

# Managing Solid Waste in an Urban Environment Integrated Planning and Institutional Capacity Building

## TRINIDAD & TOBAGO

### **Introduction**

The 1994 Barbados Conference was particularly pointed in identifying the complex interplay of factors that contributed to the scale on which "waste management" had become a horrendous problem for SIDS. Among those factors were the shortage of land areas and resources for safe disposal of wastes, population growth, growing consumerism and the increase in imports of polluting and hazardous substances.

The price of economic and social progress was a devastating build-up of a wide range of wastes both from intensive agricultural production, effluents from manufacturing or tourist resorts and wanton disposal of a growing array of consumer items. More disturbing perhaps, was the threat to human health and a reoccurrence of communicable diseases from the inadequacies of waste disposal systems, including the disposal of human waste.

**An** understanding of the magnitude of waste management problems, with their increasing pressures on the carrying capacity of SIDS will require constant monitoring, analysis and government support. All of this requires adequate equipment, sound expertise, effective policy instruments and a conscious public committed to reduction, reuse and recycling of waste.

Against this array of forces, a determined effort to pursue improved management of waste through strategic interventions involving government, private sector and community initiatives was undertaken by a quasi-statutory agency in Trinidad and Tobago in the early 1980's: The role played by this agency has provided a significant source of knowledge and expertise which are being drawn upon to assist other countries in the Caribbean.

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## Background

The rapid economic growth of the petroleum-based economy of Trinidad and Tobago was particularly pronounced from 1974, on account of the 300% increase in oil prices by the Organisation of Petroleum Exporting Countries (OPEC). The benefits of expanding incomes were accompanied by the negative environmental costs of intensive production and consumption activities. Especially was this so because of urban population expansion, leading to a build up of solid, liquid and hazardous wastes without “the development of a cohesive environmental management strategy.”

In Trinidad and Tobago, the solid waste management systems, especially in the urban areas proved to be grossly inadequate to deal with growing population concentration and lifestyles which gave rise to increasing levels of commercial, industrial and household waste. Litter abounded in public areas creating obnoxious odours and a public health hazard.

The collection and haulage of solid waste were not well organized and the majority of the equipment stocks included vehicles which were either non-functional or in need of repair. These conditions, as well as others, impacted negatively on collection schedules.

<sup>1</sup>The development, operation and administration of disposal sites were state functions handled by the Local Government sector that had the responsibility for administration of the different counties/parishes of the country. The conditions of the facilities reflected the lack of priority given the responsibility. There were twenty-five disposal sites throughout Trinidad and Tobago and all were classified as open burning dumps. 50% were less than two acres in size and eight of the twenty-five were potentially suitable for long term use. They all exhibited adverse impacts on the environment or public health. There were no plans for the development of the sites, and equipment and manpower resources to effect changes were almost non-existent. There was the risk of fire hazards from improperly disposed wastes, and the atmosphere and waterways were also increasingly polluted from such practices.

The administrative arm of government that had the responsibility for solid waste management also had the responsibility for disposal of septage from septic tanks and cesspits. The arrangement created the condition where septage was disposed at or near to the solid waste disposal sites. It was therefore necessary to consider the solution of the solid waste problems in conjunction with the disposal of septage wastes. The waste tended to be disposed of in unlined, total retention ponds that were crudely fashioned by a mechanical

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excavator. There was little thought given to sustainability and the pits were abandoned when they could no longer retain the waste. In some cases, the pits were used beyond capacity.

### **Towards A Waste Management Plan and Strategy**

As a consequence of the alarming public health and environmental problems arising from unpreserved waste disposal, it was considered imperative that a national solution be found to the solid waste problem. In order to develop a framework for tackling the solid waste management issues in the late 1970's, a comprehensive study of the solid waste problems in the nation was undertaken. A Solid Waste Master Plan was developed from the findings.

The Plan outlined alternatives for development of a system that basically addressed the components of collection, treatment and disposal of wastes. There was also a component to address the management of hazardous wastes due to the expected growth of the heavy industrial sector. The Trinidad and Tobago Solid Waste Management Company Limited (SWMCOL) was established in 1980 by the Government of Trinidad and Tobago to implement the plan.

### **Structure and Operations**

The Board of Directors comprised personnel who had many years of experience in the sectors of health, finance, law and government administration. The Chief Executive Officer of the company was the Chairman of the Board. An Executive Chairman was considered necessary to ensure a very close relationship between the Board of Directors and the company's management. It was a special arrangement for a unique programme, aimed at creating a cohesive national institution for the management of solid waste in the country, with the long term goal of continuous improvement and development of the solid waste systems.

The basic role of SWMCOL was expected to be that of a national solid waste authority with responsibility for management of the solid waste systems in the country. SWMCOL's programmes to date in tackling solid waste management issues provide an incisive case study on initiating and developing a sustainable approach to solid waste management.

**An** innovative approach towards giving effect to the recommendations of the Solid Waste Master Plan, SWMCOL was established in November 1980 as a limited liability company. The company had the power to divide the share capital into several classes and attach rights as the company may determine by special resolution.

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The administrative framework at the inception stages of the company reflected the need to address the implementation of the Master Plan. This required a body of persons with the powers to make decisions efficiently and effectively regarding policy matters for the company, and an administrative system to support the following objectives:

- 1) The public must be challenged to care for the environment and to actively participate in and demonstrate such care.
- 2) Appropriate training must be provided for the necessary capacity building towards continuous development.
- 3) The solid waste function must be a national concern. This contrasted with the existing approach at the time, wherein Local Government County Councils were primarily responsible for overseeing waste management in their individual counties.
- 4) There must be a close working relationship with the Local Council Bodies as these were the institutions that were to be ultimately strengthened as the operational arm for the implementation of the Solid Waste Master Plan.

### **The Policy Framework of SWMCOL**

The policies to guide SWMCOL's development process were essentially addressed by :

- The centralization and co-ordination of the policy and guidelines for waste management functions e.g. operations, equipment selection, contract specifications.
- The implementation and continuous development of a Solid Waste Master Plan.
- Bringing about a change in attitude of the general public regarding litter and waste management in general.
- The training of a cadre of professionals in the field of waste management, especially solid waste management.

SWMCOL's major functions were the implementation of the recommendations of the Master Plan and the long-term development of a solid waste management system. These included:

- The immediate collection of improperly disposed wastes.
- The reorganization of the national waste collection system.

- The rationalization and development of existing disposal sites.
- The implementation of recycling programmes and facilities.
- The development of a system to manage hazardous wastes.
- The development of an intensive public education programme.

These different components of the waste management systems under the Master Plan were revisited and rationalized for implementation. Assessments were both infrastructural and managerial with a view to determining the associated risks as a basis for setting priorities.

To address the major degradation of previous years, the Solid Waste Emergency Clean-Up Programme was formulated for discrete areas. This involved:

- General and Faecal Waste Collection and Disposal.
- Management and Institutional Strengthening to the Local Councils.

### **Recycling of Paper, Glass, Metals, Plastic and Cloth**

The major sustainable waste management strategy utilised in the operations of SWMCOL was recycling of waste,

public education, awareness and training. These form the main focus of the case-study as they can be replicated elsewhere among SIDS.

The 1980 Solid Waste Master Plan took seriously into account the need for waste recovery and recycling and provided an analysis of the recycling system as it existed in Trinidad and Tobago. The major items that were being marketed were glass, metals, plastic bottles and cloth. The recycling structure was quite simple and did not carry large overheads, which allowed it to exist in a sluggish market.

A Materials Recovery Facility (MRF) was recommended for construction at the Beetham Disposal site. The project was never implemented because of the unavailability of sustainable markets for waste products, and the absence of any other incentives to invest funds in a project which provided unfavourable returns. However, as the space for landfilling became less available with time, recycling initiatives were viewed from a different perspective.

### **Paper**

In 1989, SWMCOL began a serious thrust to develop the export of waste paper. After several investigations to secure raw material and markets, the first container of waste paper was shipped in 1993. The basic activities

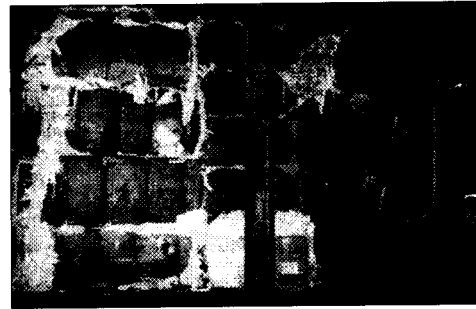
included collection of paper (not newsprint) at source from high volume waste paper generators including printers, banks, insurance companies, process plants, government ministries and schools. Today, SWMCOL's marketing representatives continue to visit prospective clients to encourage their initial involvement and to maintain continuous contact.

Special bins are provided for the storage of used paper, and these are later collected at a fee of TT\$300.00 per tonne. The company also offers shredding facilities for used paper containing confidential information. The collected paper is then separated, sorted into various grades, baled (compacted), and stored before its eventual shipment to a foreign paper mill (see Figs. 1 and 2).

Approximately 5% of the waste paper that would normally reach the landfill is recovered for recycling. Cardboard is collected primarily at landfills, and it is estimated that approximately 25% to 30% of the available waste cardboard is collected for recycling.



**Fig. 1 - Storage Facility for Baled Paper**



**Fig. 2 - Bales being readied for Shipment**

Since the commencement of the paper recycling project, there has been exponential growth in paper production which increased by 41% over the first three years, with an average export of one hundred and thirty tonnes per month in the first year. The increase for 1996 has been almost a further 40% over the 1995 production. SWMCOL currently processes two hundred and seventy to three hundred tonnes per month. Venezuela is the country's closest importer of recycled paper and it is estimated that Trinidad and Tobago export approximately three thousand tonnes to that country annually. Recycling was thereby made into an environmentally friendly economic venture.

### **Glass**

From as early as 1982, a local glass manufacturer was involved in small-scale glass recycling. However, the glass obtained from these activities was largely insufficient to satisfy raw material input. In 1989, the structure of

glass recycling initiatives underwent a significant change. In a joint venture with the local glass manufacturer Carib Glassworks Limited (CGL) and the existing salvagers, SWMCOL adopted a participatory approach in an effort to incorporate the major stakeholders into the process.

In conjunction with CGL and a community co-operative group, SWMCOL formed - from among the salvagers at the Beetham Landfill Site - the United Bottles Vendors Association (UBVA). Round-table discussions were held regarding a system for maximizing the glass recovery and recycling effort. CGL provided both training in managing a small business, as well as a vehicle to assist the UBVA with transportation.

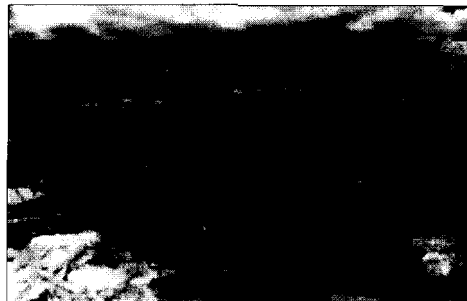
SWMCOL, as facilitator, allowed salvagers controlled access to waste known to be high in glass content, and provided site administration and infrastructure of sheds and utilities to accommodate the processing of the material (see Fig. 3). It is estimated that this initiative was responsible for a recovery rate of 20% (previously 5%) of the approximately twenty-two thousand tonnes of glass reaching the three major landfills annually. Most of this glass is recovered from the Beetham landfill.



**Fig. 3 - Recycling at the Beetham Recovery Facility**

### Plastic

In late 1993, SWMCOL also initiated a programme to collect Poly Ethyl Terephthalate (PET) from the Beetham and Forres Park landfills. The plastic was collected from the landfills and baled for shipment (see Fig. 4). However, due to a slump in world market prices for plastic, the project was discontinued. During the project the rate of production of baled PET was estimated at twenty tonnes per month. Two other private organizations were also involved in PET recycling, but have also since discontinued because of low world market prices.



**Fig. 4 - Bales of PET stored at the Beetham Recovery Facility**

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### **Other Recyclables**

The collection and processing of other recyclables such as used oil, textiles, scrap metals and compost, have never generated significant profits for SWMCOL. Used oil is collected from some industrial clients, service stations, special waste-oil depots, and visiting vessels. The oil is transported to the main oil refinery on the island where it is recycled. Although minimal, these costs of collection and transportation are recovered.

Used textiles are recovered from the landfill sites by salvagers and then washed, dried and stored in bags. The materials are then sold to larger dealers for mop making or companies in the oil industries to be stripped and reused as oil rags. SWMCOL has limited input into the arrangements, which have become community efforts at income-generation.

Ferrous scrap (i.e. iron and steel waste) is retrieved by miscellaneous collectors from both the landfill sites and external sources which include waste types such as items from dismantled buildings, or the remains of dismantled plant equipment. At the landfill site, a monthly salvage fee is paid to contracted individuals, allowing them exclusive retrieval rights. The waste is delivered to the iron and steel factory (Caribbean ISPAT) to be processed to the required specifications. Most non-

ferrous scrap metal such as copper and aluminum are retrieved at the landfill sites. These materials are easily sold by the salvagers and generate immediate profits when compared with the more steady recyclables like glass and cardboard.

### **Public Education, Awareness and Training**

The human resource element is pivotal in ensuring the success of any component of the solid waste management system. Waste generators need to be aware of their roles in eliminating indiscriminate dumping. The collectors must know the routes to be serviced and be familiar with the proper operation and maintenance of vehicles. The administrators must be clear on the integration of all the components of the system. Given the above, training programmes were organized for the field staff, line supervisors and other administrators of the Local Authorities during the implementation of the Master Plan. These training courses were formulated to address the elements of a proper collection system for solid waste and faecal wastes.

The most meaningful human resource intervention into the national solid waste collection sector was the public relations/education campaign. In Trinidad and Tobago, the responsibility for educating the public on matters

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pertaining to the environment was shared traditionally between the formal education sector, government agencies and NGOs. These organizations focused public attention on environmental education and awareness programmes that had the potential to increase public sensitivity to environmental issues, and to eventually inculcate more positive attitudes towards the environment and waste disposal.

An innovative concept to develop a human-like mascot and logo which signified litter, waste and filth was implemented for the company in the early 1980's. This was the brain child of one of the country's most creative thinkers: artist and musicologist Pat Bishop. Ms. Bishop managed this important strategy of the Solid Waste Master Plan. The name given the character was "Charlie," a name and image which became synonymous at the national level with poor waste management practices.

Places where heaps of garbage were piled, or where litter abounded, were designated as "Charlie Spots" and, similarly, anyone caught in the act of littering was labelled a "Charlie." The momentum of the "Charlie" project was sustained through television and radio programmes, children's poster contests, newsletters on matters pertaining to waste management, newspaper articles, advertising campaigns, lectures and seminars, logos, and slogans. A monthly

newsletter developed by SWMCOL and entitled "Charlie" was widely circulated in the country targeting schools, libraries, NGOs and government departments.

SWMCOL also heightened national environmental awareness by organizing a number of meetings and seminars such as a public seminar on Garbage Collection and a Litter Act Symposium. Persons who attended these meetings included government officials, persons who generate large quantities of waste, and members of the general public.

As a result of the interest shown by the public in these waste management consultations, and in order to sustain such interest, SWMCOL spearheaded the creation of "Neighborhood Action Groups" (NAGS) in communities, schools, and places of work. In the height of the project, there were over one hundred and thirty of these groups functioning throughout the country. **An** annual competition was held among these groups with the aim of converting litter-ridden "Charlie" spots into beauty spots, and subsequently maintaining these spots in good condition. The well-known slogan of this competition, and of the "Charlie" campaign in general, became "NAG Charlie Away."

The implementation of successful "Charlie" and NAG campaigns placed an enormous strain on SWMCOL's limited human and financial resources,

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and in the mid to late 1980's these campaigns were curtailed due to lack of funds. However, the stagnation of the "Charlie" and "NAG" campaigns did not mean the end of SWMCOL's public education and awareness activities which continued, albeit not on such a grand scale.

The policy of educating the public at large, and school children in particular, resulted in the establishment of an environmental education centre at the company's headquarters. The centre provided an outreach programme featuring lectures, films, slide shows and exhibitions to schools both in-house and in the field.

#### **School's Outreach Programme**

After its initial concentration on sensitizing school children to solid waste environmental issues, SWMCOL's education outreach programmes expanded its mandate to educating local communities. As indiscriminate and unlawful mini-dumps tended to proliferate in such communities, special attention was given to rural and economically marginalised communities.

Community clean-up activities which were initiated during the NAG campaign were encouraged. SWMCOL also placed litter bins at strategic locations throughout various local communities to facilitate the process of maintaining clean communities.

With SWMCOL's implementation of commercial recycling activities in 1989, public awareness activities expanded its focus to encourage the meaningful involvement of commercial and industrial sectors in solid waste management. Company marketing representatives visited these sectors to elicit their active participation in waste recycling initiatives.

In April 1996, a pilot programme on recycling was implemented in many of the nation's schools. Staff of the selected schools in east Trinidad were given lectures and literature on paper, glass and plastic recycling by SWMCOL. Special bins were also provided to the schools for the collection of recycled material. The sustainability of the pilot programme, however, was heavily dependent on teacher participation, adequate collection provision and administrative costs of follow-up visits for education. To ensure that these elements are addressed require co-ordination by a designated agency, preferably through a local government body.

#### **Building Collaborative Initiatives**

In keeping with SWMCOL's policy of networking and information sharing, the company has participated in a number of regional and international meetings. For example, the achievements of "Charlie" and "NAG"

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campaigns received acclamation beyond national boundaries. In 1985, representatives of SWMCOL participated at a conference in India which resulted in a village NAG project being started in India.

SWMCOL has also acted in an advisory capacity to Caribbean countries on matters pertaining to waste collection, disposal and environmental education. The company has hosted delegations from other islands to tour their various facilities and the delegates were given demonstrations of specialized equipment used in the collection and transport of general and faecal waste. SWMCOL representatives have also held workshops in other Caribbean islands as a means of disseminating information. For example, at a meeting in Antigua, the concept of "Charlie" and the achievements of the "Charlie" campaign became a case study in sessions held with the media and in a public meeting forum.

### **Social, Economic & Environmental Impacts from Recycling**

Recycling activities reduce the need for eventual disposal by landfilling. For example, SWMCOL noted that in its glass recycling initiative from 1989 to 1992, an annual average of approximately forty-two hundred tonnes of glass reaching the three major landfill sites were recovered and processed for recycling.

The paper recycling activity at source also creates a diversion from the sites of four hundred tonnes of waste paper per month. There are also the components of textiles, metal, and plastics from the salvaging on-site and other diversion practices off-site, e.g. from trucks stopping off on the route and selling bottles.

Recycling initiatives have caused interactions of several diverse groups. Schools, communities, industries and various social groups have become involved in recycling activities primarily as a result of the joint efforts of SWMCOL, other commercial recycling bodies and the work of environmental NGOs in public education, training and awareness.

But perhaps the social grouping which has changed most drastically as a result of the recycling initiatives is the salvaging community which originates from the Beetham community - a low income, urban community just east of Port of Spain.

The Beetham salvagers remove as many potentially valuable materials from the landfill as possible. Much of their activities also have a cultural dimension, where one generation follows in the footsteps of their parents by seeking to make a living from salvaging on the landfill.

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The potential occupational health risks of the activity and the dangers to the practitioners, their communities and the wider nation were recognized. Attempts were made to bar the salvagers entry to the site. However, this was not sustainable and strategies were put in place to streamline salvaging activities.

To bring the activity under a measure of control the following strategies were enacted:

- 1) Security forces were engaged at the site to control the lawless elements.
- 2) A system of passes was installed to distinguish those who were allowed on the sites from all others.
- 3) In concert with the private sector, groupings were identified and provided with training in business management to ensure the recycling operations were conducted in an orderly fashion.
- 4) Guidelines were established for conducting recycling on-site, especially regarding the public health aspects of the operation.

The salvaging community in the glass recycling initiative has derived financial, managerial and social benefits from their involvement in the project. The organization of the glass salvagers into

a self-managed work group (the United Bottle Vendors Association) is a form of community empowerment.

### **Observations**

### **Integrated Solid Waste Management**

Reflecting on SWMCOL's experiences, the following lessons can be derived as useful guidelines for development of integrated management planning:

1. There should be commitment from the country's public sector decision-makers to pursue and facilitate waste management strategies for cost recovery, especially tipping fees, waste segregation and waste minimization.
2. The Solid Waste Master Plan must reflect the culture of the country. Tobago needs to be considered as a separate entity.
3. The Solid Waste Master Plan should consist of free-standing projects which when taken together form an integrated system for the development of the solid waste management sector.
4. Capacity building with long-term commitment must be an integral building block of any plan.

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5. Private sector involvement in the waste management arena should be facilitated as much as possible.
  6. Any plan must consider the synergies to be derived from a regional perspective.
  7. Research, sharing of research information and the development of regional standards must be the initial priorities from the regional component of a plan.
  8. Recycling initiatives and strategies to deal with hazardous wastes should be the foremost items to be considered from a regional perspective.

It must be recognized that even though the regional perspective is desirable, if only for economy of scale, the specific requirements of individual countries must be paramount among all other considerations.

**An** integrated solid waste management plan should therefore encompass management strategies that will address all waste types and be molded to accommodate ongoing plans and indigenous conditions for the area.

### Lessons Learned

- Implementation of the Master Plan saw the conversion of dump sites to technically sound sanitary land fill facilities. This prevented leachate from degrading waste from entering into the water tables of the island, watercourses and coastal areas in proximity to waste disposal sites.
- Recycling and reuse of significant quantities of the waste stream, notably glass, paper and metals, considerably reduced the tonnage of waste contributing to the rapid conversion of limited land area.
- The many significant gains made from expenditure on environmental education and awareness through the highly successful "Charlie" and the NAG campaigns of the 1980s, were reversed in the late 1980s and beyond through myopic state budgetary practices. The expenditure needed for the "Charlie" campaign was minuscule compared to the significant environmental degradation resulting from indiscriminate waste disposal practices following the cessation of the campaign.
- Policy makers need to consider all costs including "environmental costs" into their decision-making policies.

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- Trinidad and Tobago would need to spend far greater resources to resuscitate a "Charlie-like" campaign to address the serious problems of waste related environmental degradation today than would have been necessary had the momentum of the 1980's "Charlie" campaign been allowed to continue.
  - Despite this setback, community empowerment strategies by SWMCOL and other private sector partners resulted in sustainable glass and metal recycling initiatives which continue to reduce the tonnage of waste disposal at landfill facilities while providing economic returns to communities.
  - A major concern continues to be the limited level of enforcement capability in the country with respect to implementing the Litter Act and other Laws related to the management of all categories of waste in the country.
  - Other countries can benefit significantly from both the positive strategies implemented by SWMCOL under the Solid Waste Master Plan, and from the negative experiences with respect to inadequacy of state funding for its education and public awareness efforts.

Information in this case-study has been summarised from Solid Waste Management in Trinidad and Tobago: A Case-Study prepared by the Trinidad and Tobago Solid Waste Management Company Limited, for the UNDP Caribbean Capacity 21 Project in February 1998.