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## *Solid waste management: the Philippine experience*

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**Citation:** GADI, M.T., 1984. Solid waste management: the Philippine experience. IN: Cotton, A. and Pickford, J. (eds). Water and sanitation in Asia and the Pacific: Proceedings of the 10th WEDC International Conference, Singapore, 28-31 August 1984, pp.155-158.

**Additional Information:**

- This is a conference paper.

**Metadata Record:** <https://dspace.lboro.ac.uk/2134/29003>

**Version:** Published

**Publisher:** © WEDC, Loughborough University

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**10th WEDC Conference**

**Water and sanitation in Asia and  
the Pacific : Singapore : 1984**

**Solid waste management: the Philippine experience**

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## 1.0 INTRODUCTION

Throughout the Philippines, inadequate resources have been allocated to the important aspect of solid waste management. As a result, the solid waste management systems can no longer cope with the burdens placed upon them. The collection and disposal facilities of all major cities and municipalities are in need of repairs and replacements. Inadequate handling and disposal of refuse is causing health, social and environmental problems such as the transmission of pathogenic microorganism, contamination of air, water, and land, and the emergence of scavenging as a way of life.

The Philippines is a developing country. It is composed of 60 cities and 1,502 municipalities. It has a population of 48,098,400 and a density of 160.3 persons per sq. km. with a growth rate of 3.04%. The country is in the process of industrialization, consequently, the population residing in urban areas are increasing. There is more consumption of resources and production of more solid wastes in the country's growth centers.

The problem of solid waste is emerging as an urgent national problem. Yet, while funds are often devoted to the construction of roads and bridges, building of airports, and developing the tourism industry, the problem of solid waste management is starved of resource inputs.

In this light, the National Environmental Protection Council, (NEPC) implemented the National Solid Waste Subsidy Program (NSWP). The NSWP hopes to solve these problems by providing the necessary financial and technical assistance to local government units to effect a more vigorous and coordinated effort to contain waste collection, transportation, processing and disposal problems.

## 2.0 THE PRESENT SOLID WASTE MANAGEMENT SYSTEM

Solid waste management in cities and municipalities is being administered by the respective local government units. However, data regarding the operation components of solid waste management has been comparatively inadequate. Cities and municipalities made no measurements, and in few cases,

the data presented only suburban area and not the peripheral rural communities. The NEPC recently coordinated a nationwide survey to determine the status of solid waste management in the country. The following are the results of that survey.

### 2.1 Solid Wastes Sources

The primary sources of city and municipal solid waste are households or residential areas, street sweeping, commercial and industrial establishments and the agriculture sector. The main constituents of solid waste are more or less similar but proportions vary widely due to the population factor and differences in income levels. As income levels rise, the percentage of paper, metals and glass increase while the percentage of household or kitchen refuse decline. In Metro Manila, the per capita waste generation is 0.40 kilo per day. It is 0.10-0.20 kilo lower in the other areas.

The surveys indicate that household or residential waste constitute the bulk of municipal and city solid waste, averaging 50% of the total wastes generated. Wastes from industrial and commercial establishments is the second largest source of solid waste (30%), followed by street sweeping and agricultural wastes (20%).

### 2.2 Solid Waste Storage

Various storage containers are presently in use throughout the country, many of which are unsuitable for proper storage. In major thoroughfares, 200-liter communal containers are findings greater use.

In residential areas, it is a common practice for housewives to keep handy receptacles inside their premises to avoid loss or theft and bring them out only for collection and disposal. Individual containers are mainly metal or plastic pails, paper and plastic bags, baskets, cardboard cartons sacks, with the exception of the plastic containers such as plastic bags, all are uncovered and poorly maintained. When communal containers are filled to capacity, excess waste is dumped beside the containers

### 2.3 Collection and Transportation

Collection systems are operating in all of the cities and majority (62%) of the municipalities in the country. The typical

collection system is relatively simple in operation and organization, consisting of refuse pick-up by two or three crews from the place of storage, transfer of refuse to a transporting vehicle and delivery of the refuse to a point for disposal. Simplicity, however, does not connote uniformity of operation. Collection practices across the country area as varied as they are numerous, each having a peculiar set of conditions. Variations are found in the points of refuse pick-ups, frequency, of pick-ups, types of containers, methods of transfer, types of transporting vehicles, crew sizes and disposal methods. The frequency of collection is governed by the volume of wastes and the budget for solid waste collection. Collection service is limited to the poblacion or city proper.

Collection is generally done by the collection crew who pick up the refuse containers at the street curb or just outside the buildings or residence involved. Street cleaners and sweepers are employed to collect refuse materials from the public areas including market places, using carts, and for delivery to containers which are picked up by collection crews. As indicated by field investigations the percentage of urban population served by collection system varies between 16% to 71%, with an average of 27%.

Although collection of solid waste is reportedly being made daily in some areas, the service is generally inadequate and ineffective, particularly in peripheral barangays. Collection is further hampered by very limited budget for solid waste management. The dump trucks are frequently out of service because of lack of maintenance and repair. Most of them are obsolete. Another dilemma facing local government is the rising oil prices. The result is deficient service which lead to public dissatisfaction and a general feeling of indifference of people towards solid waste management.

The deficient collection system consequently result of burying of uncollected garbage in crude pits in individual backyards if available, or worse, to indiscriminate dumping in vacant lots, river banks and other water bodies.

#### 2.4 Resource Recovery/Recycling

Throughout the country, recycling is already being practiced to a considerable degree at the household level. Organic wastes are largely being utilized as food for chickens, pigs and animals. Many household operate manual backyard composting and use the resulting compost of their plants. The utilization of animal waste for the production of methane gas is also gaining

popularity. To certain extent, resource recycling is also being practiced by the collection crew. Being underpaid and working under harsh conditions, segregating materials such as tin cans, plastics, bottles from organic garbage provides additional income for their families.

This is done in the collection vehicle usually by the crew receiving and emptying the garbage containers. Aside from this, several syndicated junk dealers are in operation as attesting to the viability and profitability of such a venture.

Salvaging is done by private individuals (scavengers) who usually live with their families in shacks near dumpsite. These scavengers in turn sell the salvaged materials to dealers. In Metro Manila alone, it is estimated that there are about 10,000 scavengers at various dumpsite.

Scavengers lead a miserable life. They worked on freshly-tipped uncompacted, putrescent materials. They are exposed to the weather during the process of sorting, subjected to obnoxious odors from rotting materials. They are exposed to pathogenic organisms from nightsoil and septic tank sludges.

#### 2.5 Solid Waste Disposal

Open dumping in land and water system is the method utilized throughout the country. This method is simple and cheap. However, this practice poses serious threats to the environment.

A pilot composting plant, using pre-sorted shredded materials was operated in Manila in early 1960. It reportedly demonstrated the feasibility of a 21-day cycle with forced aeration. The installation still exists, but was not able to operate due to technical problems.

#### 2.6 Financial Support Systems

The matter of financing a solid waste management system is one of the most aggravating problems facing administrators.

The total problems of solid waste in the municipalities and cities reflects years of financial neglect.

The municipal reports indicate that expenditures for waste management average less than ten percent (10%) of the municipal budget with some even going as low as one percent (1%). Most of the expenditures are concentrated mostly on the collection phase such as wages, fuel, repair and maintenance of vehicles and do not include non-budgeted expenditures. Solid waste management activities are greatly underfinanced and the additional expenditures will be necessary to improve conditions and procedures for effective control. General revenues come most often from

property taxes, and other tax sources which may be used by the municipality or national government. Solid waste management financing has traditionally been financed through the general revenue process.

### 3.0 THE NATIONAL SOLID WASTE SUBSIDY PROGRAM (NSWP)

Improved solid waste management systems and practices can be achieved. However, a concerted effort at all levels of the government and the populace is required. The National Solid Waste Subsidy Program (NSWP) was launched in 1979 to serve as a catalyst to achieve this end. The goals of the program are:

(1) To provide assistance to local government units for more efficient and effective collection, transportation, processing, recycling and disposal of wastes to protect the health and aesthetic conditions of the community;

(2) To encourage, promote and stimulate technological, educational, economic and social efforts in preventing environmental damage and unnecessary loss of valuable resources of the nation through recovery, recycling and re-use of wastes and waste products.

To achieve the aforementioned objectives, the following actions are being undertaken:

. Provide financial assistance for the design, construction, acquisition of refuse equipment and facilities.

. Discourage open dumping of refuse and promote the conversion of existing dumps to sanitary landfills.

. Provide technical assistance to local government units for the development of solid waste management plans that will promote improved refuse management techniques, more effective organizational management, improved methods of collection, processing, recovery, and disposal of refuse.

. Promote the demonstration, construction, and application of solid waste management practices that preserve and enhance the quality of the environment.

. Provide for the promulgation of rules, regulations, guidelines for solid waste management.

. Promote research and development programs for resource conservation techniques and environmentally safe disposal of solid wastes.

Any provincial, city or municipal government, represented by their respective local executive can avail of the subsidy by submitting a project proposal to the NEPC.

The proposal must include the description of the solid wastes problem in the area,

the proposed solution, the needed resources, and the workplan. In addition, a survey form, which will describe the existing solid waste management practices of the area must be accomplished.

The project proposals are evaluated based on the following criteria:

1. Environmental significance: The project should contribute to the direct improvement of the existing state of ecological balance (i.e, water quality, air quality).

2. Impact of the project on the locality: The project should have a general impact on publicly-held resources. It should provide the greatest benefit to the largest number.

3. Economic acceptability: The proposed project should not be too capital intensive, it should be capable of being replicated in other areas of the country.

4. Implementation capability: The proposed project should be operational within a short time as possible. The project should utilize existing resource, skills and capabilities of the implementing agency.

5. Political and public acceptability: The public should be willing to accept the new system. The local agency should be able to demonstrate the overall benefits to the local populace to achieve acceptability.

With its limited annual budget of ₱1,000,000 (US \$71,900 as of February 27, 1984) the program has extended assistance to 44 municipalities and 14 cities towards the improvement of their solid waste management systems. Among the projects that were implemented under the program are:

. Push-A-Cart (Collection and Disposal):  
The project involves the use of appropriate technology as an answer to the rising cost of equipment and capital outlay attendant to high technology. Pushcarts, instead of dump trucks, are utilized for refuse collection. Out-of-school youths and the unemployed are recruited to collect the refuse from the household for disposal in small sanitary landfill sites. The projects have provided a relatively inexpensive yet sanitary method of collection and disposal. Further, it has maximized the collection of household wastes in peripheral areas not serviced by the existing collection facilities.

. Cash-in-Trash (Resource Recovery):  
The project recruits scavengers (people who earn their living in the dumpsites) to serve as Eco-Aides. The Eco-Aides are trained and fielded to buy the recyclables wastes from the households. The recyclables are then sold to the end-buyers.

The resource recovery project have provided a more decent means of living for scavengers. It has minimize their exposure to excessive filth at the dumpsites. Through the project the volume of garbage is reduced. In turn, the household earn extra cash, no matter how small, from what are commonly considered useless garbage.

. Sanitary Landfill:

Through the program, the first sanitary landfill operation was established in Lucena City, a 120,000-population community, 120 kms. east of Metro Manila. Other communities are contemplating on the adoption of the landfill method in their area because of the excellent response of the public on the project.

. Biogas System:

Most markets and slaughterhouses are plagued by poor sanitation practices. The biogas project utilizes the abundant wastes in these places as energy sources through the installation of biogas digesters.

A sub-component of the project is the use of septic tank as biogas generators. The project involves the construction of toilet facilities coupled with methane gas generator which augment the energy requirements of the household.

. Toilet Construction

Ten thousand (10,000) water-sealed toilets were constructed around the Laguna Lake, the Philippines' largest lake and the chief source of our fish supply. The toilets were constructed to prevent the environmental deterioration of the lake due to improper disposal of excreta.

. Preparation of Solid Wastes Master Plan:

A solid wastes plan was prepared for Metropolitan Manila to strengthen its capability in solid waste management. The master plan identifies appropriate technology, for the efficient collection and disposal of solid waste. Alternatives solid waste management systems are studied and the least cost solution identified for an integrated resource recovery and solid waste management program.

. National Solid Wastes Management Seminars:

The first national seminar on solid waste management was conducted to enhance the managerial and technical capabilities of solid waste administrators. Similar seminars will be conducted on a regional and provincial basis.

#### 4.0 CONCLUSIONS

The accomplishments of the National Solid Waste Subsidy Program are insignificant when compared with the solid waste problems facing the country.

Given to usual financial limitations characterizing a developing country like the

Philippines, it can optimize its meager resources allotted for solid waste management by taking into consideration these strategies:

. Use of systems approach in solid waste management:

This does not mean the application of complex mathematical models but rather the use of systems orientation in dealing with problems. This implies the recognition of interdependence between all elements of the solid waste systems, definition of objectives, constraints, etc.

. Use of available, low cost and appropriate technology:

Careful analysis should be made regarding the utilization of imported equipment and technology. Although foreign assistance are available in forms of loans, grants and aids, most of the technologies and equipment offered are inappropriate for the local conditions. Most of these equipment are mechanized, labor displacing and require special and expensive maintenance.

. A grassroots public awareness campaign:

People are just naturally opposed to change, hence, a new system must demonstrate a change for the better if acceptability is to be achieved. An information campaign demonstrating the benefits of the new system should be undertaken before any system is implemented.

"Let everyone sweep in front of his door and the world will be clean". What Goethe said used to be true in our country. But we have run out of backyard spaces for disposal. Solid waste management has become a messy, complicated and expensive operation requiring huge resources. The problems have outraced our capabilities to solve them. The National Solid Wastes Subsidy Program is desperately trying to close the gap.

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