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Ecological Solid Waste Management Planning for Yangon, Myanmar*

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ABSTRACT

Yangon City in Myanmar needs solid waste management plan in the face of rapid population increase and urbanization. The existing solid waste management system in Yangon are labor-intensive, the service area does not cover the entire City, and the final disposal sites are not sufficient to handle the volume of wastes. In 2005, Yangon's waste generation rate was 0.465 kg per capita per day with a bulk density of 250 kg/m³. The quantity of daily wastes collected was about 672 tons out of the total 1912 tons generated, or a collection rate of 35 percent. This paper focuses on the analysis of Yangon's problems and issues on solid waste management and the formulation of a Strategic Solid Waste Management Plan. It is developed following the concepts of basic planning hierarchy and participatory approach. The strategies are envisioned to be implemented within a period of 20 years (2006-2026) and cover: 1) public awareness and education, 2) waste minimization, 3) waste collection and transportation, 4) waste treatment and disposal, and 5) cost recovery and financial sustainability.

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INTRODUCTION

As a fast growing urban center, Yangon City needs proper environmental planning focusing on solid waste management in taking the road to sustainable development. Yangon City, being the capital of the Union of Myanmar, plays a crucial role in the transformation process from a socialist into a market-oriented economy. The rapid increase in urbanization and population growth in the city contributes to a significant increase in solid waste generation that causes adverse effects on human health and the environment. At present, the city consists of 33 townships with a total area of 794.65 km² and a population of 4.1 million in 2004 (Figure 4.1).

Htay Lwin (2003) points out that the current waste management system is not adequately fitted to cope with the present situation due to lack of planning,

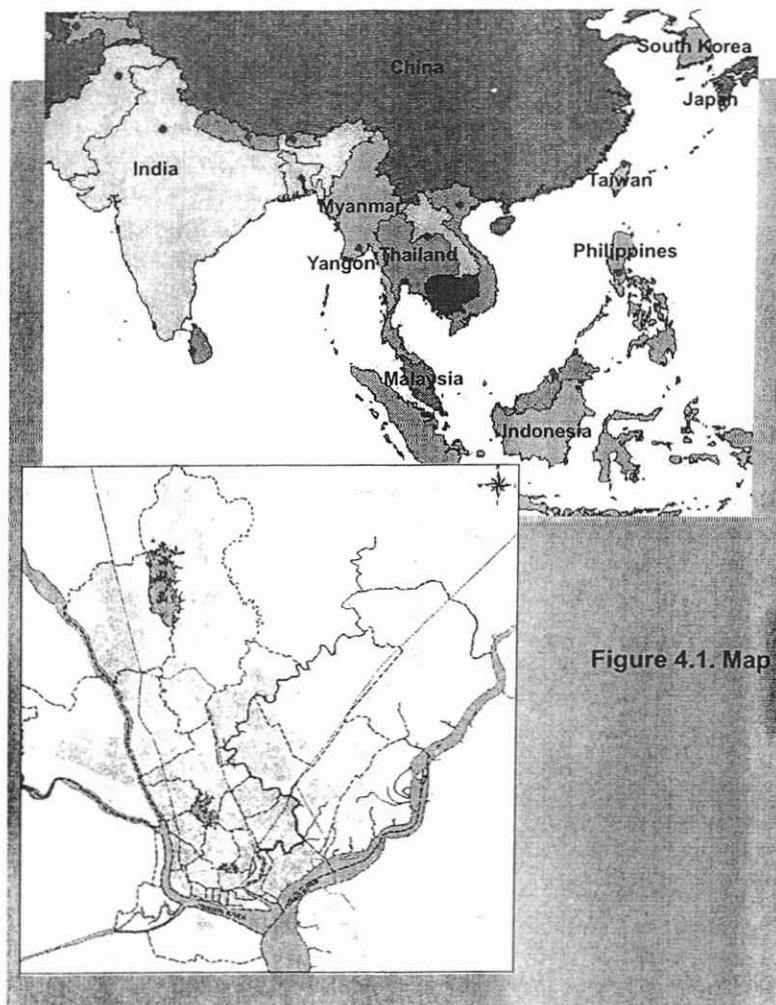


Figure 4.1. Map of Yangon City.

legislation/guidelines, capacity building, people's low level of awareness on environmental management, obsolete equipment, insufficient budget, and other limitations. He further mentioned that the major issues and constraints of solid waste management (SWM) in Yangon City are: 1) no SWM plan, 2) lack of data on waste amount and composition generated, 3) indiscriminate dumping of wastes at unauthorized places such as sidewalks, storm drains/ditches, water bodies, etc. 4) uncontrolled and unsanitary open dumpsites, 5) irregular, insufficient, and incomplete collection and hauling of waste, 6) inefficient collection route, 7) not fully and systematically developed waste volume reduction systems such as waste segregation, separate collection, recycling, and composting, 8) limited expertise of the Pollution Control and Cleansing Department, the implementing agency, 9) lack of citizen's awareness on sanitation/environment and environmental education, and 10) lack of updated laws and policies on SWM (Htay Lwin 2003).

Taking such issues and problems into consideration, Yangon City is in urgent need of a Strategic Solid Waste Management Plan to systematize and improve the solid waste management. Thus, this paper discusses the Strategic Solid Waste Management Plan for 2006-2026 by following the framework of solid waste planning hierarchy (source reduction, reuse, recycle, recovery, and residual disposal) and participatory approach..

In coming up with the Strategic Plan, the study covered the following steps: 1) determination of the generation rate and characteristics of solid wastes in Yangon City; 2) analysis of the existing Yangon solid waste management system; 3) formulation of the strategic planning framework; 4) development of the strategies for Yangon solid waste management system; and 5) formulation of the action plan that included the implementation plan, organizational plan, and investment plan for a comprehensive solid waste management of Yangon City. The strategies, together with the action plan, form the Strategic Solid Waste Management Plan of Yangon City. The conceptual framework of the study is presented in Figure 4.2.

Solid Waste Generation and Characteristics Survey

The solid waste generation survey* on households in Yangon's South Okkalapa Township indicated that Yangon City generated 0.465 kg of waste per capita per day or about 1912 tons per day. On the other hand, the solid waste characteristics survey showed that the bulk density of Yangon's solid waste was 0.25 kg/l or 250 kg/m³. The solid wastes were classified into different materials and the compositions on the waste stream were determined according to the percentage amount of the total volume. Biodegradable materials such as kitchen waste and garden trimmings constituted 65 percent; while plastic, paper, and cardboard, 18 percent; and the rest were glass, tin, leather, and rubber, and textile.

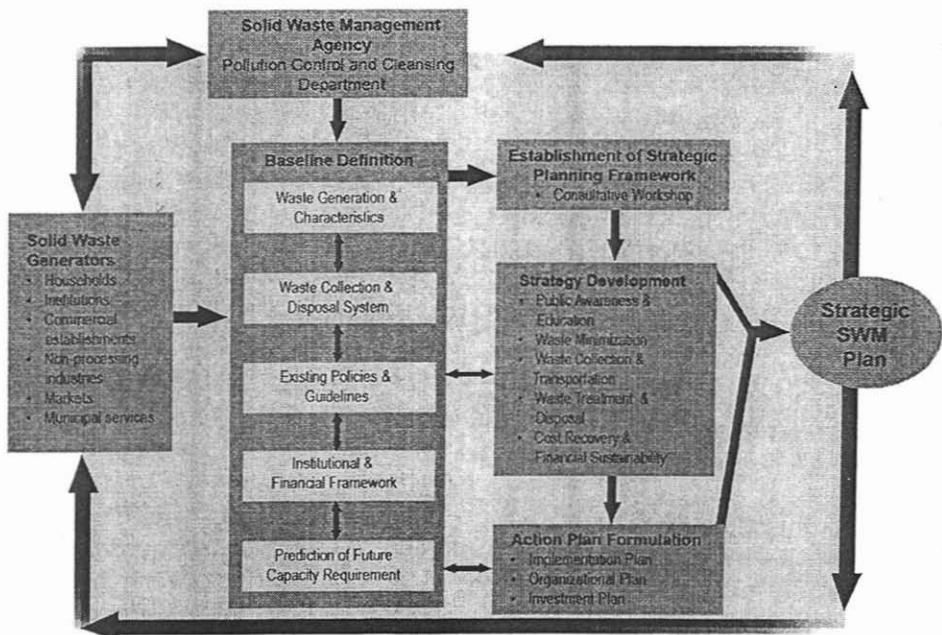


Figure 4.2. Conceptual framework for strategic solid waste management planning for Yangon.

Institutional and Financial Arrangement and Policy Analysis

The municipal solid waste management system in Yangon City is administered and performed by the Pollution Control and Cleansing Department (PCCD) under the Yangon City Development Committee (YCDC). The 33 townships in the city are classified into four districts by regions, namely: North, South, East, and West Districts. PCCD has offices in each township; and waste collection, street sweeping and transportation practices are executed by each township under these four districts.

For financial year 2003-2004, the Yangon City solid waste management system incurred a total expense of Ks 1,209 million (US\$1.2 million) to collect a total solid waste volume of 245,098 tons. Meanwhile, the system recovered a total of Ks 983 million (or US\$ 0.98 million) and showed a deficit of Ks 228 million. On a per ton basis, the cost incurred by the system in collecting and disposing of solid waste was Ks 4,932 (or US\$4.9) per ton. Per capita generation of solid waste by the population of Yangon City was 0.465 kilogram. The city, therefore, spent about Ks 2.3 (or US\$ 0.0023) per person per day in collecting and disposing its waste.

Since 1922, there has been only one legislation relevant to the policies of the Myanmar Government on waste management, that is, Section 111 and 112 of

the City of Rangoon Municipal Act of 1922: Scavenging and Cleansing Acts. The act empowers and compels YCDC to act on the waste management within their jurisdiction. In addition, the act empowers YCDC to adopt regulations and minimum standards for the storage, collection and disposal of solid waste. However, there are no implementing rules and regulations yet.

Waste Collection and Transportation Analysis

The present solid waste collection system executed by PCCD can be categorized into five types: 1) just-in-time collection; 2) handcart collection; 3) communal collection; 4) street sweeping; and 5) limited/special collection for market waste and industrial waste. The feature of solid waste collection system in Yangon City was basically labor-intensive and uncontrolled. In early 2005, there were 3,093 collection workers for solid wastes, while there were only 146 collection vehicles for transport operation. There was no transfer station in Yangon City; thus, the collected wastes were transported directly from the collection area to the Final Disposal Sites (FDS). For the entire Yangon City, the quantity of daily wastes collected was 672 tons out of the total estimate of 1912 tons; or a collection rate of 35 percent. The remaining (65%) uncollected garbage clogged the streets, backyards, waterways and vacant lots; thus, posing a major concern to the YCDC.

Disposal Sites

At present, there are three final disposal sites (FDS) in Yangon City which are all open dumps. Two dumpsites have reached full capacities but they are still being used because the new disposal sites are still being developed. The third dumpsite built in 2003 is estimated to last for 14 more years.

Consultative Workshop

A two-day Consultative Workshop involving key stakeholders was conducted to create a workable and politically viable Strategic SWM Plan and to develop consensus between stakeholders, inspire contributions, and secure broad-based ownership. The workshop was held at the Office of Pollution Control and Cleansing Department, YCDC, Yangon City in April 2005 and attended by representatives from YCDC, PCCD, city government, township PCCD office, final disposal sites, government agencies and the community. The workshop defined the strategic vision, scope of the plan, objectives and targets, and key issues for the development of the solid waste management strategies of Yangon.

Solid Waste Management Strategies

Based on the results of the baseline studies and the consultative workshop, the strategies formulated for Yangon's solid waste management system for 20 years (2006-2026) include:

- 1) public awareness and education – enhancement of waste management education in learning institutions, information and awareness program, establishment of solid waste database, and technical missions and study tours;
- 2) waste minimization – collection of direct user charges, cleaner production, promotion and support of second-hand dealers, establishment of reuse drop-off centers, development of resource exchange registers, waste segregation, promotion of recycling market, setup of recyclable collection centers, material exchange program, development of public awareness and promotion of composting practices;
- 3) waste collection and transportation system – collection of segregated waste, improvement of collection vehicles, establishment of transfer stations, extension of service area coverage, improvement of collection type, standardization of waste containers, and personal safety of collection workers;
- 4) waste treatment and disposal system – establishment of a main controlled landfill for the eastern part of the city, improvement of the existing western FDS into a controlled landfill, closure of the two filled-up FDS, establishment of regional disposal sites for townships that are too far from the main FDS, and monitoring and evaluation of the utilization of the disposal sites; and
- 5) cost recovery and financial sustainability – increase of capital investment, collection of waste management charges, and fines and penalties.

Action Plan

The solid waste management strategy for Yangon City will be divided into four separate phases: Phase 1- 2006-2010; Phase 2 – 2011-2015; Phase 3 – 2016-2020, and; Phase 4 – 2021-2025. The action plan presented in this paper covers only the first Phase, that is, 2006-2011, in which specific actions for the different solid waste management strategies have been identified. The Action Plan is composed of the 1) Implementation Plan; 2) Organizational Plan; and 3) Investment Plan.

1. Implementation Plan

Public awareness and education. The action plan proposes to include the topics on SWM in school curriculums, to facilitate tours of recycling and composting centers and refuse transfer stations, to encourage schools to implement projects on SWM, to support trainings, seminars and fora, to develop publication materials, posters, pamphlets to disseminate information and education, and to establish solid waste information network and database.

Waste minimization. The action plan proposes to establish reuse drop-off centers and recyclable collection centers in every township of the city, to encourage waste segregation activities at residents, public places, institutions, commercial establishments and industries in order to recycle or compost the waste, and to encourage backyard composting and to set composting facilities at the side of FDS.

Waste collection and transportation system. The action plan proposes to purchase non-compactor trucks annually, to extend 3 percent of service coverage area every year, to establish west and east transfer stations for effective transportation, to define definite schedule for the collection of segregated waste and to standardized waste containers for each kind of segregated waste.

Waste disposal system. The action plan proposes to establish a new eastern landfill FDS for the wastes of eastern and southern districts, to transform the existing FDS into a controlled landfill for the wastes of western and northern districts, to establish a North and South Regional FDS for the townships that are too far from the main landfill sites, and to close in 2006 the two existing FDS that are already filled up.

Cost recovery and financial sustainability. The action plan proposes to collect waste management charges in the form of direct user charges and uniform monthly charges. The direct user charge will take the form of a direct charge when the customer gets the standard waste containers, i.e., the plastic bags. The monthly charge will be a bill charged separately to the customer. The plan also proposes to increase the waste management charges by 10 percent every three years to compensate for inflation and encourage waste minimization.

2. Organizational plan

To fully operationalize the action plan, the additional components in the organizational structure of PCCD have been proposed. The department will be divided into two functional divisions (finance and administration, and operations management) and a policy advisory group (PAG). The finance and administration division will be made up of administration section, finance section, and budget and supply section. The operations management division will be composed of information and education section, waste minimization section, waste collection section, transport/maintenance section, and waste disposal section. The PAG will be multi-sectoral with representatives from several departments of YCDC, government agencies, academe, private sectors and NGOs. It will be composed of policy formulation sub-group, monitoring sub-group and technical/scientific sub-group.

3. Investment plan

For the successful implementation of strategic solid waste management plan, an investment plan has been proposed. The plan estimated that the initial investment of Yangon solid waste management system in Year 1 will be Ks5,723 million (US\$ 5.27 million). The estimated investments for Year 2, 3, 4 and 5 is about Ks 1900 million (US\$ 1.9 million) per year. The proposed funding sources are YCDC, PCCD, and the national government.

RECOMMENDATIONS

The Strategic Solid Waste Management Plan will not be very effective unless supported by policies in the form of legislations, regulations, and administrative orders issued by Yangon City Development Committee and the Office of the Mayor. The recommended policies and ordinances are the following:

- a. An ordinance to support the ecologically sound practices on solid waste management such as the requirement for the environmental impact assessment (EIA) for the site selection of final disposal sites (FDS), cleaner production programs for the industrial establishments and waste segregation programs for residential, commercial, and institutional establishments.
- b. An ordinance to support the collection of waste management charges in the form of direct-user charges (which will depend on volume of waste generated or "pay-as-you-throw" basis) and monthly charges from households, institutions, commercial, and industrial establishments.

Notes:

- The survey areas were selected from South Okkalapa Township where there are different classes of income level. The high income residential area, the middle income residential area, and the low income residential area were defined based on the types of the house ownership. Seventy five (75) households were randomly selected for sampling. Similar researches in Pacific countries recommended 50-100 sample households (WHO 1996).
 - 1) 25 households for high income class were selected from the 3rd Quarter area where houses were mainly made of concrete structure;
 - 2) 25 households for middle income class were selected from the 6th Quarter area where houses were primarily made of wood; and
 - 3) 25 households for low income class were selected from the 14th Quarter area where houses were essentially made of bamboo.

The wastes generated in the above areas were collected once a day at a fixed time (8:00 A.M) for 8 successive days to allow variation in waste generation over a week. The samples on the first day were discarded as they may contain waste accumulated from 2 or more days before.

- c. An anti-littering ordinance with penalties on illegal dumping of waste and littering.
- d. Strict enforcement of laws and regulations on solid waste management.

It is also recommended that scientific studies on how to properly develop educational and information materials on solid waste management, as well as the appropriate methodologies for social, ecological, and economic analyses of environmental management in Yangon City be conducted.

Lastly, the Strategic Plan should be supported with sufficient budgetary allocation for effective and successful implementation.

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