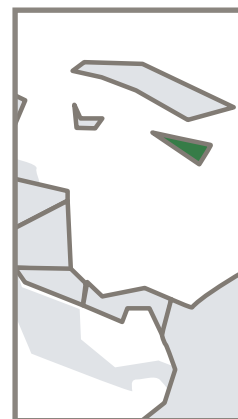


REGIONAL EVALUATION MUNICIPAL SOLID WASTE MANAGEMENT SERVICES



COUNTRY ANALITICAL REPORT JAMAICA / EVALUATION 2002

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1. EXECUTIVE SUMMARY

The Jamaica government has adopted an integrated approach to the management of solid waste and is therefore participating in Evaluation 2002 to identify and organize existing data to assist the process.

Jamaica, located in the Western Caribbean, is the third largest island in the region, with a population (2001) of 2,599,334 persons with the majority of the population concentrated in two (2) main urban centres - Montego Bay on the north and Kingston on the south east coast.

With a burgeoning population, the evolution of the solid waste sector has been in the first instance hap-hazard and then developed increased focus and rationale with a final consensus that landfilling municipal waste will prove to be the most effective and appropriate method to be employed for the island.

The sector is funded primarily through property tax in the form a subvention received from the Ministry of Local Government, Community Development and Sport. For the period 1998/99 39.7% of the ministry's total budget was allocated to the solid waste sector. Under the new regime, cost recovery mechanisms have been identified in the form of tipping fees and special waste disposal fee to supplement the budget for the sector.

In analyzing the sector significant improvements have been identified especially as it relates to the collaboration with other sectors and partners. For example, where new development occurs in the municipality it is now an requirement of the developer to plan for the provision of solid waste services and in the initial stage pay for these services prior to registering on the tax roll. With the administrative management of the sector now with a central governing body, the National Solid Waste Management Authority, the sector gave way to a system where individual parks and markets companies had responsibilities for their own regions financed through local government subvention and was replaced by a transition sector with standardized practices and harmonized administrative and financial arrangements. The sector has also seen an increase in the shared and participatory approached to the management of waste with a number of private sector companies and non-governmental organizations emerging.

In order to achieve the focus of integrated solid waste management a number of infrastructural development and investments have been made. During the period of review (1996-2000) a total investment of US\$86,677,411.57 was made to develop the sector islandwide. This has resulted in improvements being made to the service delivery of the industry directly impacting positively areas such as health, environment, economic and social development.

2. INTRODUCTION

A major policy objective of the Government of Jamaica is sustainable development through the advancement of policies and programmes related to the economy, the environment and the society. The development of a National Solid Waste Management Policy, the implementation of appropriate legislation and the establishment of the National Solid Waste Management Authority speaks decisively to the commitment to achieve sustainable development through pragmatic approaches. Major developments have taken place within the sector. The institutions and legislative framework for the sector has been developed. Market based approaches to incorporate and sustain private sector involvement have been identified as well as the major areas of investment needs. Limited infrastructural development has been undertaken with regard to a number of disposal sites.

Evaluation 2002 has provided an opportunity to organize the data and present the methodology associated with the ongoing development of the sector. The data presented will allow for a clear understanding of the conditions the sector and its investment needs.

The direct contribution of the sector to the economy, its impact on the environment and its ability to affect the quality of life of individuals is well established. Consequently, the continued development of the sector is expected to yield benefits beyond its direct investment. Non-Government and Community based organizations as well as civil society has participated in the design and implementation of sectoral programmes resulting in broad based ownership of the policy objectives.

To effectively control the disposal of this waste and also to reduce the quantities reserved for final disposal, a number of initiatives have been taken to date and are planned for implementation over the next three (3) years. These include: *Upgrading disposal sites islandwide, commencing with the Riverton Disposal Site; Developing and Implementing Cost Recovery Systems; Developing and implementing new legislation and regulations for the solid waste sector; Effecting environmental closure of some of the old waste disposal sites; developing national solid waste management plans for hazardous, regulated medical and special solid wastes and designing constructing a series of regional landfills islandwide.*

3. BACKGROUND

General Country Characteristics

Jamaica, located in the Western Caribbean, is the third largest island in the region, with a population (2001) of 2,599,334 persons. The island has a total landmass of 10,000 square metres and is divided into fourteen (14) parishes. There are two (2) main urban centres - Montego Bay on the north and Kingston on the south east coast.

The 2001 Preliminary census revealed that just over half (52.1%) of the population lives in areas classified as urban. The average household has declined from 4.2 in 1991 to 3.6 in 2001 primarily attributed to the fact that 723,343 persons occupied private dwellings, an increase of 27.1% over 1991.

In Jamaica, the **Human Development Indicators (HDI)**, which according to the United Nation Development Fund (UNDP) *is a composite index measuring average achievement in three basic dimensions of human development - a long, healthy life, knowledge and a decent standard of living* are as follows:

- A total of 20% of the population is considered to be illiterate with an illiteracy rate of 14.2% (11.4 % Men and 2.8 % Female).
- The average Life Expectancy at birth is 72 years and Infant Mortality Rate is 24.5.
- A 1.7 percent real growth in GDP was achieved in 2001 an improvement compared to the 2000 performance, which saw a 0.7 percent growth rate.

(Source: www.undp.com and Planning Institute of Jamaica - Economic and Social Survey (Jamaica), 2000.)

The Evolution of the Solid Waste Management Sector in Jamaica (1991-2001)

The Ministry of Local Government and Community Development has amongst others, the overall responsibility for solid waste management. The executing agencies prior to 2001 were the Parks and Markets Companies, which were regional in their functional capacity and along with several private contractors collected solid waste in Jamaica. These companies were created in 1987 subsequent to The Public Health Orders issued under Section 13 of the Act that divested the Local Boards of Health of their functions to carry out the activity of public cleansing in respect of the relevant parishes.

Prior to the National Solid Waste Management Policy (2000) and Act (2001) respectively the legislatures that governed solid waste management were, the Public Health Act (PHA) of 1974, the Litter Act of 1986 and Regulations on Garbage Collection and Disposal of 1998, *all of which were subsumed in the Act (2001)*.

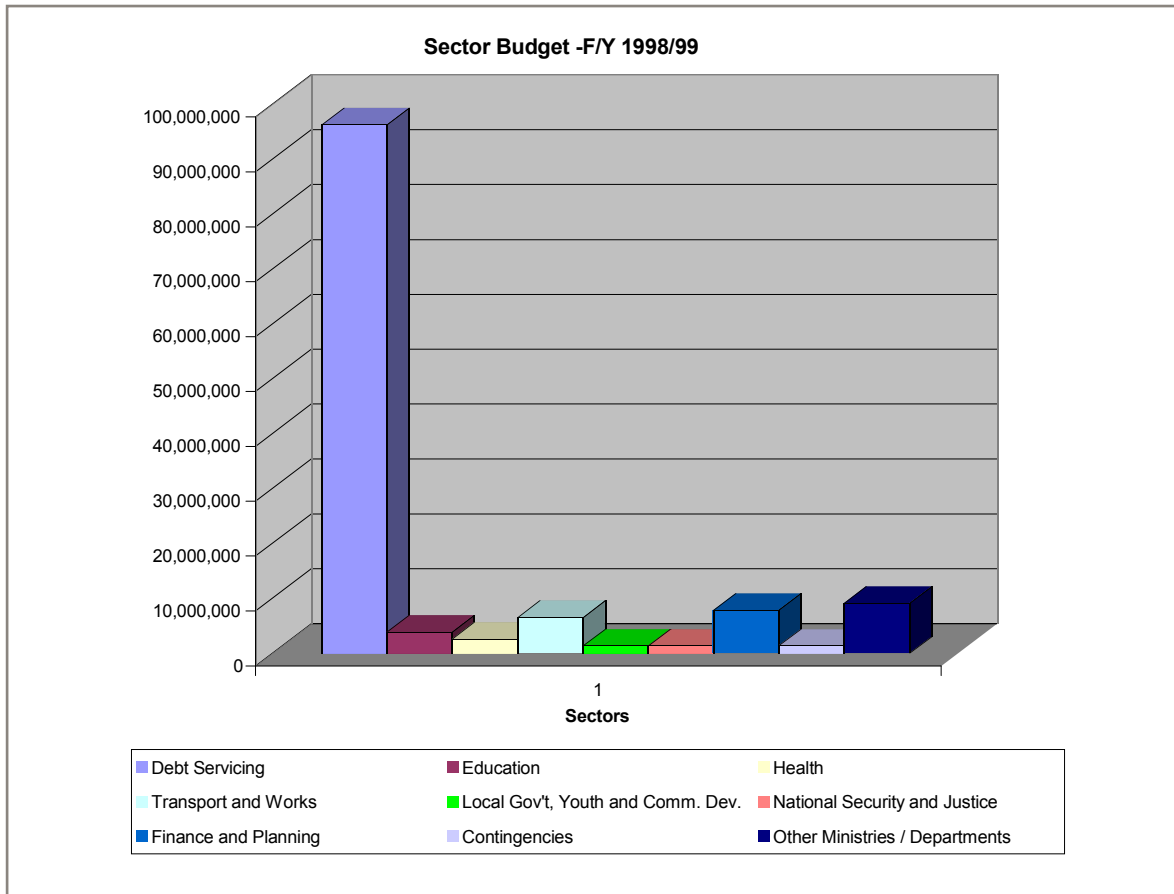
In 1996 Government invested in acquiring 65 compactors (at a unit cost of US \$100,000) to supplement the existing fleet. Further to this the Government of Jamaica, being aware that the management of solid waste in Jamaica needed improvement in addition to policy to guide and ensure the delivery of efficient and reliable solid waste management services, contracted the Norwegian consultant firm Norconsult International. NI was to analyse the needs for policy reform and project identification linked to the implementation of the long-term strategy, referred to as the Jamaica Solid Waste Management Study.

An analysis of all the different waste disposal methods, inclusive of incineration, composting, landfill, concluded that the establishment of landfills is the most cost effective and appropriate method. **The National Solid Waste Management Project (1999)** which emerged had the main purpose of supporting the improvement of environmental and sanitary conditions of solid waste disposal site in the Kingston and Metropolitan Area and other non-active disposal sites nationwide. An action plan for the countrywide management of solid waste was developed.

Agreement for the project was entered into on September 1999. Time & Motion, Waste Characterization and Waste Generation Surveys have been conducted and are ongoing, purpose being to examine the types of users of the site; the type of waste and the quantities being disposed.

Currently, solid waste management is funded through by property taxes. In 1998/99, 39.7% of the Ministry of Local Government's budget was allocated to Solid Waste Management, (see Figure 3.1 below in \$'000). The development works being undertaken under the National Solid Waste Management Project are being funded through loans from the Inter-American Development Bank (IDB) and the Government of Jamaica. Additionally cost recovery mechanisms have been identified to supplement property related services.

Total Investment over the last five years has been almost US \$87 million in loans and Central Government grants - local rate at JA. \$40.

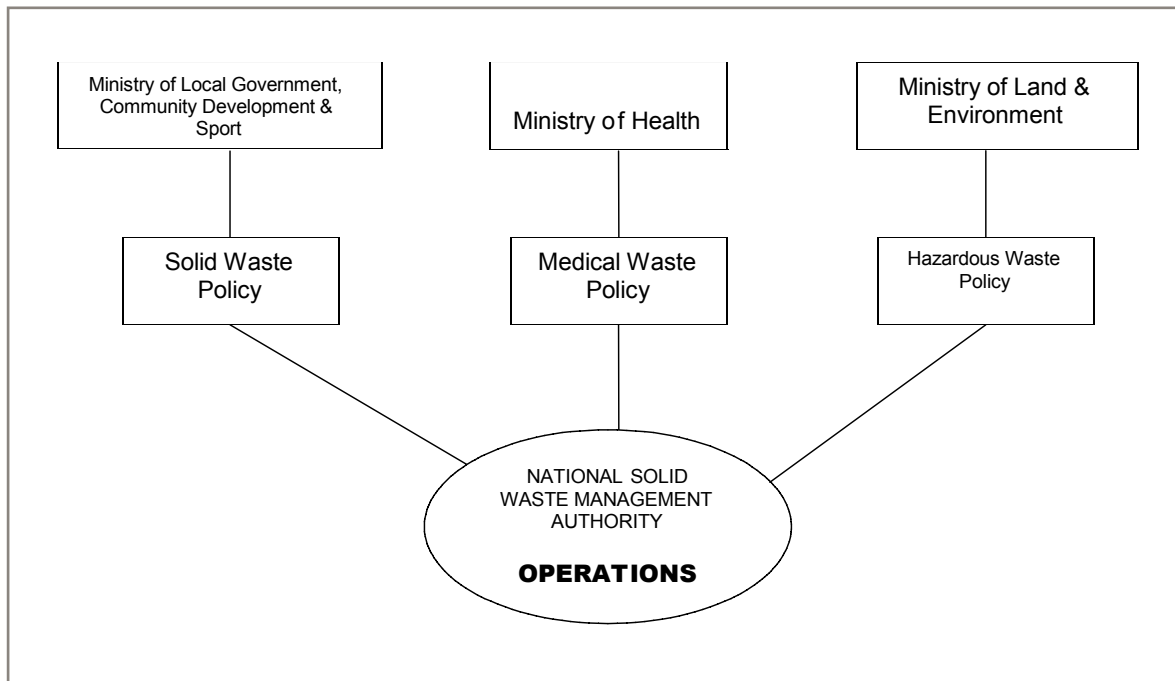


4. FUNCTIONAL STRUCTURE OF SOLID WASTE MANAGEMENT SERVICES

The Ministry of Local Government, Community Development and Sports (MLGCD&S) has portfolio responsibility for solid waste management in Jamaica. The National Solid Waste Management Act 2001 has vested authority in a National Solid Waste Management Authority to manage and regulate solid waste islandwide. A Board of Directors appointed by the Ministry leads the Authority. The Authority is able to earn its own revenue and use it to offset its expenses.

The focus of the Authority is to regulate whilst encouraging and providing opportunities for the private sector to carry out its operations centred on the collection, transportation and disposal of waste. The responsibility for different aspects of the regulatory role resides in a number of external agencies. The National Environment and Planning Agency (NEPA) require that potential operators of waste disposal facilities and waste processing facilities meet environmentally accepted standards and simultaneously satisfy the requirements of the NSWMA with regard to licensing requirements for disposal facilities. The following chart depicts the primary Ministry's responsibilities of the major environmental agencies.

Ministry Responsibilities



4.1 Regulatory Framework

The National Solid Waste Management Act 2001 is the principal legislation governing solid waste management in Jamaica. Along with this Act there will be enabling regulations covering issues such as licencing, tipping fees, recycling, hazardous and medical waste.

Where other jurisdictions cover some aspect of solid waste management for example, the Public Health and Natural Resources Conservation Authority Acts, appropriate cross referencing will be done.

4.2 Operational Issues

The National Solid Waste Management Authority regulates the solid waste operations of collection, transportation, transfer and disposal of solid waste. (In the short term disposal sites will be operated by the NSWMA until they are divested.

The private sector will be encouraged to pursue business opportunities in solid waste collection. The government will provide incentives for this to occur.

Solid waste collectors will have the opportunity to:

- Offer services to industrial, commercial and institutional entities through contractual arrangements with the respective entity (as they currently do).
- Bid for contracts to provide collection services for household and curbside commercial solid waste through processes administered by the NSWMA.

Collection vehicle currently owned by the government will be divested through a transparent bidding process to those interested in establishing themselves in the solid waste collection business.

The companies collecting solid waste will be licensed by NSWMA. In addition, each truck will be licensed to haul a specific type of waste. This is to prevent trucks licensed to carry municipal waste from carrying medical or special waste.

4.3 Cost Recovery

There is no sustainable source of revenue for funding for solid waste management operation outside of property taxes and government grants. Property taxes form a portion of the Parochial Revenue Fund that is administered by the MLGCD&S under the Parochial Rates and Finance (Amendment) Act. Tipping Fees and other sources of revenues will offset the provision of solid waste management services.

Traditionally, Property Taxes have been used for solid waste management, street lighting and beautification within each parish. Under the new system, the Local Authorities will be required to pay for municipal solid waste collection and disposal services from the property taxes or any other revenue source they deem fit to use.

Industrial and large commercial waste generators will pay a haulage fee to licenced waste haulers to collect and dispose of their waste. The haulers will pay the tipping fee from haulage fees they charge. Consistent progress has been made in the use of the newly installed scale at the largest disposal site in the island. This will facilitate the transition from trip based fees to tonnage based fees for waste haulers collecting on behalf of the waste management agency.

The 'polluter pays' principle is the basis on which the system will be operated so that the waste generator is always cognizant of the fact that a cost is associated with the management of waste. Incentives, penalties and public education will complement these initiatives with a view to reducing illegal dumping.

The waste management agency will earn revenue from fees to license solid waste management companies, collection vehicles, disposal sites and waste processing facilities. Additionally, revenue may be generated from the operation of recycling enterprises.

5. SITUATION OF THE DELIVERY OF MUNICIPAL SOLID WASTE MANAGEMENT SERVICES AT THE LOCAL LEVEL

5.1 Analysis of the quality and coverage of collection, transportation and final disposal in large, medium and small populated nuclei

It is estimated that approximately 945,496 tonnes of waste is generated across the island annually. Of this amount, 72% or 680,757 tonnes are collected within the wastesheds.

The collection service that currently exists is a hybrid system in which public and private service providers share equally in the collection of waste islandwide. Within some wastesheds the state is the sole provider of solid waste management services.

Many of the sites will be closed as they currently operate as dumps. It is proposed that each wasteshed will ultimately be served by a regional landfill and a network of transfer stations (facilities where solid waste is collected, aggregated, sorted or processed for the purpose of subsequent transfer to another facility for further processing, treatment or disposal) to facilitate the disposal of waste.

Two of these regional sites have been identified and are undergoing improvements to upgrade them to landfills. These are the Riverton and Retirement disposal sites.

Work is ongoing to finalise the locations of the other two regional landfill sites to serve the south western and north eastern wastesheds. This work is being done jointly by the Project Executing Unit (PEU) in the Ministry of Local Government, Community Development and Sport and the NSWMA.

5.2 Cost analysis and rates for delivery of the service

Based on the period under review calculated rates for delivery of service are broken down as follows.

- i. Manual Sweeping - US \$5.60/km
- ii. Collection - US\$288.90/t
- iii. Final Disposal - US \$46.67

It was impossible to extract rates as they relate to other processing methods such as incineration, recycling, etc. The above rates reflect the rate levied to large, medium and small populated nuclei.

5.3 Municipal development and its relation to solid waste management

There are a number of agencies involved in the development of the municipalities in Jamaica. These vary from the Local Parish Councils, the Ministry of Water and Housing to private sector interest. Often times the development process, which involves, depending on the developer, an Environmental Impact Assessment, excludes analysis related to the provision of solid waste services.

It is assumed that this service will automatically be provided to new housing developments, school, etc. without attention being placed on capacity of the service provider, changes in collection schedules and routing to accommodate new development.

Although the National Solid Waste Management Authority may take into account population increases on a parish basis it still does not account for the distribution of the increase across the parish and as such does not aid the strategic planning process for the provision of efficient services. Development Orders and Land-use Planning Maps are often out of date and not necessarily enforced. Hence, the utilisation of these may be flawed in forecasting population distribution and densities.

5.4 Administrative Management, economic and financing modalities of solid waste management services

Administrative management was the responsibility of the individual Parks and Markets Company at the local level. Subventions were disbursed to them from the local authorities and they organized and operated the sector. Operation of the sector varied across the regions.

Municipal solid waste services were chiefly financed from local government budgets through central funding. The portion of the budget that financed these services was obtained from property taxes. Revenue was further generated from commercial operations. The collection of commercial waste was not the responsibility of the Parks and Markets Companies, but due to the absence of commercial waste haulers in some sections of the country a service was extended to commercial waste generators at a cost. During the evaluation period the Riverton Wasteshed received a major loan of US\$16.5 million from the Inter-American Development Bank for development of the services in the metropolitan area.

Towards the end of the evaluation period the sector was in transition to a more centralized and harmonized administrative and financial arrangement.

5.5 Shared and participatory management (municipality, community, NGOs)

Domestic solid waste services were chiefly the responsibility of the Parks and Markets Companies. There were occasions of shared management with corporate citizens who donated receptacles and sponsored beautification projects. Various NGO's had projects or programmes, the most noted being 'Recycle for Life', that focused on specific fractions of the general waste stream and addressed the management of these. Operations of NGO's were rarely collaborative with the government agencies with the responsibility for managing solid waste services.

5.6 Small businesses involved in the collection, transportation and final disposal of the waste and their contractual relation with the municipalities

In Jamaica, municipal responsibility for solid waste encompasses all of the corresponding services. However, solid waste management practices are undertaken by several small businesses that are involved in the collection, transportation, and final disposal of the waste under contractual agreements with the NSWMA.

Small businesses contracted to the company operate under written agreements that vary from contractor to contractor. Once there is a need for collection services in a particular region, interested contractors with vehicles that are of the preferred type and are in proper working conditions, can apply to the NSWMA for a contractual agreement to perform collection. In addition there are policies regarding the cost of collection that must be agreed upon before a contract is granted. Periods for which contract last will again vary as some contracts can last for a few months while others may renew yearly.

After the waste is collected by the small business owners, it is transported to the municipal disposal sites—which are operated by the NSWMA—for final disposal.

5.7 Micro-enterprises involved in sweeping and cleaning of ways, recycling and segregation

Micro enterprises in the context of small private companies do not play a major role in recycling, segregation sweeping and cleaning of road ways in Jamaica. Sweepers and cleaners are either employed directly to the NSWMA or to a private contractor. These employees are normal from the communities in which they work, and cleaning and sweeping activities are conducted daily.

Segregation and Recycling of waste is not practiced extensively by micro enterprises. Waste pickers and sorters—not employed to the NSWMA or contractors—are key players in the collection and recycling of the recyclable waste. They extract materials such as aluminum containers and plastic bottles and recycle them into other products.

5.8 Important sectoral projects that are being carried out in the country

Major sectoral projects during the evaluation period were:

- Increase in the collection fleet with an acquisition of 65 compactors in 1996
- A comprehensive solid waste management study conducted by a Norwegian firm, Norconsult International
- Emergence of the National Solid Waste Management Project in 1999, which continues to present.

5.9 Contribution of funds

Tabulated below (Table 5.9) is the investment in the sector during the evaluation period

Area / Wasteshed	Municipality Resources (Thousands of US\$)	Central Government Resources (Thousands of US\$)	Loans (Thousands of US\$)
Riverton		54,882,158.08	16,500,000
Retirement			
Southern			
North Eastern	4,866,583.05	891,983.25	

Total Invest - US \$86,677,411.57

6. STRENGTHS AND CRITICAL ASPECTS OF SOLID WASTE MANAGEMENT SERVICES

Limitations

Solid Waste management has always been under the purview of the Ministry of Local Government, Community Development and Sports (even with periodic name change) a ministry that has benefited from less than 5 % of annual national budgets. In fact there has been major reduction in central and local government allocation for waste management. Inadequate funding therefore has been one of the major constraints to the sectoral, arrangement, integration and development.

Financing of solid waste management has also been limited by the fact that the additional source of funding, which has been via low rate property taxes, been significantly insufficient, coupled by the fact that a system of billing and collection, until recently, was not in place.

The sector has therefore not been able to impact the subsectors that so prominently feature in the collection and disposal requirement. A lack of standard containerization and maintenance and limited private sector interest to invest in waste reuse (composting, recycling) has impact significantly on garbage accumulation in informal dumps and litter in the former and increase volume of waste in the latter.

Other factors that negatively impact the sector has been;-

- a) limited knowledge of economic benefits from proper waste management
- b) lack of reliable information on real costs of waste management system

Owing to the fact that the institutional capacity has been limited, the community spirit and social conscience of the people has been positively brought to bear on the management of the sector. Additional work can be done to integrate health and environmental education in schools, associations and general population. In order to have public consensus on the payment for public cleansing services which has culturally has been frowned upon, increased community participation and awareness of the sector is need.

Enforcement and Legislature has been obsolete and /or uncoordinated. Improvement is needed to reduce parallelism and duplication of function amongst agencies.

Strengths

Since the mid 1990s a more serious approach has been taken to the formal arrangement and development of the coordinating agency at the National level has been commissioned which has its mandate to, amongst others:

- define environmental policy, including solid waste management items
- develop strategy for the elaboration of national policies on solid waste management and thereby
- Institute on-going action to design plans, programs and projects at the national level in the short, medium and long term.

Specific pieces of legislation for solid waste management, namely the NSWMA Act, 2001, have been defined and work has begun on accompanying regulations.

A growing presence of qualified managers in charge of solid waste sector and by extension improvements in staff upgrades and / or acquisition of highly qualified staff have seen a positive impact on the new approach to solid waste management.

The sector is trending towards privatization and technological advancement to significantly improve the service delivery directed by studies and research projects.

There is growing participation of the health and environmental authority in the approval authorization and implementation of waste projects and development of environment and health impact assessment (EHIAs) for solid waste management. Additional work is necessary however in the supervision, monitoring and control of waste management services by the health and environmental authority.

Despite all the improvements made on the limited budgetary allocation and funding, much more advancement can be made with a growing identification of economic benefits inherent to proper waste management and the existence of economic provisions backing the private sector for execution of investment and operation of waste management services.

7. RELATION OF SOLID WASTE MANAGEMENT SERVICES TO HEALTH, THE ENVIRONMENT, ECONOMIC AND SOCIAL DEVELOPMENT

7.1 Characterise the impact of solid waste management services on health and the environment

In most significant terms, improper waste disposal will result in negative impacts on both human health and the environment. The groups at risk from the improper disposal of solid waste include - the population in areas where there is no proper waste disposal method, waste workers and workers in facilities producing toxic and infectious material. Other high-risk groups include population living close to a waste disposal site whose water supply has become contaminated either due to improper waste dumping or leakage from landfill sites. Uncollected solid waste also increases risk of injury, and infection.

In particular, organic domestic waste poses a serious threat, since they ferment, creating conditions favourable to the survival and growth of microbial pathogens. Direct handling of solid waste can result in various types of infectious and chronic diseases with the waste workers and the sorters being the most vulnerable.

Co-disposal of industrial hazardous waste with municipal waste can expose people to chemical and radioactive hazards. Uncollected solid waste can also obstruct storm water runoff, resulting in the forming of stagnant water bodies that become the breeding ground of disease. Waste illegally dumped near a water source also causes contamination of the water body or the ground water source and or the food chain through which plants and animals feed.

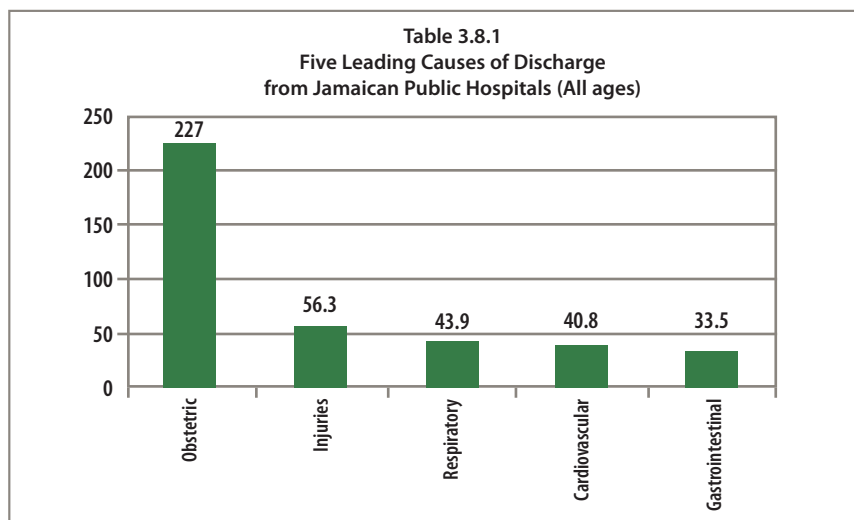
Disposal of hospital and other medical waste requires special attention since this can create major health hazards such as Hepatitis B and C. The waste generated from the hospitals, health care centres, medical laboratories, and research centres such as discarded syringe needles, bandages, swabs, plasters and other types of infectious waste are often disposed with the regular non-infectious waste and therefore pose the highest risks to workers and other waste handlers alike.

7.2 Epidemiological studies conducted to measure impact of inadequate waste management on health

There are no solid waste sectoral studies outlining the relationship of solid waste management services to health, environment, economic and social development.

However, the efforts currently made to improve the management of solid waste in Jamaica are geared to prevent further environmental degradation and to protect public health.

Table 3.8.1 shows the five leading causes of discharge from Jamaican Public Hospitals. It is expected that the improved management practices at the landfills as well as the public education campaigns which advocate for abandoning negative behaviours such as illegal dumping and burning of waste will contribute to the reduction of respiratory illnesses. The solid waste community education programme which fits into Ministry of Health and PAHO healthy community programme is working towards safe management of solid waste at the household level with expected reduction in the incidents of gastrointestinal diseases.



7.3 Occupational Health of formal and informal workers involved in collection and transportation

During the period of review and in the past much emphasis was not placed on the safety of the average municipal solid waste worker, more so the informal workers in the system. As a result much of the operating procedures, the issuance of personal protective equipment and the reporting of minor injuries were ad hoc.

It is difficult to quantify the number of injuries and maladies associated with the industry because of the lack of reporting. However, preliminary studies, now being conducted, have begun to indicate that the most common occupational hazards include sprains and strains, contusions/bruises, fractures, cuts or laceration, respiratory tract irritations and skin irritations. There were 7 fatalities for the period 1998-2000 due to accidents with the heavy equipment. Sweepers and collection crew sidemen are more susceptible to fatal accidents. Expenses incurred by Metropolitan Parks and Markets (company managing over 60% of the national municipal waste) amounted to US\$4132.48 between the years 1998 and 2000. This figure does not record amounts spent by individuals, insurance payment and cases or injuries that go un-reported.

Other occupational safety hazards include in more details:

Infections

- Skin and blood infections resulting from direct contact with waste, and from infected wounds.
- Eye and respiratory infections resulting from exposure to infected dust, especially during landfill operations.
- Different diseases that results from the bites of animals feeding on the waste.
- Intestinal infections that are transmitted by flies feeding on the waste.

Chronic diseases

- Incineration operators are at risk of chronic respiratory diseases, including cancers resulting from exposure to dust and hazardous compounds. This can also be a risk associated with landfill workers especially where there is a frequent occurrence of landfill fires

Accidents

- Bone and muscle disorders resulting from the handling of heavy containers.
- Infecting wounds resulting from contact with sharp objects.

- Poisoning and chemical burns resulting from contact with small amounts of hazardous chemical waste mixed with general waste.
- Burns and other injuries resulting from occupational accidents at waste disposal sites.
- Methane gas explosions can also result in injury at disposal site and homes in and around the area via migration of methane gas.

7.4 Analyse the equity of the services: equity, efficiency, quality, effectiveness and sustainability

Total islandwide coverage for the period under review ranges from 47.5 % to 66.25% much of that service is being provided to areas easily accessible by collection units and or areas that are well populated. Decisions related to the provision of collection services are not based on economic standings or social order. Each area is clearly analysed to determine the best logistical method to effect collection or not. The frequency per area is also based on the generation and the availability of collection units. Therefore, as it relates to equitable distribution of services it can be considered fair.

Efficiency in the provision of service is based on adequate resources and man-power usage. The collection efficiency has been identified as 75%. There are critical issues to be resolved with regards to collection of municipal waste in urban low income communities. There are considerable problems with storage capacity within the households which demand a communal storage approach. Communal storage although feasible brings a number of operational problems. A great number of Low income communities are considered squatter communities in which the road infrastructure does not allow for adequate access. Densities are generally high demanding a great number of communal containers and placing pressure on collection frequency. Also commercial waste finds its way into the communal containers exacerbating the collection frequency demands. These problems associated with poor storage capacity allow for very unsanitary conditions which create problems with flies and rodents.

Some of these urban low income communities are located at the gully (large concrete storm water drains) banks. Community members illegally dumped municipal solid waste in the gullies creating a blockage of waste and debris impeding the normal flow of storm water with its subsequent potential flooding problems. Illegal dumping of municipal waste is considered vulnerable for the solid waste sector when working towards the reduction of risks associated with natural hazards.

As outlined in Chapter 5, municipal solid waste management is financed through the property tax with subventions from Central Government. For the period in review, the property tax collection was awfully inadequate to finance the sector which seriously compromised the public private sector partnerships as there were difficulties in keeping with financial commitments made.

7.5 If possible analyse the economic value of the sector in terms of generation of work, exchange of goods and services, development of small business and recycling among others.

The solid waste sector has the potential to be an economically valuable industry both at the commercial and community level. One strategy for accomplishing this objective is to create joint ventures and other types of relationships between businesses and community based organizations.

Due to the pressing nature of solid waste the management of waste can be seen as a business development opportunity. Increased disposal costs and the development of environmental regulations over the past few years have spawned proposals and ventures related to different aspects of waste processing and recycling whether formal or informal. Many of these efforts are as a result of entrepreneurs eager to expand their operations and to create a niche in this embryonic market place.

During the 1990s and much of this review period the NSWMA has been providing technical assistance to dozens of community groups and individuals. This includes drafting reports on various means of waste recovery

and offering workshops for community groups in addition to the employment opportunities in the sector. During the period of review the sector employed on average 333 persons and contracted another 1,336 persons ranging in skills from administrative to operational. The government established contracts with community leaders/organization for the collection and sweeping in urban areas. In the rural areas individual contracts were issued by the government agencies.

The NSWMA also worked with small and large businesses that were developing products that advanced waste reduction, recycling, and scrap-based manufacturing. These services included reviewing business plans and identifying financing primarily by means of the Jamaica Promotions Corporation (JAMPRO) for the potential implementation of these investments. The sector has also attracted about US\$16 million in new investment to rehabilitate existing disposal sites and from introduce create cost recovery mechanisms not just for the Government of Jamaica but also low-income and working class communities such as Riverton (one community adjacent to the major disposal site in the island).

A vibrant informal economic regime is currently operating in the sector. It is difficult to characterize the economic benefits being accrued from these activities as it goes mainly unreported. However it can be classified into three prongs and a structure can be clearly seen from the various activities undertaken:

- a. Street sweepers
- b. Collection crews;
- c. Waste pickers/sorters

Street sweepers recover items that are usually sold at the end of each day or at a later date once sufficient quantities have been accumulated. On a good day, a sweeper can make up to the equivalent of their daily wage by only recovering glass alone.

The next tier of waste recovery lies in the customary habits of the sanitation collection crews. This type of recovery effort has grown out of reasons to supplement income and the relative ease of collecting these materials, while still on the job. Recovery efforts of the collection crew are indirectly supported by households in upper-middle income communities that pre-sort the waste into different fractions for curbside collection. Where there is communal collection bins such as skips, the crew quickly searches the waste for recoverable materials before emptying. This proves lucrative at times especially in areas where commercial enterprises or public institutions are located.

Waste picking activities are common in many developing countries, especially at disposal sites. In 1996, it was estimated that approximately 300 individuals were involved in waste picking activities at the Riverton disposal site alone. This included men, women and children who travel from outside of the Kingston Metropolitan Areas to Riverton for waste recovery activities.

Organised waste pickers work in groups of two to six persons, often specialising in recovering different material types. They have designated storage areas adjacent to the site and market their loot to larger waste dealers. Unorganised waste pickers work individually and do not specialise in any type of waste. They sell what they find at the end of each day to smaller waste dealers located close to the site and the price they receive are much lower than the organised pickers.

Similarly too, the viability of the Tourism sector in Jamaica is greatly depended on a healthy environment. The sector has been working with solid waste authorities designing programmes for the improved management of solid waste within hotel properties as well as the protection of beaches, coral reefs and recreational waters.

8. PARTICIPATORY MANAGEMENT IN SOLID WASTE MANAGEMENT

The management of Municipal Solid Waste has had a community participatory approach from the beginning of the 1980s. In urban communities leadership was sought and trained and given the responsibility for organising crews for sweeping and collection activities. All solid waste activities were carried out by community members in their own communities having great sense of ownership and accountability.

For the disposal sites, members of communities adjacent to the facilities were trained and used as spotters, security guards, waste tally operators, heavy equipment operators, etc. In the Riverton Landfill which collects over 60% of the waste generated islandwide, a community based organisation named Riverton Landfill Association was organised and given the contract for the operational activities at the disposal site.

The government has encouraged a number of NGOs and youth clubs to participate in community education and awareness programmes geared to promote adequate solid waste management practices.

With regards to recycling efforts between the government and the industrial sector (drinks manufacturers) resulted in an initiative for the processing of PET bottles. "Recycle for Life" was the name of the NGO designed to collect PET bottles and transport them to a shredding facility for further exportation for recycling. The initiative has not had the success expected as the community does not believe the price incentive given for the return of the bottles is appealing enough.

There are a number of education initiatives at the community level. Efforts have been made to involve the Citizens Associations as well as the Neighbourhood Watch groups in education campaigns highlighting the importance of Solid Waste Management. The schools as part of the Healthy School initiative have been adopting Solid Waste Management issues in the curriculum.

In Occupational Health and Safety programmes the government has provided the necessary tools and safety equipment. It has been noticed that the culture of safety in very poor and efforts are being made to implement a comprehensive occupational health and safety programme. The initial phase of this programme resulted in forty - one (41) persons employed to the Riverton Landfill being equipped with personal protective equipment at a cost of US \$5,450.00. The programme will extend to the collection and public cleansing crew and all other landfill staff islandwide on a phased basis.

Community Participation: Mobilization and Community Organization

Community participation in any solid waste management system is a key element in the decision making and implementation process. In Jamaica, efforts are made by the National Solid Waste Management Authority to involve active participation by community members in the operation and implementation of projects. At the Riverton Disposal Site —which is now being transformed into a landfill— two community facilitators were employed in order to achieve a vibrant community based organization. This organization will help to facilitate the sharing of objectives for projects and allow the concerns of the community to be addressed throughout the implementation phase.

Employment of neighbouring community members is another vital aspect of community involvement in solid waste management in Jamaica. Community members are employed in some of the most critical but vital areas of the sector. A vast proportion of the persons employed in Street Sweeping, Waste Sorting, Waste Collection, Scale House Operation and basic Landfill Operation are from Neighbouring communities.

Participation of NGOs and Other Groups of Civil Society in Waste Management

Several government, non governmental Organizations (NGOs) and donor agencies possess direct or indirect responsibilities in the improvement of the solid waste management services, environment, health and sanitation condition in Jamaica.

Although The Central Government and Local Government play a major role in managing solid waste, several small community groups, educational institutions, environmental bodies and private collectors contribute immensely to the awareness and education of the local people.

Institutions such as the University of Technology and the University the University of the West Indies have made tremendous contribution in the area of research. Environmental bodies such as Ridge to Reef and the Coastal Water Quality Improvement Project (CWIP) and Several Citizens Association throughout the Island has helped in the promotion and awareness of the solid waste management project.

Municipal Support for Community Projects

As a part of its function to "take all such steps as are necessary for the effective management of solid waste in Jamaica, the National Solid Waste Management Authority (NSWMA) has always seen it as its initiative to provide support, whether finance, information or equipment, for community projects geared towards the encouragement of proper solid waste management. Communities throughout the Island continue to benefit tremendously as funds are often provided for community clean up projects, expert advice is given as to how a particular project could bear fruitful results and waste receptacles are often times provided and later collected and disposed at the National Solid Waste Management Authority's disposal sites.

Education and Sanitary Environment Communication

In realizing the full potential of the NSWMA, a part of its mission is to promote behavioural change through public education. In accomplishing this mission, the Authority hosts numerous public education campaigns in local schools, churches and community/youth groups, to educate the nation on the most efficient and environmentally friendly manner in which to manage waste. Brochures, flyers and pamphlets are common media through which waste management information is spread across the Island.

Hygiene and Occupational Safety Programs for Staff Members of the Sector

The National Solid Waste Management Authority is currently developing a manual which seeks to address matters relating to Occupational Health and Safety. The manual is still in the draft stage and is expected to be finalized and put into operation. The manual covers critical issues such as the general environmental controls, use and care of machinery and equipment and protection against hazardous materials that might be encountered. There is also a section which speaks to basic medical and first aid that could be given in an emergency situation.

As a move to protect the employees from harmful diseases, The NSWMA undertook an all Island attempt to vaccinate all employees of the company from hepatitis A and B.

Informal Sector Workers in the Segregation and Recycling of Materials

Informal sector workers play a key role in the management of solid waste in Jamaica. They work day and night on the disposal sites to collect the recyclable materials. Some of the findings of the informal sector workers are as follows:

- They can be seen quite often around the area where waste is tipped off at the disposal site picking up waste materials for their use.
- An excellent example of segregation of waste at the landfills is provided by the informal sector workers who make a living out of discarded materials.

- It has been observed that there are various groups and individuals each taking a specific item for segregation task.
- After segregation of waste, the workers either sell recovered materials to local residents, companies that practice recycling, or they either recycle the materials themselves. At the Riverton Landfill, recovered aluminum are recycled into pots and pans and sold by these informal workers.

Presence of Children and Mothers Who Live and Work in the Garbage

Economic and social circumstances contribute largely to the high rate of Children and Mothers living and working on municipal dumps and landfills. Landfills are a sure but dangerous place where the daily needs for these individuals can be met. There are cases in developing countries where homes are constructed by mothers from pieces of cardboard and plastic, and it is there amongst the food and trash unwanted by others that children live, play and work. For most people in developed economies, the image of children living and working in garbage dumps is almost impossible to visualize.

In Jamaica the situations are similar. Men, women and children are faced with the daily risk of being run-over by landfill equipment and the deadly diseases that plague these sites so that unwanted materials can be taken and either recycled or sold to obtain income. The rate at which these individuals and families live and work on the dumps is not very high in Jamaica, but informal settlements are often times set up in close proximity to these sites.

A Three Year (3) Corporate Plan for the development of the sector is currently being developed by the National Solid Waste Management Authority and major stakeholders. This plan will cover to operations, investment, regulations and administrative arrangements and will speak to the development of the sector along the lines of divestment and greater formalization of administrative arrangements.

Future needs for investment and for institutional reorganization.

Investments and reorganizations needs are structured along these lines:

Operations

Rolling stock - that is suitable collection vehicles. Vehicles equipped with the capacity to traverse hilly terrains and unplanned settlements with limited access.

Landfills & Transfer Stations

Major investments are needed in this area to address the development of a network to complement the closure and consolidation of dumps across the island. Four to five major landfills are planned. Funds have been identified for the development of one such landfill at Riverton which is currently underway. A hazardous waste facility is also needed.

Medical Waste

Investment is needed in the development of a system to address the proper collection, handling and disposal of this waste. A preliminary investigation in the autoclave technology has begun in this regard to inform the process.

Recycling

Formal recycling systems are embryonic and serious inroads need to be made in developing systems responsive to the handling of non-biodegradable.

Reform and modernization to correct problems and increase the effectiveness and efficiency of solid waste management

Reform and modernization has centred largely on the management of disposal sites. All dumps operated by the National Solid Waste Management Agency have been upgraded to disposal sites. Further modernization will incorporate a dual strategy of the closure of inappropriate sites and the development of landfills.

Alternatives and suggestions to increase the effectiveness of solid waste management services

Arrangement of the solid waste sub-sector

- At present government plays a large role in the operation of the sub-sector. The expectations are that role will increasingly become regulatory paving the way for the private sector to assume the role of operators and service providers. This will result in the divestment of all wastesheds across the island on a phased basis.

Regulation of the services

- Work to revise the Litter Act, 1986 has begun that will result in regulations to supplement the National Solid Waste Act.
- The passage of the National Solid Waste Management Act 2001 provides for the formulation of regulations to govern services such as the haulage, disposal and recycling of waste as well as the management of litter in public places. These are likeliest to arise in the areas of investment and the provision of indirect cross subsidies to users of services
- Estimate of financial requirements to increase the coverage and quality of the services for the next 10 years. These have not been established. The current budget is 1.5 billion providing collection service coverage of 70% for fiscal year April 2003 to March, 2004.
- With better coverage, more emphasis on public education programmes and the introduction of new initiatives this annual sum is likely to be larger in the next few years. Better projections for the budget requirements for the NSWMA for the next 10 years will be ascertained during the development of the National Master Plan.