of one to odor does not reduce the exposure to others. The external cost of SWM consists of environmental damages and health problems that arise from improper waste management. There are two types of costs in environmental degradation: private cost and social cost on SWM (Kathuria, 2004a). Private cost pertains to SWM fees, taxes etc., while social cost is the effect of pollutants on others and the effect of haphazard dumping on public health and aesthetics. When social cost is greater than private cost, negative externalities occur, resulting in environmental degradation. When social benefits overcome private benefits, positive externalities happen and this will enhance environmental quality. In SWM, social costs are more than the private cost of environmental degradation. If people are asked to bear a part of the social cost, this externality problem will be solved. This is called the internalizing the externalities.

2.1 Economics of pollution

With environmental management measures in place, the public internalizes the externalities as they are forced to pay the environmental cost. In SWM, internalizing the externalities means that the waste generator should pay for the cost of SWM. This is also called the Polluter Pays Principle (PPP). After the introduction of PPP, MSW generators start adjusting their behavior on solid waste disposal.

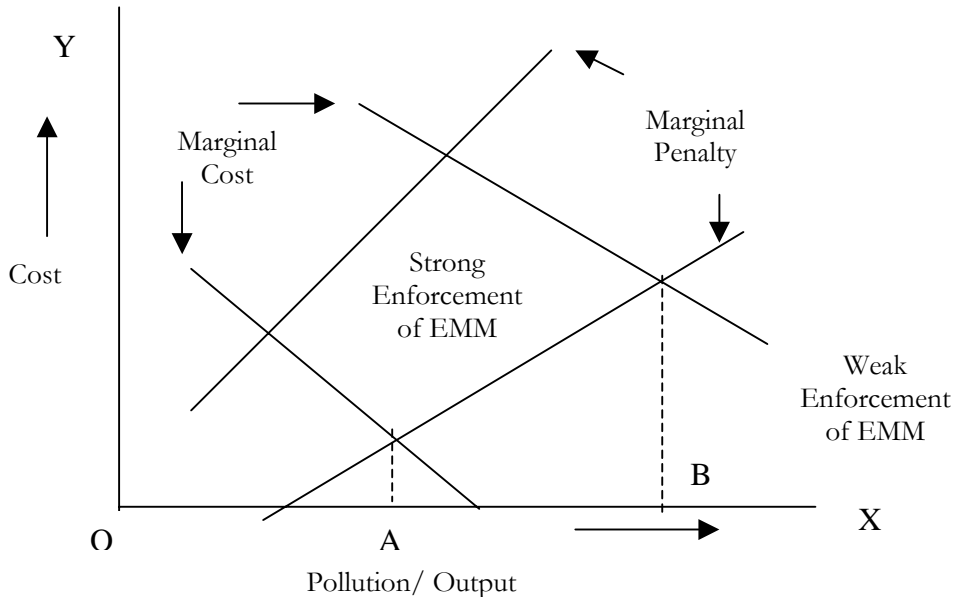


Figure 1. Marginal abatement cost vs expected penalty for pollution (Source: Kathuria, 2004b)

According to Kathuria (2004b), there are two parties on the equilibrium pollution level: the regulator (Vientiane Municipality), and the polluters (people, industries and institutions). The regulator's concern is for the Marginal Social Damage (MSD) or Marginal Expected Penalty (MEP) not to exceed Marginal Abatement Cost (MAC), so that society benefits with more users' fees from SWM. The polluter's concern is for MAC not to exceed MEP, so people and commercial institutions prefer to minimize MSW rather than pay fines and users' fees. The intersection of MAC and MEP gives the equilibrium level of pollution. A downward shift in MAC and MEP will reduce the solid waste pollution level. As the price of environmental services increases, people or commercial institutions decrease their pollution levels. The subsequent increase in abatement cost creates a decrease in environmental services.

2.2 Environment management measures: experiences in other countries

A study in the People's Republic of China, Indonesia, Malaysia, Philippines and Thailand argued for the adoption of market-based instruments (MBIs) as complementary tools for environmental protection in the Asian context of rapid industrialization and emerging economic and financial systems (Chen and Bacareza, 1995). The authors also identified four reasons for the adoption of MBIs in the developing countries. First, MBIs can achieve the desired effect at the least possible cost as implementing those entails lower information, monitoring and enforcement costs. Second, economic instruments are easier to enforce than command and control (CAC) regulations in countries with limited enforcement capability. Third, economic incentives will tend to discourage rent-seeking

behavior due to their transparent nature. Fourth, economic instruments generate revenues whereas regulations require bloated bureaucracies.

Empirical studies in the USA show that non-MBI approaches to regulate pollution were 22 times as expensive as the least-cost MBIs (UNEP, 2004). In the 1990s, the introduction of MBIs for pollution control in Malaysia resulted in 25% reduction of pollution loads beginning with the second year of intervention (O'Connor, 1996). A study in Olangapo City of the Philippines (Bennagen and Altez, 2004) found that shifting from the existing flat fee structure to a unit pricing of SW diverted at least 30% of the garbage through various alternative waste management practices, such as household recycling and managing food wastes. Gerhard (1994) claims that recycling reduces household waste fraction by 10%.

Taiwan has been implementing several types of recycling systems for polyethylene bottles, glass bottles, aluminum cans, waste paper, used tires, lubricating oils, mercury cell batteries and pesticide containers. Similarly, Korea has also proposed the deposit-refund system for a wide range of products. In Mexico, car batteries are under a compulsory deposit-refund scheme through which a new battery can only be sold with the return of an old one (Huber *et al.*, 1998). In Ecuador and Columbia, a SW collection fee is applied as a 10% surcharge on electricity bills (Huber *et al.*, 1998). Although it may not include rationalization of waste generation, the collection costs for such a scheme are low and effective. This definitely saves time and human resources in collecting users' fees.

3 CURRENT PRACTICES OF SWM IN VIENTIANE

3.1 Waste disposal, collection and recycling

Vientiane Municipality has 30 trucks, 8 of which are close-type compactors and the remaining 22 are open trucks. Around 50 administrative staff and 150 waste collectors (field workers) are engaged daily to collect, transport, weigh and dispose the waste. The public company Urban Cleansing Service Center (UCSC) has 75 SWM staff who works 5 persons per truck. Currently, UCSC and two private companies, Lao Garbage Company and Chanthabouly Cleansing Pvt. Company, are jointly handling the city waste. Lao Women's Union, supported by SWM for Vientiane Poor Project, is conducting educational and training programs for the waste pickers in the city. They are focusing on topics like how to handle hazardous waste in the waste stream, how to increase the income, and how to add value to the collected wastes. Bamboo bins and polyethylene bags are generally used to store garbage in household areas and waste collection points of market and office areas. The municipality has installed 50 large containers around the city to collect larger volumes of waste for easier access to the waste trucks.

Currently, there are 30 recycling banks operating of which 20 are at the community level and 10 at the school level. At the very first stage, the municipality provided a budget of 500,000 Kip (US\$ 50) for each community in order to construct banks for waste collection. In schools, students with the help of their teachers operate and manage the recycle banks as an extra-curricular activity. They bring the recyclables from home once a week to deposit in the recycle bank at school. When the

recycle bank is full, they contact a private recycling company to come and buy the contents. The students then divide their share among themselves and the school administration. In the community level, the chief, storekeeper, cashier and volunteers/community members jointly manage the recycle bank. Community members, adults, children bring their recyclables to be weighed and deposited in their account. When the bank becomes full, the administration contacts the recycling company to buy the contents. The recycle manager then shares the money with the members based on the bank accounts and its overheads.

According to SWM for Vientiane Poor Project (2005), around 300 waste pickers are currently working in the city but only half of the waste pickers have been registered. One hundred waste pickers are working in the city, while the other 200 work at the landfill sites 18 km away from the city. The practice of composting and recycling reduce the level of leachate as a result of removal of the organic fraction of the waste stream, reduces the total amount of waste disposed, and ultimately reduces the overall cost of SWM. The KM-7 Waste Buying Company (supported by Thai Company) and Lao Chareon Recycling Center, both private enterprises, are the major recycling centers in Vientiane. They buy recyclables from water pickers, school waste banks, and other similar groups to sell their materials to Laos, Thailand and Vietnam.

According to Somphathana (2004), the waste segregation and recycling initiative has led to the establishment of Lao Chareon Recycling Center in 1999, located 8 km from the center of Vientiane. With an initial investment of US\$ 10,000, the company claimed to have gained a net income of US\$ 18,000 by 2001. Now this company has become financially sound and has been expanding its business every year. At the initial stage, the project bought recyclables from waste pickers at landfill sites, and slowly they started to buy from the community and school recycle banks, scavengers and project-formed groups and individuals from the city.

Classification of the waste showed that organic waste comprised 30% of the total MSW generated in Vientiane followed by 22% recyclable items like paper, metal and plastics. According to NORAD (1998), Household waste in Vientiane makes the largest contribution at 75.8% of the total waste, followed by industries and markets at 19.1%.

3.2 Organizational structure of SWM in Vientiane

The Ministry of Communication, Transport, Post and Construction (MCTPC) started to deal with solid waste management since 1992. Initially, Japan International Cooperation Agency (JICA) financially supported the management of solid waste. In 1995, solid waste management was handed over to the Vientiane Municipality, specially the Vientiane Urban Development Administrative Agency (VUDAA). The Urban Cleansing Service Center (UCSC) was established under this administration to collect, transport and dispose MSW. VUDAA operates under a board and has five divisions, including the Technical and Urban Planning Division, and Environmental and Sanitation Division. The organization chart (Figure 2) outlines the responsibilities for SWM in Vientiane Municipality. MCTPC is the line ministry with a direct responsibility for SWM. The Environment Protection Law (1998) has given the authority to the Science, Technology and Environmental Organization as national level agency under the ministry for environmental management and monitoring units at the ministerial level, provincial, special zone, municipal, district and village

levels. The Department of Communications, Transports, Posts and Construction (DCTPC) represent the ministry at the provincial level and the municipality administration is responsible for SWM at local level. The public organization, Urban Cleansing service Center takes responsibility for SWM. UCSC has been working since 1998 in coordination with the municipality and JICA. UCSC accounts more than half of the overall municipality’s cleansing services. JICA has implemented a one-year project on the “Improvement of the SWM System in Vientiane Urban Areas”.

The project was supposed to provide heavy equipments as well as a maintenance workshop at a distance of 7 km, improve the waste disposal site 18 km outside the city and provide safe drinking water supply to the people living in the area near the dumpsite. The Lao Garbage Company, the Vientiane Development Company and Participatory Development Training Center (PADETC) are also involved in different kinds of activities in urban waste management in the city. PADETC is providing SWM programs for youths in schools and communities with youth volunteers and are getting some financial support from the Embassy of the Netherlands. The overall structure of SWM in Vientiane is as given in the figure 2.

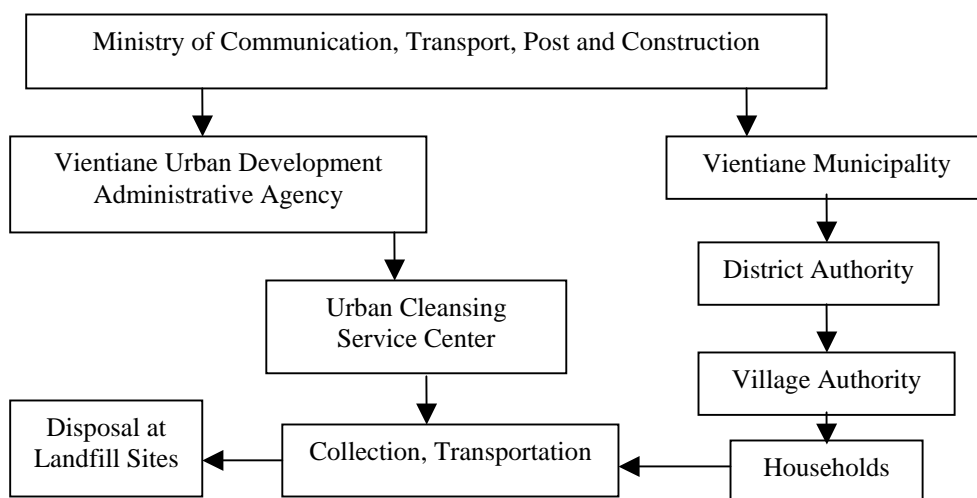


Figure 2. Organizational structure of solid waste management in Vientiane
 (Source: VUDAA, 2005, Chart unpublished but provided by VUDDA during the interview)

3.3 Laws, regulations and jurisdiction with solid waste management

A number of laws, guidelines, and regulations have been made in Lao PDR that deals directly with solid waste management. These are:

- The Environment Protection Law of Lao PDR 1998;
- Decree on the Management of Solid Waste and the Cleaning of Public and Residential Areas;
- Regulation on the Monitoring and Control of Waste Discharge (No.1122/STENO) 1998;
- Guidelines for Hospital Waste Management (1997); and
- Industrial Waste Discharge Regulation (No.180/MIH) 1994.

After the 1992 Rio Earth Summit, Lao PDR established the Science, Technology and Environment Organization (STENO) directly under the Prime Minister's Office. Within the STENO, the Department of Environment (DoE) is delegated the specific task of environmental management while other STENO departments deal largely with science and technology issues. STENO/DOE oversees policy formulation and coordination of environmental protection efforts.

The DoE consists of two divisions: Policy and Programs Appraisal Division (PPAD) and Regulation and Compliance Monitoring Division (RCMD). PPAD is tasked with the formulation of national environmental policies employing policy inputs and technical assistance from the other ministries. RCMD is responsible for overseeing the legal and regulatory framework on environmental management issues.

According to the environment protection law, the authority to manage solid waste lies with STENO at the national level and with the respective environmental management and monitoring units at the ministerial, provincial, special zonal, municipal, district, and village levels. The Ministry of Communications, Transport, Posts and Construction is responsible for SWM and the Department of Communications, Transports, Posts and Construction represent MCTPC at the provincial level while the municipal administrations are responsible for waste management at the local levels. The joint supervisory committees from provincial and district administrative offices are usually responsible for implementing the solid waste management programs.

4 SOLID WASTE MANAGEMENT: APPROACHES AND PROBLEMS IN VIENTIANE

In Vientiane, a combination of government and private companies assigned in different sections of urban areas take up the task of waste collection. The municipal administration dictates the collection frequency, and payments by households and commercial institutions. People generally perceive waste problem as minor and duty of the municipality. They lack awareness on the importance and seriousness of the problem and make no efforts to reduce waste. Other problems are:

- Waste collection is not efficiently planned and does not reach all the communities. Infrequent collection (once a week) has led to illegal dumping.
- Inappropriate handling of waste (open burning of uncollected waste and throwing of waste on the bank of Mekong River) has caused health risks and environmental impacts.
- Coordination is lacking among the municipality, residents and the private sector.
- Open dumping has led to monitoring difficulties, polluted natural streams and tributaries, and posed high health risks for human beings and livestock.
- Vehicles for waste collection are insufficient for reaching all communities.
- User fees are too low to compensate for the cost of SWM by the municipality.

4.1 Market based instruments (MBIs)

MBIs are very popular instruments for SWM because it is easy to implement and strengthen the financial base of institutions involved in SWM. Waste collection fee for a household averages about USD 1-2 (10,000-20,000 kip)/household/month. Municipality has appointed community head in every community, they collect the fees. Finally they deposit it to the Municipality and in return community head receives some allowances. The rates for commercial institutions are higher, but considerably low relative to their contribution to pollution. The deposit-refund system is another kind of MBI. Glass bottles (beer and soft drink products) are traditionally returnable in Vientiane. Refund payments for aluminum cans due to the high value added from recycling and the expanding use of such containers are now increasing considerably. They have been used extensively to promote recycling and are appropriate for toxic and hazardous waste management (motor batteries, tires, lubricating oils, etc). Residents give water bottles, cleaning bottles, plastic soft drinks bottles and car batteries free of charge to the dealers and waste pickers. In case of beer bottles, USD 0.1 (1,000 Kip) is charged as deposit refund. The broken glasses are collected by scavengers and sold to the recycling centers. It is then exported to the Thailand and Vietnam. Iron, steel and other metal wastes are expensive to export as the government has imposed more duties on these materials. Tax waivers and subsidies for the establishment of recycling industries will be good incentives that can attract the private sector and NGOs to invest in SWM. Together with the subsidies, the local and national government should create a market for the recycled products to ensure sustainability. Higher duties and fixing quotas on products by import will help to create the market for recyclables. The use of compost instead of chemical fertilizer would be a good example to decrease the amount of waste disposed while obtaining 'cash from trash'.

4.2 Non-market based instruments (Non-MBIs)

Non-market based instruments are also called Command and Control. In SWM, these are technology standards (for garbage collection bins and vehicles), pollution standards, land use restriction, environmental guidelines, quota system, zoning of city, waste collection time, standard for waste disposal site, frequency of waste collection, permits and licenses for hospitals, commercial establishments and construction firms, and different kinds of solid waste plans. A non-MBI example in Vientiane is setting the standard of garbage collection bins. Plastic bins and bags are commonly used for waste collection from industries, schools, hospitals and parks. Locally made bins, plastic bags and plastic bins are widely used to collection waste are not safe enough as they cannot control bad odors from biodegradable wastes and hence attract stray dogs and birds. They also occupy more space on the roadsides. Another non-MBI is the setting of standard for the waste disposal sites since Vientiane does not have a sanitary landfill. The waste collection frequency in the city varies from once to twice per week, which is far below the standard practice. MSW is transported to the designated dumpsites located 18 km far from the municipality center of Vientiane. However, some households and commercial institutions dump waste in their surroundings, open areas and sometimes illegally dump them along the banks of Mekong River. Regulations on SWM have been addressed in some policies like the Environmental Protection Law (1998) in Lao PDR. Although there is provision of permits and licenses for hospitals, commercial establishments and construction firms but all the revenue generated by them are not allocated for SWM and urban environmental protection. The

municipality does not have sufficient resources, expertise and manpower, particularly for SWM. Non-MBIs require much more detailed information on regulated firms, industries and other institutions than would MBIs. The local government must understand the details of industrial and commercial technologies in order to set appropriate standards. Non-MBIs generally set a standard incorporating fines or penalties which are usually too low to deter violators.

4.3 Suasive instruments (SIs)

Suasive instruments rely on voluntary compliance by polluters, motivated either by the threat of adverse hype or the prospect of favorable publicity. Environmental education and awareness-raising are the key elements of any policy designed around the instrument. Training, awareness campaign, extension activities, and school and college educational programs on SWM come under this instrument. The ADB, UNDP and JICA have carried out SWM education programs in Vientiane. Environmental education, in which courses or units on domestic wastes as well as hygiene have been included, is mandatory at all levels of schools since 2001. The Faculty of Engineering and Architecture, National University of Laos, has also been offering a course on Environmental Management including integrated SWM since 1998. Targeting engineering students, the course aims to improve the knowledge about production of goods, its impacts on the environment and minimizing of the negative impacts.

4.4 Limitations of these approaches

MBIs and non-MBIs require that local institutions cooperate and promote environmental quality by shifting the costs back to the polluters. MBIs allow market flexibility to control pollution. If the polluters do not reduce their waste, then the local authority can charge higher user fees to encourage them. MBIs tend to price all units of pollution, even the smallest, so that every polluter pays. Effective monitoring, data generation and enforcement are often required for non-MBIs to function. A strong and efficient administration to implement the pollution standards and expertise to monitor practices and enact laws and regulations are also needed. It also requires more sophisticated regulatory compliance staff and better functioning administrative and political institutions. Non-MBIs allow people to pollute to a threshold level without charges; MBIs in contrast require the polluter to pay for even the smallest unit of waste generation. Persuasive instruments aim to change the behavior and attitudes of people toward minimizing their waste and reducing the overall city pollution, but they do not work effectively alone for the management of MSW as they need to be reinforced with MBIs or non-MBIs.

5 RECOMMENDATIONS

5.1 Recommendation on MBIs

The municipality charges waste collection fees only to the residents and commercial units. Industries pay proportionately more, but the fees are still on a flat lumpsum value. Introduction of a separate waste disposal fee in addition to the waste collection would further strengthen the financial base of the municipality. In line with the PPP, the local authority can increase the fees for waste collection

and service charge to encourage people and hence minimize their wastes, recycle them and/or make compost as is practiced in many countries. Box 1 cites a small-scale composting activity in the neighboring Thailand where several good practices are implemented.

Box 1. Small-Scale Community Level Composting: The Thai Experience

Increasing waste generation with the rapid urbanization of Pakkret Municipality of Nonthaburi Province, Thailand caused the authorities to find a method of reducing household waste disposed at the landfill. In 2004, the Pakkret community with the help of Japanese Embassy, Thailand established a composting/recycling center, encompassing 240 households in the municipality. The composting center consists of an office building, a composting plant, a recyclable separation area. Designated staff collect the household wastes in a small van, buy recyclables, make compost from the separated food and garden wastes, and coordinate between the Municipality and the villagers. Bio-fertilizers are produced using a rotary drum composting unit (JICA Technology) with a capacity of 300 kg/day. After collection the waste is shredded into small pieces using a hand machine and a mix of ingredients (65% bio-waste, 25% bio-fertilizer and 10% sawdust to reduce moisture content) is fed into the drum. Compost is made by operating the rotary drum 3 times/day at a frequency of 3 rounds/count to mix and aerate the waste for quick fermentation. The mixture is moved through the inner chamber of the drum taking 2-4 weeks for the fermentation. Secondary fermentation takes another 2-3 weeks in the aeration shed. Only 20% of the villagers are involved in the municipality. There is a future plan to expand the establishment of composting unit and hence the production of bio-fertilizer to other villages of the municipality.

Composting of biodegradables at the household, community and municipal levels are strongly recommended to minimize the total MSW volume. Through composting and recycling, it seems feasible to minimize the waste volume by 36% in Vientiane. The government could give priority to use of recycled products from the industries in public offices. The local government should create a market for compost by imposing taxes or making laws to fix the quota on chemical fertilizers. Waste pickers, who contribute to waste minimization, should be encouraged by giving incentives to continue their work. There are still some possibilities for the wide application of the deposit refund system. It should be promoted for glass, plastic, motor batteries, lubricating oils and metal beverage containers. The private sector can be encouraged to enter into the business of collection, recycling and disposal of waste by providing incentives and loans for equipment purchases. The national and local governments can also waive taxes for the establishment of MSW recycling centers and other related enterprises.

5.2 Recommendation on non-MBIs

Waste separation at source (household level) is the main solution towards environmentally sustainable SWM. Once waste separation has been successfully implemented at source, there are many opportunities to collect and utilize these segregated materials in a number of ways. Community participation and waste segregation can significantly reduce the cost of collection as well as the

overall cost of SWM. The following methods are recommended to the municipality to formulate rules and regulations on the MSW problems in the city:

- Households should practice source segregation by keeping the garbage of different nature in different bins or containers.
- Households should store garbage in good condition so that the municipal workers can collect easily.
- Individuals should buy commodities with minimum packaging or return packaging materials to dealers (in case of tooth paste, soap, shampoo, cosmetics, etc.).
- Used items should be returned to the dealers for collective recycling or disposal (lubricating oils, furniture, motor batteries, electrical and electronics appliances).

Non-MBI requires specific expertise, such as standard setting of bins and vehicles as well as formulation of SWM laws. The municipality also needs experts to monitor SWM activities who can also provide training and build or enhance capacity of the municipality personnel to enable better implementation and monitoring of SWM activities. Periodic study visits can also be designed so that the municipality or the government personnel involved in SWM can learn from improved practices of SWM in neighboring cities outside Lao PDR. The government laws and regulations are not specific enough to address clear-cut roles and responsibilities to personnel, government organizations and private sectors. They should give specific roles and clearly defined responsibilities to SWM stakeholders. The findings show that some are reluctant to pay the existing SWM fees because of the irregularity in collection and disposal of wastes. It is recommended that frequency of collection and disposal of waste be increased to every alternate day accompanied by proper standard setting of collection bins and initiation of windrow composting of waste at the dumpsites.

5.3 Recommendation for Suasive instruments

The public and commercial institutions believe that SWM is the sole responsibility of the government. Public awareness about proper SWM is increasing but at a slow pace. Involving the private sector and non-profit organizations will change the behavior of public and create better alternative solutions to SWM. Lao Television airs a weekly 15-minute SWM educational program. The Vientiane Daily also has one column reserved for environment related news and issues every week. Mass media such as newspapers, television and radio should further be mobilized to make the public aware of better SWM. Changing consumption patterns of the people in the city has altered the composition of the waste stream to an increased fraction of plastic materials. Though clean campaigns and other educational programs can change the public attitude, create environmental awareness and proper behavior developed towards minimization of waste generation. A public campaign on waste reduction may involve messages such as: keeping garbage bins in suitable locations, buying goods without unnecessary packaging, returning packaging materials to the origin of production, returning products for collective disposal, and recycling items such as used furniture, electrical and electronics appliances. For the younger generation to make them aware of and motivated them to practice improved waste management, the importance of effective SWM has to be integrated into the school and college curricula. The Student Affairs Office of the National University of Laos has also been organizing campus-wide cleaning campaigns occasionally to raise

awareness on clean environment. These programs should be continued and extended in the other universities and schools on a regular basis to ensure better understanding among the younger generation who can bring home their awareness to the community.

6 CONCLUSIONS

This study on the SWM situation in Vientiane city supports the findings of other previous studies on solid waste in Vientiane. Market based instruments for managing solid waste are more effective than non-MBIs in terms of cost management and ease of implementation as MBIs try to shift the cost of pollution back to the polluters and internalize the externalities by increasing user fees as a function of the amount of waste generated. Non-MBIs, on the other hand, require strong administrative structures to penalize violators and may be less effective in Vientiane. MBIs should also be combined with persuasive instruments that help change public attitudes towards handling of waste in the city. Some residents are reluctant to pay for the currently unreliable collection and unsanitary disposal system. Community dissatisfaction with the current practices may lead to more refusals to participate and pay fees hence further reduce the revenues. Certainly, the municipality needs to improve its solid waste management services, but it is also necessary to fully effectively use persuasive instruments to complement MBIs. Effective SWM calls for the active participation of communities, local governments and NGOs.

These findings may have implications for other cities in the GMS as they also have similar problems with solid waste and thus face related challenges. For example, the number of urban poor has increased significantly in both Cambodia and Vietnam as a result of rapid urbanization. SWM problems in those two countries are attributed to the shortage of (i) skilled and experienced human resources; (ii) appropriate equipment to ensure cost-effective collection and transportation of waste; (iii) accessible finances due to insufficient revenue generation; and (iv) remuneration for workers to encourage effective operation. There is a need in the GMS cities to modify the current flat-fee structure, to change public attitude on environmental sanitation, to introduce hygienic practices, and to provide information and education to waste pickers and local residents. In Cambodia and Vietnam, the Japan Fund for Poverty Reduction Project is promoting community awareness and proper sanitation programs. Local governments are now faced with major issues such as how to finance the infrastructure needed for effective and efficient SWM as well as how to recover the investments related infrastructure, operation and maintenance. A mix of MBIs and persuasive instruments may be a solution for these GMS cities.

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