

# case study

CANADA SRI LANKA MUNICIPAL COOPERATION PROGRAM

September 2007

## Waste Audit in Galle

Tackling a waste management crisis in post-tsunami Sri Lanka

### Summary

In the wake of the 2004 Southeast Asian tsunami many communities in Sri Lanka faced severe disruptions to local infrastructure. FCM staff and volunteers who visited the Galle District in November 2005 encountered a waste management crisis, as the

tsunami had blocked access to or rendered inoperable the region's landfills. As a result, garbage was left to accumulate in the streets and in front of houses, attracting vermin and creating other sanitary problems. The Canada/Sri Lanka Municipal Cooperation Program (MCP) was developed to assist in post-tsunami

recovery and reconstruction through the sharing of expertise between municipal leaders in both countries. FCM has been active in five districts of the country that were particularly hard hit by the tsunami. Although there have been initiatives in diverse areas such as local government planning, library service restoration and strategic





Waste Collectors at work

planning, and surface water drainage, waste management has been a central priority, especially in Galle district.

With funding from the Canadian International Development Agency (CIDA), FCM undertook a project to improve solid waste collection services in Galle, beginning in December 2005 with the task of waste sampling to determine what would be the most effective management strategy. Following sampling protocol outlined in the World Bank Technical Paper number 426<sup>1</sup>, which deals with designing and operating solid waste landfills in lower-income countries, the team carried out a waste audit on December 5th and 6th 2005. City contractors and waste management staff collected loads of garbage destined for the city's temporary dump site. The waste audit team consisted of supervisors and labourers from Galle's Engineering Department,

*“A waste audit provides a low-tech solution to the growing garbage crisis.”*

the city's Public Health Inspectors and 1 officer from the Association of Municipalities of Netherlands, and FCM's technical team.

The waste audit process was an ideal methodology for Galle's situation. The tsunami had led to a loss of municipal equipment and infrastructure, while also dealing a blow to the morale of the city's staff. A waste audit provides a low-tech solution to the growing garbage crisis, while taking advantage of existing infrastructure, equipment and human resources. Galle, like many Sri Lankan local authorities, operates on a small budget and therefore must allocate limited revenues in the most efficient manner. The waste audit process proved to be a useful tool for assessing the city's waste stream and determining the best course of action for improvement. Other municipalities can easily apply the techniques and lessons learned from this project.

## Introduction

The City of Galle, with a population of approximately 112,500 people, occupies a spot on the southwest tip of the island of Sri Lanka.

The population is divided into approximately 19,300 households. Prior to the FCM project, waste collection in the city's fifteen wards was done in a rather ad hoc manner, with pick-ups occurring seven days per week and all materials being taken to a temporary dump site. While city engineers had data for average daily volumes collected, there was no system in place to either weigh the waste or determine its nature and composition. Both of these sets of information are essential for the development of a waste management master plan. The waste audit activity took the first steps towards addressing this problem. The results of the waste audit are equally important for determining the ideal design and characteristics of a new long-term waste disposal site that will serve the city of Galle.

<sup>1</sup> Pugh, Michael and Philip Rushbrook, WTP426, 1999. The full document is downloadable at: <http://go.worldbank.org/AC4IF9C0T0>

## Conducting a Waste Study

### *Integrating and Enabling Local Partners*

The waste collection services project arose out of a cooperative working relationship between FCM and Ministry of Local Government and Provincial Councils of Sri Lanka. The Canada/Sri Lanka Municipal Cooperation Program (MCP) has focused on waste collection systems in the Galle region, but also works towards the related objectives of increasing public environmental awareness through education and empowering local government to create a long-term sustainability plan. Project partners helped assemble tools and equipment necessary for the waste audit activity, as well as for subsequent waste management initiatives arising from the project. As well, the City of Galle supplied tractors and trailers for the collection process and manpower for the waste audit. The waste audit team integrated local officials and labourers with FCM project officers and experts from Canadian municipalities.

## Planning and Consultations

Information on the number of loads collected per day from each ward was obtained through a meeting with the City Engineer, Public Health Inspector, Engineering Clerk and Waste Collection Overseers. During this meeting, members of the audit team reviewed the protocol, forms and terminology that would be used in the process.

Workers were instructed on the various waste categories to be sorted. They were also trained on how to properly deal with hazardous materials and



*Conducting the waste audit*

## The Collection Process and Sorting of Waste Samples

Following the recommendations of the World Bank Technical Paper number 426, the team took twelve samples, each consisting of one cubic metre (1,000 litres) of waste. Twelve of the city's fifteen waste collection wards were represented in the sampling. For measurement purposes, Galle's Engineering Department constructed a wooden box with interior dimensions of exactly one cubic metre. Tractors and trailers used in the regular waste collection process delivered loads from twelve of the city's wards, which were emptied into the box. The box was shaken to settle the contents,

which were then emptied onto a clean surface to be sorted.

The teams initially made a visual assessment of the load to determine the predominant waste type. If biodegradable food waste made up the largest proportion, it was separated first and placed into the nylon bags. For more mixed loads, workers first removed the non-biodegradable elements and sorted them into separate piles. Crews separated the waste into twenty-two distinct categories, each of which was placed in a nylon bag and weighed on a 100 kilogram scale.





A beneficiary of the program

provided with safety equipment and gloves. The supervisors distributed nylon bags, in which to collect the separated waste, and other relevant equipment such as tape measures, rakes, shovels, box cutters and clipboards to the crew.

## Results: What Forms the Bulk of Galle's Waste?

When the waste from the twelve wards had been sorted and weighed, the results were tabulated. The team generated figures for the percentages, by weight, that each category of waste contributed to the total waste stream. Biodegradable materials constituted a staggering 77 per cent of the total waste collected. Of this figure, 59 per cent was made up of food, mostly fruit and vegetable waste, while yard waste contributed the remaining 18 per cent. Additionally, most of the paper products in the waste stream, altogether comprising 5.5 per cent, were too wet to be recycled and therefore could be considered as part of the biodegradable waste suitable for composting. With this taken into

account, nearly 83 per cent of the total waste stream had the potential to be composted.

Traditional recyclable materials such as glass bottles and aluminum cans were conspicuously absent from the waste samples. In total, glass bottles made up only 1 per cent of the waste stream, and those present likely came from a commercial source rather than from a residential sources. Only six aluminum beverage cans were found in the entire sample. Residual waste, made up mostly of clothing, broken pots, toys and non-recyclable packaging, constituted less than 11 per cent of the total waste stream sampled.

The average cubic metre of waste collected weighed 263 kilograms. According to Galle's Engineering Department, an average of 66,840 cubic metres are collected and disposed of annually. By multiplying these figures the team arrived at an estimate of 17,580 tonnes of waste disposed of per year. Since they conducted the audit during the dry season actual yearly figures could be slightly higher, as the average weight of waste would be heavier in the rainy season.

With the large proportion of organic waste, the most prudent next step was to plan a backyard composting program in the city. As well, Galle Municipal Council prioritized the construction of a centralized composting facility, which could process the large amounts of biodegradable waste from public markets. The relative absence of traditional recyclables from the waste samples illustrated the success of existing recycling programs carried

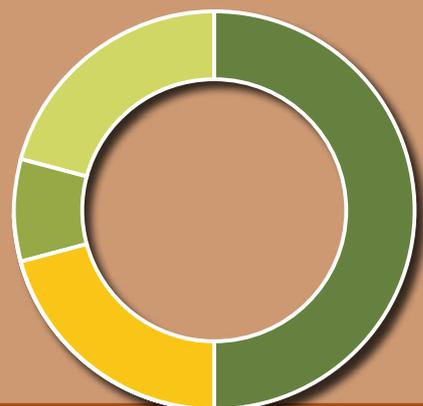
out by NGOs and private sector junk shops. The diversion of biodegradable materials from the waste stream would substantially extend the life of the proposed regional landfill currently being planned by Galle and its neighbouring communities.

## Analysis: The stage is set for Community Composting

As part of analyzing the results of the project, the team drew comparisons to similar waste audits conducted in the municipalities of San Isidro and San Pablo in Costa Rica and Olongapo in the Philippines. In general, the percentages of various types of waste were quite similar among the four cities. The particularly low levels of recyclable materials in both Galle and Olongapo were likely due to the operations of local junk shops in both municipalities. In order to ensure city-wide coverage, Olongapo instituted a bylaw to license and regulate these junk shops. A similar regulation, as part of Galle's long-term solid waste management strategy, could

### What Forms the Bulk of Galle's Waste?

- 59%** Fruit & Vegetable Waste
- 18%** Yard Waste
- 5.5%** Paper Waste
- 17.5%** Non biodegradable Waste



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potentially further reduce the number of recyclables in the waste stream.

While biodegradable food waste was prevalent in all four cities, Galle's percentage was notably highest. The likely reason for this is that food waste from fruit and vegetable markets in Olongapo, San Isidro and San Pablo is separated and utilized for livestock feed, whereas in Galle it is collected with the rest of the waste stream and disposed of in the landfill. The organic waste eventually breaks down in the landfill, however it produces odour and generates methane gas, which harms the environment. Following the example set by the village of Battagama in Galle district, the city would benefit from the establishment of a centralized composting facility. The project could be financed through the marketing of finished compost as well as through fees charged for the collection of food waste from market vendors.



*A recipient of a compost bin through the program*





'Open House Session' – The public being educated on waste management

The results of the waste auditing exercise were also important in the broad context of formulating a long-term solid waste management master plan. Since Galle did not have a weigh scale at the dump site, only volume-based figures existed for waste collection and disposal. The new estimates for annual tonnages of waste generated by the city, by individual household and by area will be useful in planning a long-term disposal site.

## Lessons Learned and Recommendations

### *Use Existing Resources and Focus on Low Cost Solutions*

The audit required a team of fewer than ten labourers, who were recruited from local municipal departments. The project team provided shovels, rakes, gloves and other minimal equipment to the workers. Galle's Engineering Department constructed the wooden box used to measure the samples, and utilized its regular waste collection vehicles for the project.

## Sri Lankan Waste Problems can be resolved by a Waste Audit

The sharing of knowledge is essential to the success of MCP projects, with lessons learned in Galle and the other four districts being disseminated to neighbouring communities and the rest of the country. The waste audit process has worked for Galle to determine the nature of their waste streams and to decide on the most effective ways to reduce levels of garbage sent to landfills.

## Formulate a Garbage Collection and Disposal Plan

The lack of a consistent collection schedule and disposal plan has confused residents, caused garbage to accumulate and consumed unnecessary fuel and resources through daily operations. The project team should work with Galle's

municipal council to develop a waste collection model. This model could examine the feasibility of converting the current tractor and trailer-based system to a more efficient one which uses compactor trucks.

## Allocate Budget and Costs

By following the example set by the village of Battagama, Galle could sell the finished compost derived from its public markets' biodegradable waste. The profits gained from this enterprise could help finance improvements to the waste collection and disposal system.

Other funding sources should also be explored. The study identified a national backyard composting initiative administered by Sri Lanka's Central Environmental Agency (CEA). It was suggested that Galle should investigate partnership opportunities with this agency in regards to possible pilot projects and eventual full-scale distribution of backyard compost bins.



Evaluation of the use of compost bins, being carried out.

*“In Galle, an ‘Open House’ approach was chosen to educate the community about waste issues.”*

### Engage the Community

This is a key step, since the sorting of waste is done at the individual household level. A public education program to educate residents about the social and environmental benefits of composting, as well as to address potential participatory barriers, could be delivered with assistance from a non-governmental or community-based organization.

In Galle, an ‘Open House’ (refer case study on the ‘open house’ concept) approach was chosen to educate the community about waste issues. A series of Open Houses was held, during which the Mayor encouraged residents to use the distributed compost bins, while also stressing the importance of cooperation to the success of Galle’s solid waste reduction strategy.

### Begin Backyard Composting

The first step in minimizing the huge volume of biodegradable food and yard waste in the collection stream would be to set up a residential backyard composting program, delivering compost bins to households throughout the city and educating residents in their usage. Many homes previously had productive gardens which were washed away by the tsunami. Backyard composting could revitalize these gardens while reducing the amount of garbage generated by households. Furthermore, compost has the potential to remove salt from land that was salinated by the disaster.

### Work with Neighbouring Communities

Considering Galle’s high proportion of organic waste, the estimated 17,500 tonnes of garbage to be hauled annually to a new regional landfill site could potentially be reduced to 3,500 tonnes. If other communities along Sri Lanka’s south-west coast, with whom Galle is developing the regional landfill, could similarly reduce their waste levels by composting, it would dramatically extend the life of the proposed landfill.



### Activities to be completed in a Waste Audit

- 1 Assemble the necessary equipment (gloves, rakes, box cutters, shovels, nylon collection bags, tape measures, pens, markers, clip boards and pre-printed forms).
- 2 Instruct the crew on how to properly handle hazardous waste, as well as how to recognize the various waste categories.
- 3 Collect between 12 and 20 samples of between 500 litres and 1,000 litres (1 m<sup>3</sup>) each. A standardized box or receptacle makes this task easier.
- 4 Empty the contents of the box onto a flat, clean surface. Visually assess the load to determine the primary waste constituents.
- 5 Sort the contents into separate nylon bags for each waste type.
- 6 Weigh each nylon bag on a 100 kg scale, subtracting the weight of the empty bag.
- 7 Record the net weight of each waste type on a pre-printed form. Percentages can then be calculated using the assembled data.

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