



JAPAN INTERNATIONAL COOPERATION AGENCY (JICA)
Ministry of Home Affairs, Provincial Councils and Local Government
Democratic Socialist Republic of Sri Lanka

**THE STUDY
ON IMPROVEMENT
OF SOLID WASTE MANAGEMENT
IN SECONDARY CITIES
IN SRI LANKA**

**ACTION PLAN FOR CHILAW
FINAL REPORT
Volume V-2A
MAIN REPORT**



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ACTION PLAN FOR CHILAW

FINAL REPORT

Volume V-2A

MAIN REPORT

DECEMBER 2003



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List of Volumes

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This is Action Plan for Chilaw, Main Report.



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In this report, the project cost is estimated using the September 2003 prices and at an exchange rate of
1 US\$ = 117.02 Japanese Yen = 95.28 Rupees

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List of Abbreviations

| | |
|--------|--|
| CDA | Community Development Assistant |
| CDO | Community Development Officer |
| CEA | Central Environmental Authority |
| CPHI | Chief Public Health Inspector |
| CUA | Chilaw Urban Area |
| DEO | Divisional Environmental Officer |
| DF/R | Draft Final Report |
| EIA | Environmental Impact Assessment |
| F/S | Feasibility Study |
| GDP | Gross Domestic Product |
| IC/R | Inception Report |
| IDP | Infectious Disease Prevention |
| IEE | Initial Environmental Examination |
| JBIC | Japan Bank for International Cooperation |
| JICA | Japan International Cooperation Agency |
| MOH | Medical Officer of Health |
| MGTP | Management Plan |
| M/M | Minutes of Meeting |
| MOHALG | Ministry of Home Affairs, Provincial Councils and Local Government |
| MSW | Municipal Solid Waste |
| MSWM | Municipal Solid Waste Management |
| NGO | Non-Governmental Organisation |
| O&M | Operation and Maintenance |
| PDM | Project Design Matrix |
| PHI | Public Health Inspector |
| POS | Public Opinion Survey |
| P/R | Progress Report |
| SLILG | Sri Lankan Institute of Local Governance |
| S/W | Scope of Work |
| SWM | Solid Waste Management |
| UCC | Urban Council Chilaw |
| WGR | Waste Generation Rate |
| WTP | Willingness to Pay |

Chapter 1 Background Conditions

1.1 Introduction

This plan was prepared by Chilaw Urban Council (UCC) by itself, with JICA's technical assistance. Any decisions in this study were made by UCC.

1.2 Basic Fact Sheet

1.0 General Data

| | |
|-----------------------------|---|
| 1.1 Province | North-Western |
| 1.2 District | Puttalam |
| 1.3 Local Authority Status | Urban Council |
| 1.4 Location | On western coast, about 80km north of Colombo |
| 1.5 Description | Two distinct areas: "mainland" and narrow coastal strip, separated from each other by a lagoon; very flat, with many low lying areas; many coconut trees. |
| 1.6 Chilaw Urban Area (CUA) | 5.17km ² (4.49km ² net land, subtracting lagoon area) |
| 1.7 No. of Council Members | 11 |

2.0 Socio-Economic Data

| | |
|----------------------------------|---|
| 2.1 Total Population (2001) | 24,105 (2002 estimate = 24,539) |
| 2.2 Daily Floating Population | 2,000 (approximate) |
| 2.3 Average Population Density | 53.7 persons per ha (2001, based on net land) |
| 2.4 Population Growth Rate | 1.8 % per year |
| 2.5 Approximate No of Households | 5,220 (2002 population divided by JICA survey result) |
| 2.6 Family Size (approximate) | 4.7 (JICA survey of 120 houses) |

3.0 Overall UCC Data

| | |
|-------------------------------------|------------|
| 3.1 Total Approved Cadre (2002) | 261 |
| 3.2 Total Budget Expenditure (2002) | 31,695,000 |

4.0 Solid Waste Management (SWM)

| | |
|---|-----------------------------|
| 4.1 Collection Amount (2002) | 11.9 T/d; 4,351 tonnes/year |
| 4.2 Budget SWM Expenditure (2002) | 10,936,000 |
| 4.3 Approved Cadre for SWM works (2002) | 77 |
| 4.4 Ratio of SWM workers to all employees | 29.5 % |
| 4.5 Ratio of SWM to total expenditure | 34.5 % |
| 4.6 SWM expenditure per capita | 446 Rs/person/year |
| 4.7 SWM expenditure per tonne waste | 2,514 Rs/T |

1.3 Natural and Social Conditions

Chilaw is the second largest town in the Puttalam district, situated on the coast, with a lagoon running through the middle of the town. It has a typical coastal climate. Almost 50% of the working population living within CUA are engaged in agriculture and fisheries activities. Many visitors come to the town for the annual Munneswaram festival in September. Land use is tabulated below.

Table 1-1: Land Use in Chilaw

| Classification | Area | Percentage |
|-----------------------------|--------|------------|
| Residential | 272.00 | 53.57 |
| Commercial | 10.68 | 2.10 |
| Public/government | 22.07 | 4.35 |
| Cemeteries | 4.60 | 0.91 |
| Industry | 1.86 | 0.37 |
| Bare land | 10.43 | 2.05 |
| Coconut cultivation | 12.35 | 2.43 |
| Shrimp farms | 8.02 | 1.58 |
| Open spaces | 15.24 | 3.00 |
| Religious | 6.82 | 1.34 |
| Wetlands | 18.05 | 3.56 |
| Roads | 37.80 | 7.45 |
| Waterbodies (mainly lagoon) | 81.00 | 15.95 |
| Barren lands | 6.80 | 1.34 |
| Total Area | 507.72 | 100.00 |

Note: Open spaces in this context is believed to cover public places.

1.4 Main Implications for SWM

The main implications of this background information on Chilaw for SWM are:

- SWM service provision should be of a high quality due to Chilaw being a relatively large town and to protect its lagoon and sea environments.
- The flat nature of Chilaw indicates that its drainage system may easily be blocked by garbage, litter and other materials, meaning that regular cleaning is required to avoid nuisance and public health problems .
- The owners of many of the low lying areas scattered throughout the town (old prawn ponds, marshy lands, etc.) are often keen or willing for UCC to dump garbage there, this being a cheap method of landfilling for them. However, before dumping at such places, consideration needs to be given to the associated possible negative environmental and social impacts.
- A lot of garden waste may be generated, due to the large number of coconut trees in Chilaw, the leaves of which are used for many purposes (e.g. roofing, fencing) and then thrown away.
- Corrosion of SWM equipment (vehicles, litter bins, etc.) is likely to be a problem due to Chilaw's proximity to the sea.

Chapter 2 Current SWM Condition

2.1 Current Waste Stream

The "waste stream" refers to the "flow" of waste from generation to final disposal. It describes and quantifies the waste generated by different sources within the scope of this Study and quantifies the amounts of waste collected, recycled and disposed of by different means. Determination of the waste stream is one of the most important tasks to be completed in the formulation of a SWM Plan. Waste stream results (2002) are summarised in this section, with additional waste stream details being given in the supporting report.

2.1.1 Waste Stream Terminology

The terms used in the waste stream model adopted for the CUA are defined below.

Table 2-1 : Waste Stream Terminology

| Term | Definition/Explanation |
|--------------------|---|
| Generation | Production of all waste at source. |
| On-site disposal | Waste is disposed of by the generator within their property, usually by burial in a pit and/or burning of the waste or sometimes incineration (e.g. hospitals). |
| On-site composting | Organic waste is composted within the property of the generator itself in order to produce a useful product - compost. |
| Discharge | Part or all of the waste generated is put out for collection either within the property of the source itself (e.g. local hotels, some institutions), outside the property (e.g. in bins or in small piles at the roadside) or at an approved collection point (e.g. concrete bins located around the town). |
| Collection | Waste discharged by a source is collected by Chilaw Urban Council (UCC) for transportation to one of the final disposal sites. |
| Disposal | Waste collected by UCC is discharged at one of the final disposal sites. |
| Recycling | Part or all of the waste generated is sold or given to an external person/shop/company, etc. for reuse or recycling. In this context, recycling generally refers to the recovery of inorganic and non-compostable waste materials, particularly plastics/polythene, paper ¹ , glass, metals and some textile scraps. Recycling may take place at source, following discharge and collection, and from the final disposal site and illegal dumps. |
| Composting | Readily biodegradable waste (e.g. food/kitchen, garden, paper wastes) is collected and then decomposed aerobically in a controlled manner at a commercial compost facility run by UCC, NGO or the private sector. Composting may be carried out in order to reduce the weight, volume, and polluting strength of waste to be subsequently placed in the landfill and/or to produce a marketable product for sale. |
| Illegal dumping | Part or all of the generated waste is dumped outside the generator's property in an area where such behaviour is prohibited (e.g. open spaces, drains, canals, etc.). |
| Composting | Readily biodegradable waste (e.g. food/kitchen, garden, paper wastes) is collected and then decomposed aerobically in a controlled manner at a commercial compost facility run by UCC, NGO or the private sector. Composting may be carried out in order to reduce the weight, volume, and polluting strength of waste to be subsequently placed in the landfill and/or to produce a marketable product for sale. |
| Illegal dumping | Part or all of the generated waste is dumped outside the generator's property in an area where such behaviour is prohibited (e.g. open spaces, drains, canals, etc.). |

¹ Many types of paper may readily be composted, while other types are only slowly biodegradable or not suitable for composting (e.g., glossy magazines).

2.1.2 Waste Sources

The main sources of municipal solid waste (MSW) considered in this Study are households, commercial enterprises, markets, institutions, industries and "other" (public spaces, road and drain/canal cleaning) wastes. Each of these sources is briefly described below.

Table 2-2 : Main Waste Generation Sources

| Source | Description |
|-----------------------------|---|
| Household | Waste generated from domestic activities, including food preparation, cleaning, fuel burning, yard sweeping, gardening and other miscellaneous household wastes (e.g. old clothing, appliances, etc.). |
| Commercial | Wastes generated by trade, service and some manufacturing enterprises, excluding markets and industries (covered separately). |
| Markets | Waste from markets selling a high proportion of vegetables, fruit, meat and/or fish (i.e. fish and vegetable markets). |
| Institutions | Wastes from schools, other educational institutes, hospitals, UCC, government offices, police, prison and religious places. Hospital waste includes some hazardous items as discussed further below. |
| Industries | Wastes from shrimp/prawn farms/hatcheries, sawmills and other industries. |
| Other | Waste from the Children's Park and Stadium (public spaces). Road/drain cleaning waste, collected by UCC labourers. |
| Construction and demolition | Wastes originating from construction, rehabilitation and demolition activities, etc. These wastes are not usually handled by UCC but are dealt with by the contractors involved. Typically, they are used as clean fill on other sites or in low-lying areas. Hence, they are not considered further in this Study. |
| Hazardous (Special) | Hazardous wastes originating from various sources, including household items (e.g. batteries, spray cans, etc.). These are described separately for each category as appropriate. The management of sharps, clinical, body parts and highly infectious wastes from hospitals is a major concern in Chilaw. |

2.1.3 Waste Generation

2.1.3.1 Waste Generation Rates

Waste generation rates (see table below) were measured or estimated from a combination of quantitative data and interview surveys. Key points are summarised here.

- The average household waste generation rate of 0.530kg/cap.d is similar to other Sri Lanka data² for urban councils (0.45-0.65kg/cap.d).
- Commercial waste generation is 3.6T/d (16.4% of MSW), with the commercial waste generation rate being moderately high (8.71kg/enterprise.d). These quantities were determined from survey data for a mixture of large and small waste generators within the commercial areas of the city, together with UCC trade licence/enterprise data. They are considered realistic, being supported by observations of business activities within UCC, the high value being attributed to the relatively high number of restaurants, local hotels³, bakeries, timber/carpentry shops and metal workshops in CUA.

² UNEP (2001), State of the Environment Sri Lanka 2001

³ Local hotels = canteens, small eating places, etc.

- Market waste generation (0.84T/d, 3.8% of MSW) is based on estimates for the fish and vegetable markets within UCC and equates to a market waste generation rate of 1.55kg/stall.d. This is considered reasonable, the waste generation rate being relatively low, as 150 “basket stalls” at the fish market are included within the market stalls total.
- Hazardous waste generation is relatively small, comprising typical everyday items (e.g. polish cans, batteries, fluorescent tubes, razor blades (hairdressers), used drugs (pharmacy), etc. which are disposed with normal garbage. However, there are two boat building enterprises within Chilaw, that produce moderate quantities of fibreglass waste.
- Significant quantities of healthcare hazardous wastes are produced by the Chilaw Base Hospital, with the other two hospitals within Chilaw producing small amounts of such wastes. Total healthcare hazardous waste generation is estimated to be approximately 0.96T/mth of clinical wastes and body parts, 0.44T/mth of placentas, 0.26T/mth of sharps and 0.034T/mth of highly infectious wastes.
- Total MSW generation is 22.0T/d, equivalent to 0.90kg/cap.d. Waste generation by source is shown in Figure 2-1.

Table 2-3: Estimated Waste Generation Quantities (2002)

| Source | Waste Generation Data | | | Waste Generation | | |
|---------------------|-----------------------|-----------------------|---------------|------------------|--------------|--------------|
| | WGR | WGR Unit | No of Units | Amount (T/d) | | % |
| Residential | 0.530 | Kg/person.d | 24,539 | 13.00 | 13.00 | 59.2 |
| Commercial | 8.71 | Kg/enterprise.d | 413 | 3.60 | 3.60 | 16.4 |
| Markets | 1.55 | Kg/stall.d | 541 | 0.84 | 0.84 | 3.8 |
| Institutions: | | | | | | |
| Schools | 0.093 | Kg/(stud+staff).d | 11,556 | 1.07 | | |
| Other education | 0.056 | Kg/(stud+staff).d | 2,107 | 0.12 | | |
| Hospitals | 0.339 | Kg/(patients+staff).d | 2,321 | 0.79 | | |
| Govt offices | 0.807 | Kg/worker.d | 898 | 0.72 | | |
| Religious | 1.01 | Kg/clergy.d | 45 | 0.05 | 2.75 | 12.5 |
| Industries: | | | | | | |
| Prawn farms | 16 | Kg/farm.d | 14 | 0.22 | | |
| Sawmills | 34.7 | Kg/worker.d | 19 | 0.66 | | |
| Other (6) | 0.20 | T/d | N/a | 0.20 | 1.08 | 4.9 |
| Other: | | | | | | |
| Parks | 0.30 | T/d | | 0.30 | | |
| Road/drain cleaning | 0.40 | T/d | | 0.40 | 0.70 | 3.2 |
| Total | 0.90 | Kg/person.d | 24,539 | 21.97 | 21.97 | 100.0 |

Notes: WGR = waste generation rate

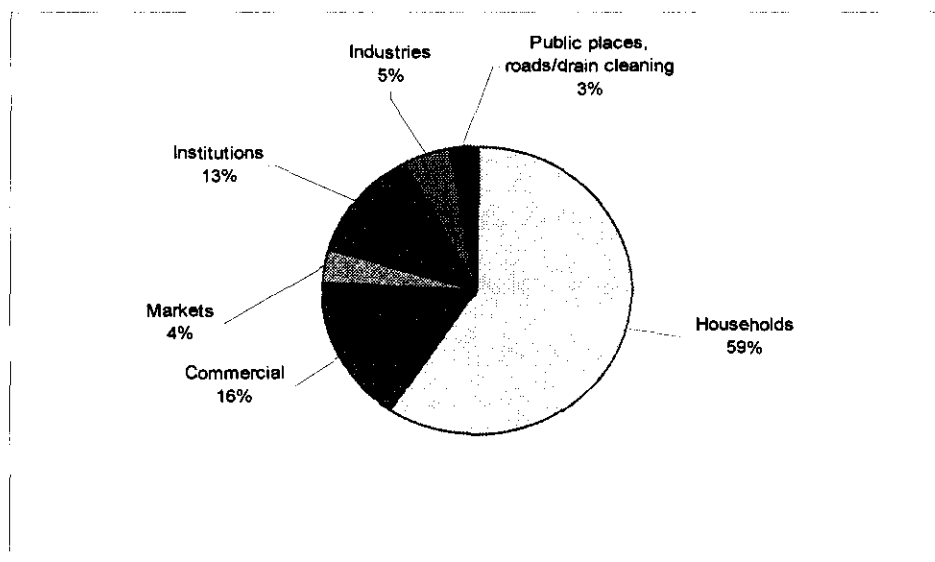


Figure 2-1: CUA Waste Generation by Source (2002)

2.1.3.2 Factors Affecting Waste Generation

The main factors affecting waste generation in Chilaw are summarised below:

- Waste generation from commercial enterprises, markets, institutions and some industries increases approximately 1-3 times during festivals (e.g. Munneswaram and Thaipongal festivals) and other special occasions (school sports meets, fairs).
- Seasonal variations, with waste generation increasing during the wet season (May-June (minor) and October-December (major)), mainly due to increased garden waste.

2.1.4 Waste Stream Breakdown

2.1.4.1 Field Investigation Results

Field investigation results on the proportions of waste being disposed of on-site, discharged for collection, directly hauled to landfill, composted on-site, recycled at source or illegally dumped are tabulated below.

Table 2-4: Waste Stream Field Investigation Results (2002)

| Source | Method (%) | Comments |
|----------------------|------------------|---|
| Households | Discharge: 45.3% | Household public opinion survey results, modified to account for an estimated 80% garbage collection service coverage in Chilaw (by population). |
| | ID: 31.5% | |
| | OSD: 22.0% | |
| | Recycling: 1.3% | |
| Commercial | Discharge: 71.1% | Most commercial waste discharged for UCC collection. |
| | OSD: 25.4% | Some commercial places burn a lot of their waste (mainly paper). |
| | Recycling: 3.4% | Limited recycling – mainly kitchen waste from some restaurants and the Chilaw Rest House used for animal feed and glass bottles plus some paper/cardboard, plastic/glass bottles/containers and metals. |
| | Compost: 0.1% | Ceylon Bank composts some kitchen waste for its own use. |
| Markets | Discharge: 96.3% | Almost all market waste is collected by UCC. |
| | Recycling: 3.7% | Minor recycling: mainly organic waste for animal feed, king coconuts, and animal parts plus some paper/cardboard. |
| Schools ² | Discharge: 44.6% | Four of six schools surveyed (75% of UCC population) discharge some (2) to all (2) of their garbage for UCC collection. |
| | OSD: 32.7% | Four of six schools burn some (3) to all (1) of their garbage on site. |
| | ID: 22.7% | Ananda College open dumps most of its waste at a nearby cemetery. |

| Source | Method (%) | Comments |
|-----------------------------------|------------------|--|
| Other Educational | OSD: 55.2% | Percentages estimated from school survey data and limited local knowledge: Vidyakara Tuition Centre burns all of its waste on-site. |
| | Discharge: 35% | |
| | ID: 9.8% | |
| Hospitals | Discharge: 91.1% | All normal garbage is collected by UCC from Chilaw Base Hospital and two smaller private hospitals (Chilaw Clinic, St Mary's Nursing Home) (for healthcare hazardous wastes – see below). |
| | OSD: 7.1% | Base hospital burns/buries healthcare hazardous wastes on-site. Small quantities of such wastes produced by the two private hospitals may either be disposed of on-site or discharged for UCC collection. |
| | Recycling: 1.8% | Some recycling by Base Hospital and Chilaw Clinic of plastic/glass bottles/containers and coconut shells. |
| Government offices | Discharge: 75.1% | Two of three offices surveyed discharge some of their garbage for UCC collection, while additional UCC data indicates the police station and prison garbage is also collected by UCC. |
| | OSD: 24.8% | Two of three offices burn/bury some (1) to all (2) of their waste on-site. |
| | Recycling: 0.1% | One office surveyed recycles some paper waste. |
| Religious places | Discharge: 80% | Not surveyed. Adopted percentages based on Kandy and Matale data. |
| | OSD: 20% | |
| Shrimp/prawn farms and hatcheries | OSD: 88.4% | Prima shrimp farm burns most of its waste on-site while recycling about 700 paper bags/month and some metal barrels. Furnishel Aqua Project takes most of its garbage off site to an unknown place (counted as illegal dumping). |
| | Recycle: 7.8% | |
| | ID: 3.8% | |
| Sawmills/timber depots | Recycling: 73.3% | Four of the five sawmills surveyed give away or sell most (1) to all (3) of their sawdust, while two burn/dispose of some of their sawdust on-site. Three use some (2) to all (1) of their woodchips on-site, while three sell some (2) to all (1) of their woodchips. |
| | OSD: 26.7% | |
| Other industries ³ | Discharge: 74.8% | Of the four other industries surveyed, three discharge some of their garbage for UCC collection, including fibreglass waste from the Neil Marine Boatyard. Bata Shoe Co waste is also collected by UCC. |
| | OSD: 20.1% | Two burn/bury some of their garbage on-site. |
| | ID: 5.0% | Justin Cooray Boat Producers illegally dumps its garbage, which includes some fibreglass waste. |
| Parks | Discharge: 100% | All park waste (Children's playground and Stadium) assumed to be collected by UCC. |
| Road/drain cleaning | Discharge: 100% | All road/drain cleanings assumed to be collected by UCC. |

Notes:

1. ID = illegal dumping, OSD = on-site disposal.
2. Carmel Girls Central College also composts a very small amount of garden waste on-site (<0.05%).
3. Some (minor) recycling by other industries, including 150kg/mth of textiles (Mid Garment Factory) and a smaller amount of metal barrels.

2.1.4.2 Recycling and Composting at Other Points of the Waste Stream

In addition to recycling at source, recycling may occur at other points of the waste stream, while some waste may be diverted for composting. The quantities of recyclable and compostable materials collected at such points were estimated as follows:

- (a) **Following discharge:** individuals (scavengers) may sift through discharged waste prior to collection, recovering items of value to them for reuse/recycling. The amount of recyclables recovered in this manner is assumed to be negligible due to the large number of individuals collecting recyclables directly from households (43% of surveyed households) and other places (i.e. at source), rather than following discharge; the widespread practice of households taking recyclable materials to shops (23% of surveyed households); and very few people observed doing this.

- (b) **During collection:** an estimated 17% of UCC workers salvage bottles and metals from the collected waste for sale. About 25kg/d of materials are believed to be recovered in this manner, based on survey interviews with 41% of UCC workers.
- (c) **At the disposal sites:** there are no UCC labourers and hence they are not involved in recycling at these places. Similarly, none of the 50 households surveyed living in close proximity to five of UCC's disposal sites in use during 2002 are involved in collecting recyclable materials or food/kitchen waste for animal feed from any of these sites. However, two of these households do allow some of their animals to graze at two disposal sites (Aluthwatta and Suduwella) on a daily basis. No scavengers from outside areas were identified during the course of this study at any of UCC's disposal sites. Hence, recycling at final disposal is considered negligible.
- (d) **From illegal dumping sites:** recycling at such places is considered negligible.
- (e) **ORDE compost plant:** around 0.81T/d of fish/vegetable market waste is taken to the ORDE compost plant by UCC for composting, based on UCC and ORDE records.

This gives a total quantity of materials recycled at places other than at source or diverted for composting of 25kg/d and 0.81T/d respectively, equivalent to 0.1% and 3.7% of total waste generation.

Some materials are taken directly to middlemen for recycling by individual collectors and UCC labourers. Based on interviews with five middlemen in the city, the total amount of materials recovered in this manner from within CUA is estimated to be 0.35T/d, which is consistent with total at source recycling (0.34T/d, excluding sawmill waste recycling of 0.48T/d).

Table 2-5: Summary of Recycling Data

| Material | No of Households (from survey of 150 houses) | | Recycling Quantities (kg/d) | |
|-----------------|---|--------------|-----------------------------|------------------------|
| | Give to individual collectors | Take to shop | During collection | Collected by middlemen |
| Paper/cardboard | 18 | 5 | 0 | 22.4 |
| Plastic | 0 | 0 | 0 | 12.4 |
| Glass | 47 | 23 | 22.8 | 59.6 |
| Metal | 11 | 0 | 2.5 | 198.7 |
| Battery cases | 0 | 0 | 0 | 58.0 |
| Total | 52 | 28 | 25.3 | 351.2 |

Notes:

1. Although 87 households are visited by individual collectors, only 52 actually give recyclable materials to these collectors.
2. Iron is by far the most common type of metal collected followed by aluminium. Some copper and brass are also collected.

2.1.4.3 Collection and Disposal Quantities

Current collection quantities have been determined from UCC records of the number of vehicle loads collected from within each zone over the seven day period: 12-18 August 2002. No JICA load count survey was undertaken at Chilaw, due to logistical difficulties associated with monitoring the large number of disposal sites used by UCC. The UCC data has been converted to tonnes, as shown in the following table, using measured vehicle capacities (m³) for handcarts, tractors and the lorry, filling factors based on JICA field observations and UCC's experience and appropriate density data.

Table 2-6: UCC SWM Vehicle Volume and Tonnage Data

| Vehicle | Volume (m ³) | Density (kg/m ³) | Fill factor (%) | Tonnage (T) |
|-----------------|--------------------------|------------------------------|-----------------|------------------------|
| Handcart (5) | 0.42 | 300 | 95 | 0.12 |
| 2WT (2) | 2.6 – 3.2 (avg = 2.9) | 246 | 80 | 0.52-0.63 (avg = 0.57) |
| 4WT Trailer (4) | 6.7 – 8.1 (avg = 7.3) | 246 | 60 | 0.99-1.19 (avg = 1.08) |
| Lorry (1) | 3.0 | 246 | 110 | 0.81 |

Notes:

1. Actual vehicle dimensions are given in the supporting report.
2. As some UCC handcarts discharge waste directly for disposal rather than transferring it to another vehicle, these handcart loads have been included in estimating the collection quantity.
3. Density data: 300kg/m³ for handcarts and 246kg/m³ for UCC tractors/lorry, based on WACS survey data for UCC collection vehicles⁴ (200kg/m³), in-situ waste density of 390kg/m³ for a large 4WT trailer (6.3m³), measured by weighbridge in Colombo in Jul-Aug 2002 and comparative data from Kandy and Matale.

The current UCC disposal quantity of 11.1T/d is less than the collection quantity, primarily due to 0.81T/d of fish/vegetable market waste being diverted to the ORDE compost facility for composting and also due to a very small quantity (25kg/d) of recyclable materials collected by UCC workers between discharge and disposal.

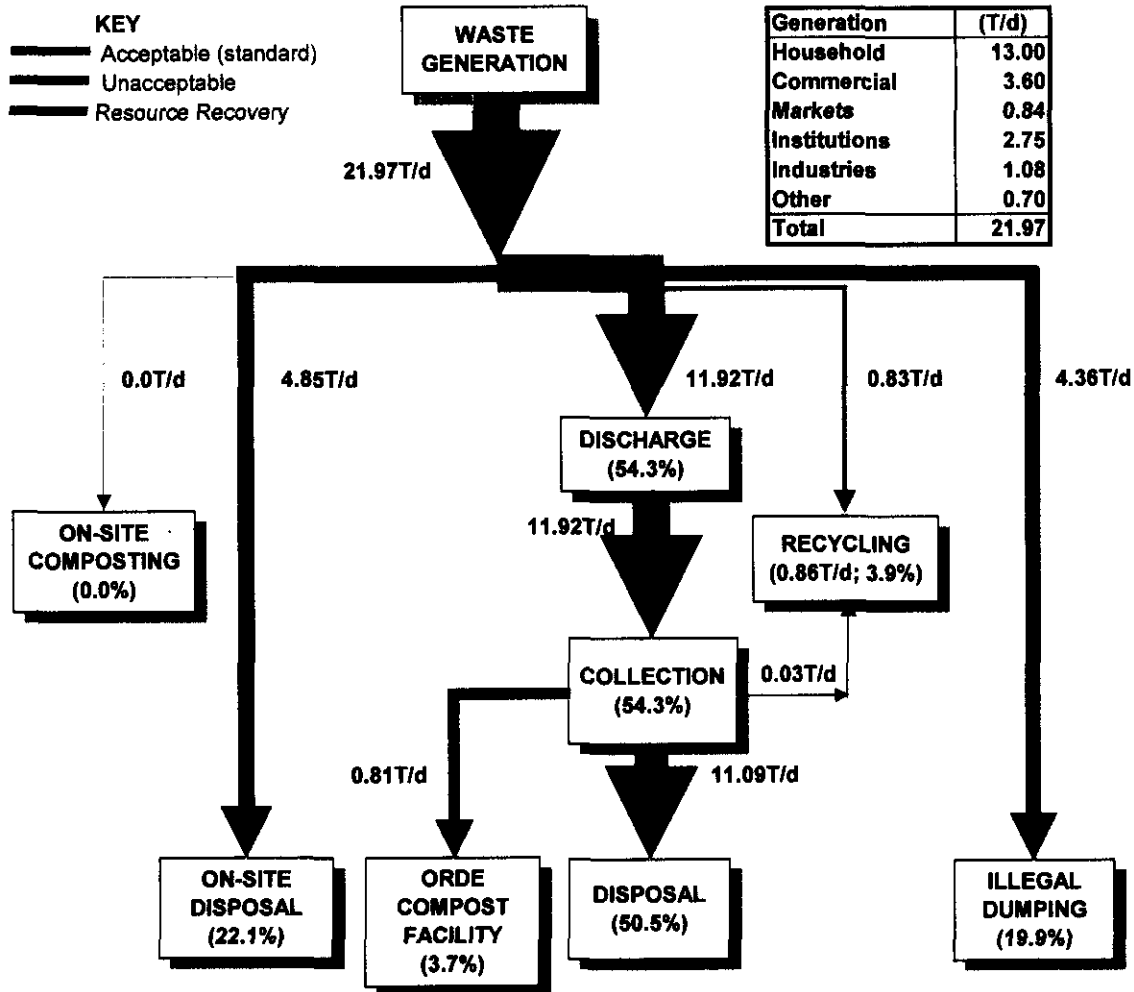
2.1.5 Waste Stream

Waste stream data for Chilaw is presented below.

Table 2-7: Waste Stream Breakdown (2002)

| Source | On-site disposal | On-site compost | Dis-charge | Recy-cling | Illegal dumping | ORDE compost | Gener-ation |
|----------------------|--------------------------------|-----------------|------------|------------|-----------------|--------------|-------------|
| Household | 2.86 | 0.00 | 5.89 | 0.16 | 4.09 | 0.00 | 13.00 |
| Commercial | 0.91 | 0.00 | 2.56 | 0.12 | 0.00 | 0.00 | 3.60 |
| Markets | 0.00 | 0.00 | 0.81 | 0.03 | 0.00 | 0.00 | 0.84 |
| Institutions: | | | | | | | |
| Schools | 0.35 | 0.00 | 0.48 | 0.00 | 0.24 | 0.00 | 1.07 |
| Other Educ. | 0.07 | 0.00 | 0.04 | 0.00 | 0.01 | 0.00 | 0.12 |
| Hospitals | 0.06 | 0.00 | 0.72 | 0.01 | 0.00 | 0.00 | 0.79 |
| Govt offices | 0.18 | 0.00 | 0.54 | 0.00 | 0.00 | 0.00 | 0.72 |
| Religious | 0.01 | 0.00 | 0.04 | 0.00 | 0.00 | 0.00 | 0.05 |
| Industries: | | | | | | | |
| Prawn farms | 0.20 | 0.00 | 0.00 | 0.02 | 0.01 | 0.00 | 0.22 |
| Sawmills | 0.18 | 0.00 | 0.00 | 0.48 | 0.00 | 0.00 | 0.66 |
| Other | 0.04 | 0.00 | 0.15 | 0.00 | 0.01 | 0.00 | 0.20 |
| Other: | | | | | | | |
| Parks | 0.00 | 0.00 | 0.30 | 0.00 | 0.00 | 0.00 | 0.30 |
| Roads/drains | 0.00 | 0.00 | 0.40 | 0.00 | 0.00 | 0.00 | 0.40 |
| Sub-total | 4.85 | 0.00 | 11.92 | 0.83 | 4.36 | 0.00 | 21.97 |
| Recycling at: | Collection and disposal | | | | | | |
| - discharge | | | -0.00 | +0.00 | | | |
| - collection | | | -0.03 | +0.03 | | | |
| - disposal sites | | | -0.00 | +0.00 | -0.00 | | |
| To ORDE | | | -0.81 | | | +0.81 | |
| Total | 4.85 | 0.00 | 11.09 | 0.86 | 4.36 | 0.81 | 21.97 |
| % | 22.1 | 0.0 | 50.5 | 3.9 | 19.9 | 3.7 | 100.0 |

⁴ The JICA survey result represents the average density of composite samples of garbage extracted from different collection vehicles over a four day period (four samples).



Notes: Percentages are relative to total generation within CUA

Figure 2-2: UCC – Current Waste Stream (2002)

The waste stream shows us:

- Most waste (12T/d, 54%) is currently discharged for collection by UCC, with 0.8T/d being taken to the ORDE compost facility and 11.1T/d to final disposal. Ideally, more waste should be diverted from final disposal in the future.
- On-site disposal is the second most common disposal method (4.9T/d; 22%). This is appropriate in some parts of Chilaw (e.g. houses with large properties, institutions, prawn farms/hatcheries, sawmills).
- Illegal dumping is also very common (4.4T/d; 20%). This should be eliminated in the future.
- Resource recovery, via recycling (0.9T/d, 4%) is significant, while on-site composting is currently negligible. These should both be further promoted in the future.

2.1.6 Breakdown of Waste Discharge Amount

The amounts of different wastes being disposed of to landfill are tabulated below. This shows:

- The amount of organic materials that can be composted is about 7.4T/d, excluding paper.
- Higher value recyclables (glass, hard plastic and metal) account for only 2.4% of the waste to disposal (0.0, 0.1 and 0.1T/d respectively), indicating almost all of these items are already being recycled.
- Lower value recyclables (paper, textiles, soft plastic), account for 11.4% of the waste to disposal, with both paper and soft plastic being present in much larger quantities (0.7 and 0.3T/d respectively), indicating the recycling rates of these items are lower. Of these materials, paper has the most (but still limited) potential for increased recycling, particularly if it can be sorted at source and collected separately. Otherwise, once mixed with other garbage, it becomes contaminated and is much more difficult and expensive to recycle.

Table 2-8: Amounts of Waste to Disposal (2002)

| Survey Items | Waste Type | Percentage | Disposal amount (T/d) |
|------------------------------------|------------------|---------------|-----------------------|
| Physical composition (wet base) | Kitchen | 36.6% | 4.1 |
| | Grass & wood | 29.7% | 3.3 |
| | Paper | 6.8% | 0.7 |
| | Textile | 1.3% | 0.1 |
| | Soft plastic | 3.1% | 0.3 |
| | Hard plastic | 1.0% | 0.1 |
| | Leather & rubber | 0.1% | 0.0 |
| | Metal | 0.8% | 0.1 |
| | Glass | 0.3% | 0.0 |
| | Ceramic & stone | 12.1% | 1.3 |
| | Others | 8.2% | 0.9 |
| | | Total | 100.0% |
| Bulk density | | 0.20 kg/litre | |

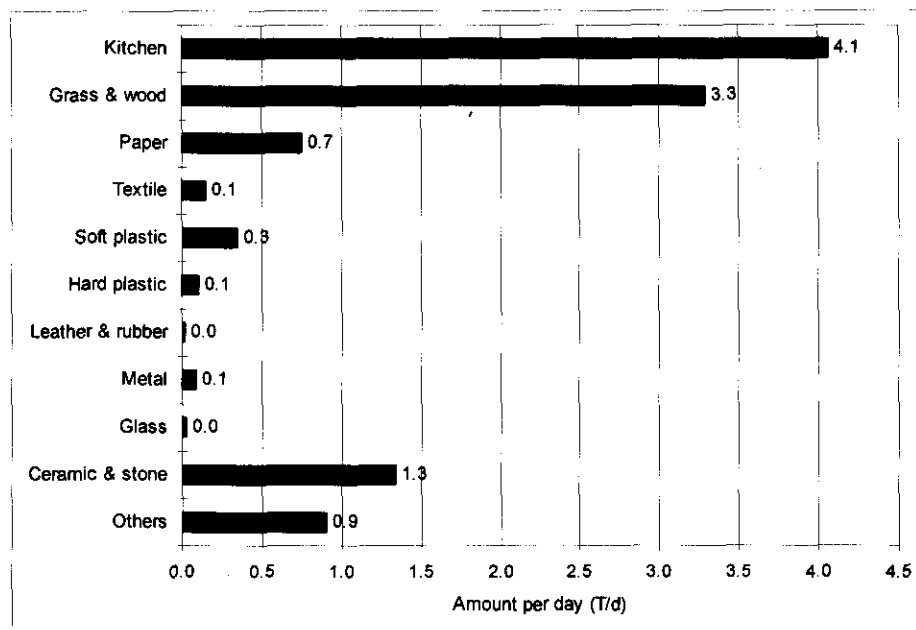


Figure 2-3: Daily Amount to Disposal (2002)

2.2 UCC Waste Management Institutional Setting

The UCC Health Department is currently responsible for waste management in Chilaw. Specific responsibilities include:

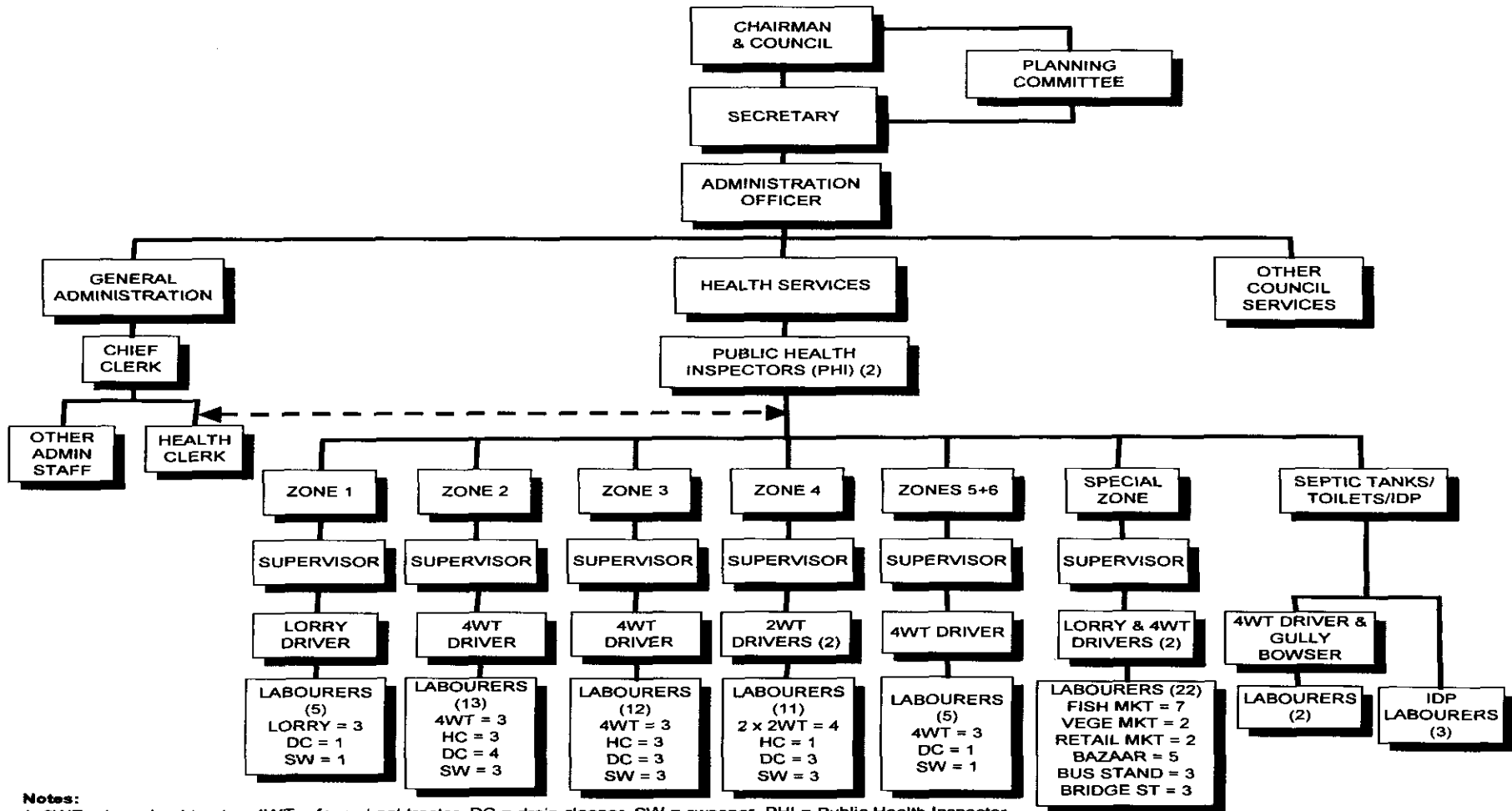
- Collection of MSW within CUA, including the planning of collection routes and daily scheduling of garbage collection vehicles.
- Transportation of the collected MSW to the ORDE compost facility and final disposal sites.
- Cleaning and garbage removal from public markets.
- Septic tank and toilet emptying services.
- Street, drain and public spaces (e.g. parks) cleaning⁵.
- Collection of any SWM fees levied for the services provided.
- Enforcement of local ordinances and national laws related to SWM.
- Implementation of policies relating to waste minimization, public education/awareness, etc.

2.2.1 Organisational Structure

The current waste management organizational structure (as of August 2002) is shown below. The Senior Public Health Inspector (SPHI) has overall responsibility for all of UCC's waste management activities, including SWM, whilst a second PHI assists him in these duties. At the next organizational level, there are six Supervisors (two permanent and four acting (promoted labourers)) each responsible for different waste management areas of the town, as set out in the following table. Beneath them, there are six drivers and 69 labourers (all permanent, excluding the four acting supervisors), who are assigned to different areas. Actual SWM labour strength is estimated to be 64, as five of these 69 labourers are typically assigned to other duties (one driver, two parks and two office workers). There is also one Health Clerk. UCC's allocated cadre for labourers is 77.

The Planning Committee serves as an advisory committee to the Council, dealing with all health issues, including SWM. UCC staff on this committee comprise the Chairman (committee chair), Secretary, Environment Officer (committee secretary), Community Development Officer, SPHI, Works Supervisor, Revenue Officer and ORDE Secretary. Meetings are normally held monthly.

⁵ Drain and street cleaning comes under Infectious Disease Prevention (IDP) Services.



Notes:

- 1. 2WT = two wheel tractor, 4WT = four wheel tractor, DC = drain cleaner, SW = sweeper, PHI = Public Health Inspector
- 2. Special zone uses a lorry and 4WT and associated drivers from other zones for garbage transportation to disposal.
- 3. The gully bowser uses a four wheel tractor and associated driver from either the Health or Works sections, when in operation.

Figure 2-4: UCC Waste Management Organisational Chart

Table 2-9: UCC – Breakdown of Waste Management Staff and Equipment

| Area | PHI | Supervisors | Drivers | Labourers | | Collection Points | | Hand-carts | Vehicles | Public Toilets |
|---------------------------|--|-------------|----------------------|--|-------------|-------------------|-----------|------------|---|---------------------------|
| | | | | Tasks | No | Permanent | Temporary | | | |
| Zone 1 | 2 PHIs cover all these areas between them. | 1 | 1 | 3 lorry, 1DC, 1SW | 5 | 4 | 9 | 0 | 1 x lorry | 1 |
| Zone 2 | | 1 | 1 | 3 Tr, 3HC, 4DC, 3SW | 13 | 6 | 9 | 2 | 1 x 4WT (+1 stationary trailer, mainly for Special zone) | 1 |
| Zone 3 | | 1 | 1 | 3Tr, 3HC, 3DC, 3SW | 12 | 1 | 12 | 2 | 1 x 4WT | 1 |
| Zone 4 | | 1 | 2 | 4Tr, 1HC, 3DC, 3SW | 11 | 1 | 15 | 1 | 2 x 2WT | 1 |
| Zone 5 & 6 | | 1 | 1 | 3Tr, 1DC, 1SW | 5 | 2 | 1 | 0 | 1 x 4WT | |
| Special | | 1 | 2 (from other zones) | 7 fish mkt 2 vege mkt 2 retail mkt 5 bazaar 3 bus stand 3 Bridge St | 22 | 1 | 1 | 2 (shared) | 1 x lorry (am) 1 x 4WT (pm) (borrowed from other zones) | 1 (fish market - disused) |
| Septic tanks/ Toilets/IDP | | 0 | 0 | 2GB 3 mosquito control | 5 | N/a | N/a | | 1 x GB | |
| Disposal sites | 0 | 0 | | 0 | N/a | N/a | 0 | None | | |
| UCC Total | 2 | 6 (note 2) | 6 (note 3) | | 73 (note 3) | 15 | 47 | 5 | 1 x lorry, 3 x 4WT 2 x 2WT, 1 x GB | 4 |
| Allocated cadre | | | | | 77 | | | | | |

Notes:

1. DC = drain cleaner, PHI = Public Health Inspector, SW = sweeper, GB = gully bowser, Tr = tractor, 2WT = two wheel tractor, 4WT = four wheel tractor.
2. The six supervisors includes two permanent (Chief Overseer and one supervisor) and four labourers (permanent staff) promoted to acting supervisors.
3. The 73 labourers includes the four labourers acting as temporary supervisors. It also includes five labourers assigned to other tasks: (1 driver and 4 for Sathutu Uyana (park and office). Hence, the actual labour strength is 73 - 4 - 5 = 64.
4. All labourers are permanent, with casual labourers only being used when permanent labourers are absent.
5. Two handcarts are used within the special zone, being shared between different areas.

2.2.2 Waste Management Equipment

Current waste management vehicle and supporting equipment details are shown in the following two tables, together with estimated vehicle lifetimes, based on practical experience of UCC staff.

Table 2-10: Waste Management Vehicle Fleet and Supporting Equipment

| Vehicles/ equipment | No | Use | Estimated Life (yrs) |
|---------------------------|----|---|----------------------|
| Handcarts | 5 | SWM collection, road and drain cleaning | 3-5 |
| Two wheel tractor | 2 | SWM collection | 15-20 |
| Four wheel tractors (4WT) | 5 | 3 – SWM 2 – Works (road construction/ maintenance) | 15-20 |
| 4WT Trailers | 6 | 4 – SWM 2 – Works (road construction/maintenance) | 8-10 |
| ELF 350 lorry | 1 | Mainly SWM, but also various other tasks. | 10-20 |
| Gully bowser | 1 | Septic tank/public toilets emptying | 10-12 |
| Water bowser | 1 | Water delivery | 10-12 |

Table 2-11 : Vehicle Labourer and Equipment Details

| Vehicle/Task | Labourers | Equipment |
|------------------|-------------|--|
| Handcart | 1-2 per HC | Rake, 1-2 small baskets, 1-2 ekel brooms (1 if one labourer, 2 if two labourers) |
| 2WT | 2 per 2WT | Mamoti (hoe), rake, shovel, 2 small baskets, ekel broom |
| 4WT | 3 per 4WT | Rake, fork, shovel, 1-2 baskets |
| Lorry | 3 per lorry | Rake, fork, shovel, 2 baskets |
| Sweepers | 11 | Ekel broom |
| Drain cleaners | 12 | Shovel, rake, 1-2 brushes, gumboots |
| Fish market | 7 | 4 baskets, 4 ekel brooms, shovel, rake, wheelbarrow |
| Vegetable market | 2 | 3 baskets, rake, shovel, 2 brushes |
| Retail market | 2 | 2 baskets, rake, shovel, wheelbarrow |
| Bazaar | 5 | 3 rakes, fork, 3 shovels |
| Bus stand | 3 | 2 baskets |
| Bridge St | 3 | 2 baskets |

Notes:

1. Gumboots are only provided to drain cleaners.
2. Gloves are provided to labourers (4 sets/year), but very few wear them, as they say they are too uncomfortable.
3. Two sets of uniforms are provided each year to labourers - khaki shirt/shorts for men and white saris for women.

2.2.3 UCC Waste Management Services Labour Force and Equipment

2.2.3.1 SWM (Garbage) Collection

UCC's collection labour force and equipment comprises:

- Five handcarts, two 2WTs (two wheel tractors), three 4WTs (four wheel tractors) and one ELF350 lorry.
- Six Supervisors, six drivers and 64 permanent labourers, of whom 90% are tamil and 10% sinhala. Some casual labourers are available to work when permanent labourers are absent.

2.2.3.2 Markets

Garbage collection and cleaning of Chilaw's three public markets (fish, vegetable and retail markets) is administered by the Health Department, with there being one Supervisor (Special Zone Supervisor) and 11 labourers employed for this purpose during the day and evening shifts. Market waste is generally collected by a four wheel tractor from one of the other zones.

2.2.3.3 Street and Drain Cleaning

Street and drain cleaning are normally undertaken by designated labourers, with 11 and 12 labourers being assigned to sweeping and drain cleaning duties respectively in the different zones, as shown in the previous figure. Normally, the actual number of drain cleaners is considerably less than this, with some zones only being assigned drain cleaners for part of a day or some days per week, rather than daily.

2.2.3.4 Septic Tank, Toilet Emptying and IDP Services

These services include:

- The management and maintenance of public toilets.
- The provision of gully sucker services within Chilaw and to some areas outside CUA on request.
- Mosquito control (spraying).

The septic tank/toilet emptying/IDP services equipment and labour force comprises:

- Four public toilets. There is an additional toilet at the fish market but this is not in use, as it needs repairing and it has no water supply.
- One gully bowser.
- Two labourers. As the gully bowser has been out of service for most of the last 12 months, these labourers are believed to have been assigned to other tasks.
- Three labourers for mosquito control (spraying)

Three of the public toilets are cleaned and maintained by a private contractor, while the retail market toilet is cleaned by UCC.

2.2.4 SWM Costs

UCC's 2002 budget costs, tabulated below, show that 35% of UCC's budgeted expenditure was allocated to SWM. This is mainly due to the high number of UCC employees engaged in SWM works (30% of total). These results are comparable with other Councils covered by this study, with SWM expenditure accounting for an average of 22.0% (range = 13-35%) of local authority budgeted expenditure and SWM workers an average of 29% (range = 22-37%) of all Council workers, by cadre.

Table 2-12: UCC Budget SWM Costs and Employees (2002)

| Item | SWM | UCC Total | SWM as % of Total |
|---------------------------------|------------|------------|-------------------|
| Budget Expenditure (million Rs) | 10,936,000 | 31,695,000 | 34.5 |
| UCC Employees (by cadre) | 77 | 261 | 29.5 |

2.2.5 Waste Collection/Disposal Fees

Only Neil Fernando and Co (boatyard, Rediwella) pays for garbage collection (350Rs/mth fee).

Residents are supposed to pay 100Rs/load for garden waste collection. Most people do not follow this system, as only about 25 people paid this fee over a 12 month period in 2001-02. Instead, they simply discharge their garden waste outside their properties and/or rely on political favours to get it collected.

No gully bowser revenue was earned over a 12 month period in 2001-02, as the gully bowser was out of service for most of this time.

It is worth noting that informal payments to garbage collection workers are relatively common and include:

- 24% of 120 households surveyed pay an average of 85Rs/yr “small allowance” or 75Rs/yr “reward”.
- 6 of 39 commercial/industrial and institutional places surveyed pay an average of 720Rs/yr (range = 100-2,000Rs/yr).

2.2.6 SWM Bylaws

Standard Sri Lankan SWM by-laws are in place, most of which are very old and out-of-date. By-law enforcement is generally poor with many people following illegal practices⁶.

2.2.7 UCC Workshop

UCC has no vehicle repair or workshop facilities. Hence, when a vehicle needs repairing, a tender notice is issued requesting quotations for the required work. At least three quotations must be obtained, with the approval process varying according to the value of the works. The UCC Secretary can approve repairs up to 2,000Rs in value, the chairman can approve repairs up to 10,000Rs, while any repairs over 10,000Rs must be approved by the Council. Generally, the lowest bidder is chosen to undertake the required works. The tender process typically takes about two weeks⁷, while most repairs take around two weeks to complete resulting in vehicles generally being out of service for one month, by the time the repairs are completed.

UCC estimate that about 70% of total vehicle maintenance/repair expenditure is spent on the maintenance of SWM vehicles.

2.3 SWM System Components

2.3.1 Discharge, Collection and Transportation

2.3.1.1 SWM Collection Zones

Chilaw is divided into six zones for SWM, sweeping and drain cleaning purposes. In addition, there is a special zone, comprising parts of Zones 2, 4 and 6, which covers the commercial centre of the town. Important characteristics of these zones are summarised in the supporting report. Field investigations and discussions with SWM staff indicated that the UCC garbage collection service covers ~75-85% of Chilaw on a population basis. An average service coverage of 80% has been adopted for this study.

⁶ However, several court cases have recently been filed against some commercial enterprises in the town centre for throwing their garbage into roadside drains. This has resulted in some improvements in garbage discharge behaviour in this area.

2.3.1.2 UCC SWM Discharge System

Most waste generators discharge their mixed garbage by one of the following methods:

- At the roadside for primary collection by handcart followed by transfer to one of around 15 permanent rectangular concrete bins located around the town or a stationary trailer parked near the town centre.
- Directly to these concrete bins/collection points.
- At the road side. About 47 temporary collection points have been identified where there is no bin, *but which are used by residents and other waste generators for garbage discharge.*

Often the garbage is discharged directly onto the ground or into the concrete bin, although some residents do use plastic bags or dustbins. A small number of residents and some commercial/industrial enterprises give their garbage directly to the collection vehicle while some commercial/industrial enterprises may have it collected directly from their premises. More details on various garbage discharge methods are given in the supporting report.

These practices result in lots of scattered garbage and mini-dumps, creating poor sanitary conditions, due to animals - goats, cows, cats and dogs – looking amongst the garbage for food. Some bins have even been partially demolished by nearby residents.

Large amounts of garden waste are produced in the city, and are typically discharged illegally at community collection points or at the roadside for subsequent collection by UCC. This includes a high proportion of coconut palm thatching⁸, particularly from zones 5-6 and some other low income areas within Chilaw. Often, garden waste is burnt at such places, while building waste is also commonly present.

Many drains are full of or blocked with garbage, causing nuisance and health problems.

These observations show that there is an urgent need to improve the current discharge system.

2.3.1.3 UCC SWM Collection System

a. Collection System

Garbage is collected from these informal and formal collection points and directly from the discharger, as set out in the supporting report. The collection frequency ranges from daily (e.g. main roads, commercial area, some residential areas) to alternate days (e.g. Melpura, Seda Uyana lanes, Wattawana Rd and Medawatta areas).

Most of the collection vehicle labourers use polysacks for loading garbage, rather than the baskets provided by UCC. The polysack is spread on the ground, with garbage being placed on top of it by one

⁷ Experience from other councils suggests that the tender/approval process may take considerably longer than two weeks, when the repair works must be approved by the Council (i.e. >10,000Rs).

⁸ This is used for roofing and fencing purposes and requires periodic replacement.

labourer using a rake or fork, following which two other labourers lift the sack and throw its load into the vehicle.

Garbage collection by vehicle is difficult in some low income and densely populated areas (e.g. parts of Zone 1) due to the access roads being narrow, shops blocking the roads, etc.

Time and motion studies, undertaken by JICA for a tractor in August 2001, found that it took the tractor 3h 43min to complete one round, while loading made up 73% of the total round time.

b. UCC Collection Vehicle Unit Costs

UCC collection vehicle unit costs were calculated for handcarts, tractors and the lorry using actual trips (Aug 8-14, 2002) and cost data supplied by UCC, supplemented by data from other sources where necessary. These costs are illustrated below (details in supporting report).

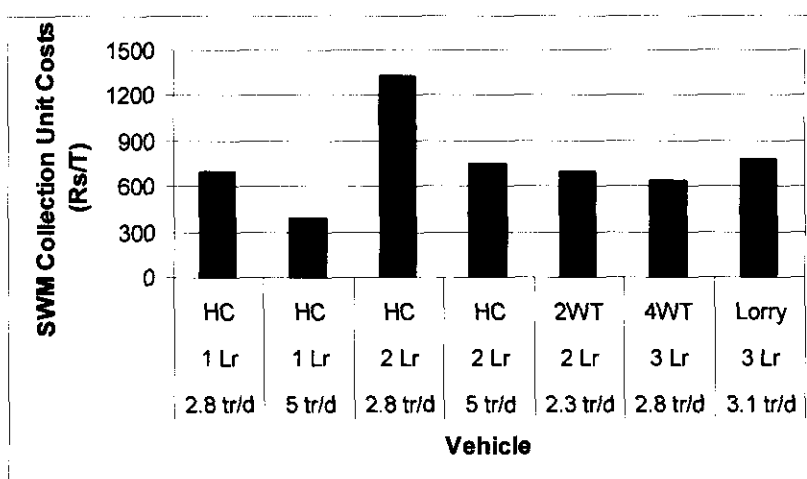


Figure 2-5: UCC Garbage Collection Vehicles – Current Unit Costs

This data shows:

- According to UCC, handcarts transferring their loads to the stationary trailer are able to do an average of five trips/d. In this case, handcart unit costs are reasonable (391Rs/T) when operated by one labourer but become high with two labourers (749Rs/T).
- According to UCC, handcarts taking their loads directly to disposal are able to do an average of 2.8 trips/d, in which case the unit costs are high for one labourer (689Rs/T) and very high for two labourers (1,322Rs/T).
- Tractor/lorry unit costs are similar, with four wheel tractor costs being lowest (629Rs/T), while lorry unit costs are highest (772Rs/T), this being due to the four wheel tractor having a bigger capacity than the lorry (1.08T/load compared with 0.81T/load). In relative terms, tractor and lorry unit costs are considered high, based on data from other study towns.

c. Assessment

The present garbage collection system involves a lot of wasted effort. For example, some handcarts used for primary collection, discharge their loads of garbage at collection points, from where they are loaded into collection vehicles. Similarly, tractor labourers spend a lot of time loading garbage discharged on the ground or into public bins into vehicles. Many of the public bins are poorly designed. This system results in garbage being double handled and loading taking a long time.

Another major problem is that the collection vehicles are getting old (average age: 2WT = 8yrs, lorry = 12 years old, 4WT = 6yrs; trailer = 5.2years) and often breakdown.

Repairs take a long time.

The high costs indicate there is considerable potential for reducing handcart, tractor and lorry unit costs by decreasing the number of labourers, increasing the number of daily trips, and improving the collection efficiency.

2.3.2 Processing and Treatment

The ORDE⁹ compost facility was constructed at a total cost of 1.85M Rs with a grant from the Ministry of the Environment. It is located at Munneswaram, 2-3km outside Chilaw and began operation in June 2001. Details of this facility are set out in the supporting report, with key points summarised here.

It is designed to handle around 10 tractor loads/day of Chilaw's MSW (about 4T/d of compostable materials). However, it has operated at below full capacity for about 50% of its lifetime. For example, when surveyed in July-August 2002, it was composting around 0.81T/d of Chilaw's MSW.

The compost facility is benefiting Chilaw and the environment in a number of ways:

- It is saving UCC time and money by composting a significant amount of organic wastes and disposing of the associated rejects by burning on-site, thus reducing the amount of waste to final disposal.
- It is producing a useful product from waste – compost, which is of a high quality.
- It is creating jobs, through employing people at the compost facility, and generating income, through the sale of compost.

In addition, most residents living close to the compost facility¹⁰ are happy, there being few complaints about flies, odour, etc. while residents talked about the benefits of the compost facility – taking their waste for disposal, providing jobs and making compost available to them for sale.

These findings show that ORDE is a vital part of Chilaw's present SWM system. However, it has struggled to survive since beginning operation and is facing several major problems:

⁹ Organisation for Resource Development and Environment, an NGO.

¹⁰ JICA survey of 20 residents living near the compost facility in September 2002.

- Difficulties in selling their compost. ORDE's sale price is 8Rs/kg (including 20% discount) but they are competing for customers with chemical based fertilizers (e.g. urea = 14Rs/kg (formerly 7Rs/kg until subsidy recently removed)), coir based compost (6.5Rs/kg), cow dung/straw (1.33Rs/kg) and chicken manure (1.25Rs/kg).
- Difficulties in generating enough income to cover their costs. For example, over Jan-Jun 2002, their monthly deficit (income less expenditure) ranged from 8,400 to 22,500Rs/month. This situation is believed to have improved since then, but financial viability remains an issue.
- Pre-sorting is expensive and time consuming. ORDE receives mixed waste and it takes 3-4 labourers around 3-4h to sort one tractor load of waste into compostable and non-compostable materials. This equates to a sorting cost of about 350Rs/load.
- It does not receive any financial assistance from local or central government while UCC does not pay any "gate fee" to ORDE for taking its waste.
- Disposal of reject waste materials (about 125kg/load) is a problem. Currently, these are burnt and/or landfilled on-site.

In January 2003, ORDE signed an agreement with Nature Care Lanka, which transfers ownership of the compost facility to Nature Care over a 12 month period. This has resulted in the injection of some much needed cash into the operation, with Nature Care covering operating costs, while they are actively pursuing new markets for ORDE's compost (e.g. sale to farmers in Kalpitiya at a subsidised rate for organic farming, export market). However, a lot of work is still required to turn ORDE into a sustainable operation.

2.3.3 Final Disposal

UCC does not have their own permanent landfill site. Instead, they use several different sites, mainly within CUA for final disposal. Generally, these are on private land and include abandoned prawn ponds, old coconut factory ponds and low lying land that is subject to flooding. In most cases, the land owner requests UCC to dump garbage on their land, so as to fill it in or raise the ground level. No UCC labourers are stationed at any of these sites and UCC does not apply any soil cover¹¹ or take any other environmental protection measures. Hence, many nearby residents suffer from odour, pest, birds and sometimes smoke problems, while large volumes of leachate may be generated during the rainy season, which enter the groundwater, lagoon or sea.

Currently (August 2003), UCC is using around two sites in the Wattakaliya area for disposal of waste not taken to the ORDE compost facility.

¹¹ Some landowners sometimes apply soil cover themselves.

2.4 Resource Recovery

Resource recovery is relatively common, with there being a strong informal recycling sector operating within Chilaw, as summarised below.

Table 2-13: Summary of Resource Recovery Initiatives in Chilaw

| Sector | Comments |
|-----------------------------|---|
| Reuse | Many shops and micro-enterprises selling items for re-use (e.g. shoes, bicycles, umbrellas, paper bags, etc.). |
| Recycling at source | Very common. 73% of 120 surveyed households are visited by someone to collect/buy their reusable/recyclable materials (but only 43% actually give these items), while 23% take some reusable/recyclable items to shops for refund/sale. |
| Recycling by SWM Labourers | <ul style="list-style-type: none"> 17% of UCC workers involved. Collect 25kg/d of glass bottles and metal. Earn "tea money" (50-100 Rs/labourer.mth). |
| Recycling at disposal sites | Negligible - no UCC workers, nearby residents or outsiders are known to be involved. |
| Middlemen | Interview surveys held with 5 middlemen shops found: <ul style="list-style-type: none"> Established businesses: four over 10yrs old; one new. Creating jobs: employ at least 25 people. Recycling wastes: 0.68T/d, 52% from within CUA (0.35T/d). Generating income: purchases (280,000Rs/mth) vs sales of 364,000Rs/mth. Mainly buy high value recyclables: newspaper/exercise books, glass bottles, sacks and plastic containers for reuse; metals, broken glass and battery cases for recycling. Main problems: shortage of recyclables > high land/building rental costs > problems obtaining credit. |
| ORDE Compost facility | Previously described. |

Refer supporting report for further details.

2.5 Social Aspects

2.5.1 Household Surveys and Interviews

2.5.1.1 Household Public Opinion Survey Results

A public opinion survey was conducted in late July 2002 within CUA in order to prepare a basic socio-economic profile of Chilaw's residents and to gain an appreciation of public attitudes towards the current provision of SWM services, desired improvements to these services and their willingness to pay for improved services. The survey covered 120 households, comprising forty households each from three high income (Korayawatta, Bridge Street and Kuruduwatta), two middle income (Aluthwatta, Sedawatta II) and two low income (Sedawatta I, Kurusapaduwa) areas.

84% of the surveyed population are Sinhalese, 5% Muslim and 11% Tamil. Data on the average number of people per household and monthly income is set out below.

Table 2-14: General Household Data

| Item | Low income | Middle income | High income | Overall |
|---|------------|---------------|-------------|---------|
| Average number of people per household | 5.0 | 4.9 | 4.2 | 4.7 |
| Average monthly household income (Rs/household) | 4,436 | 13,113 | 22,840 | 13,496 |
| Average monthly income (Rs/person) | 593 | 2,662 | 5,430 | 2,871 |
| Average monthly expenditure (Rs/person) | 917 | 2,061 | 3,926 | 2,218 |

The survey results show a considerable difference in both income and expenditure between different income groups, with the figures for low income households being very low. Note that quite a few low income households earn their living by fishing, which is a seasonal trade.

Key survey results related to SWM are summarized here:

- 95% of surveyed households are provided with a garbage collection service by UCC, of whom 68%¹² stated they use this service. 20 (25%) of surveyed households using the service are very satisfied with present SWM service provision, while 45 (56%) households are somewhat satisfied. Area-wise data shows slightly less satisfaction in middle income areas compared with other income areas. The overall satisfaction rate is about average, when compared with other towns/cities surveyed in this study.

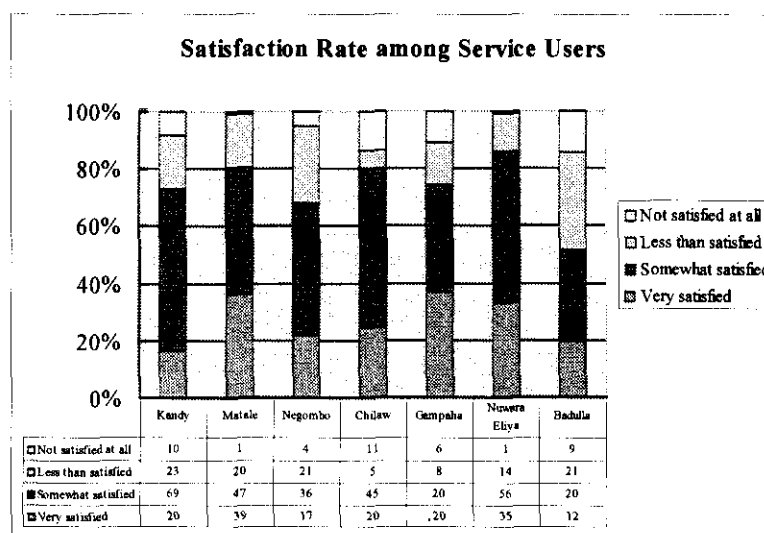


Figure 2-6: Waste Collection Service Users' Satisfaction Rate

- The most common reason given for dissatisfaction was that the garbage collection frequency is too low, followed by garbage collection not being properly done. This seems surprising as UCC collects garbage quite often: 21% (25) of surveyed households receive the UCC collection service daily, 19% (23) more than four times per week and 23% (27) two to three times per week. However, 41% (49) of surveyed households discharge their garbage as soon as it is generated or daily, implying that dissatisfaction may be due to people expecting a more regular garbage collection service than now and explaining the large amount of discarded waste present on many streets within Chilaw.

¹² Does not quite tally with "main waste discharge" method data, due to some people saying they use the UCC service but then later saying they open dump their waste outside their premises.

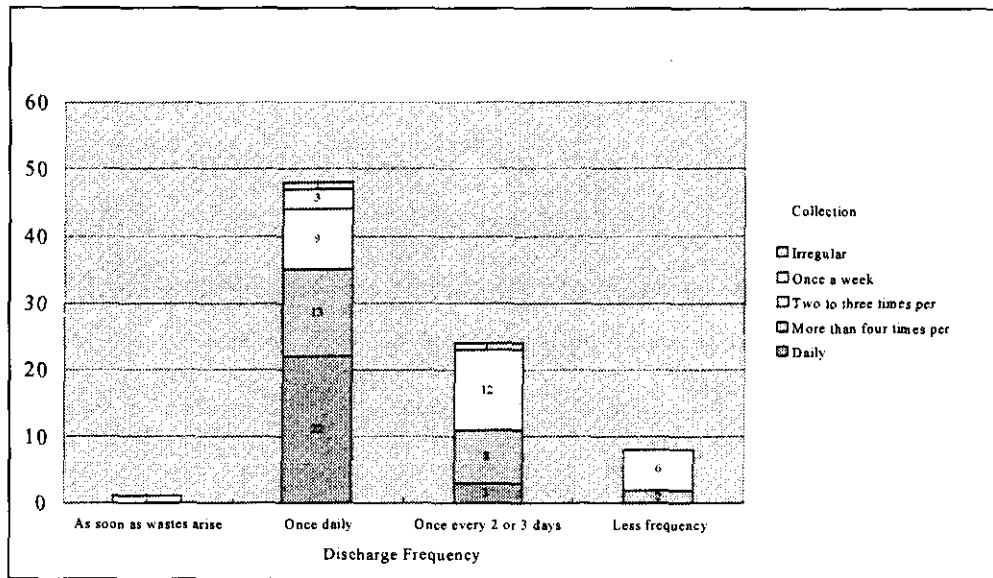


Figure 2-7: Discharge – Collection Gap

- Households’ main waste discharge methods are shown below. 70 (59%) households use the UCC collection service, with 45 (38%) discharging garbage outside their properties for house to house collection, this being the most popular discharge method, and 25 (21%) households carrying it to a specified collection point. 16 (13%) households dispose of their waste by burning or burying it within their premises, while 30 (25%) households illegally dump their waste outside of their houses, mainly from the low income group and mainly into the sea.

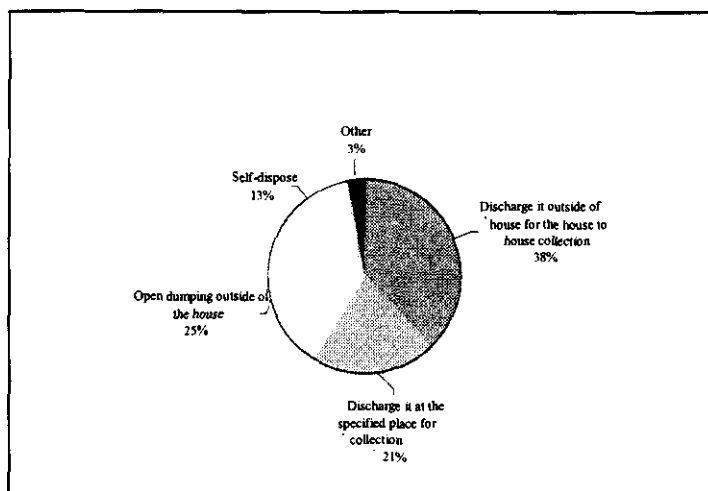


Figure 2-8: Common Waste Discharge Methods

- In general, adult female members handle waste in 87% of the sample households.
- Almost 90% of surveyed households are willing to cooperate with source separation for recycling. However, about 73% of surveyed households¹³ are called on by someone who comes to collect their reusable or recyclable materials (mainly glass, paper and iron). Hence, an informal recycling system is already very active.

¹³ This figure is lower than that of Kandy, Matale and Nuwara Eliya, but higher than Negombo.

- Only 16 households (13%) have ever discussed proper garbage discharge methods at the community level.
- Over 90% of surveyed households appreciated the necessity for SWM awareness programmes.
- The average WTP (willingness to pay) for improved SWM services is 90Rs/month per household.

2.5.1.2 Findings from Community Awareness Meetings

From August 2002, a series of community awareness meetings were held approximately every Wednesday to present the findings of this study and obtain ideas and feedback from the public regarding SWM services. Key discussion points from meetings held on 8th and 28th August 2002 in Suduwella and Malpura respectively are summarised here in order to gain a deeper appreciation of the public's attitude towards SWM service provision¹⁴.

Each of these communities are willing to cooperate in improving the SWM situation in Chilaw. The "bell collection" system, introduced at the meetings as a possible improvement measure, was well liked by most participants. However, although collection two to three times per week is enough for some participants, others strongly prefer daily collection. Both communities appreciate the necessity of improving people's discharge behaviour. Community-based supervision of people's discharge behaviour by establishing special neighbourhood groups was recommended at the meeting in Suduwella.

These meetings were well organized by UCC staff, with active participation from the audience.

2.5.2 Commercial/Industrial and Institutional Survey Results

Interview surveys were conducted with 39 commercial/industrial and institutional places within CUA during July-August 2002. Key survey results are summarised below.

- 32 (82%) places are provided with a garbage collection service by UCC. 30 (77%) use this service, 21 (70%) of whom are satisfied with it. The main reasons for dissatisfaction relate to the discharge system being poor, the collection/sweeping frequency is too low, collection/sweeping is not done properly or is irregular, or the collection point is too far away. The Base Hospital is also concerned about the handling and disposal of hazardous healthcare wastes.
- The four most desired improvements to garbage collection and disposal are an improved discharge system, followed by public education, a shorter distance to the collection point and an improved garbage collection frequency.
- Seven (18%) places supported the introduction of an individual garbage collection fee, while 23 (59%) enterprises indicated an average WTP of 596Rs/mth (range = 20 to 3,000Rs/mth).
- 38 (97%) places believe recycling is necessary, with 35 (90%) enterprises being very willing to cooperate in separating their garbage at source.

¹⁴ Refer supporting report for more detailed information.

- Four (10%) places are willing to undertake on-site composting, while two are doing so already. However, the majority (33, 85%) of places are not in favour, mainly due to a lack of space on site (16) and it taking too much time (7).
- 39 (100%) enterprises consider a campaign to raise peoples' awareness for maintaining a cleaner city and environment is either very necessary (38) or somewhat necessary (1).

The most common additional comments relate to widespread support for recycling (12), the need for public education/awareness raising (6), reducing polythene use (3), improving the present SWM system (3) and installing new or easily accessible bins (3).

2.5.3 Attitudes of Cleansing Workers

2.5.3.1 Present UCC Cleansing Works Labour Force

As of October 2002, there were 64 permanent and 31 casual cleansing workers in UCC. Of these, 91% are Tamil, 1% Muslim and 8% Sinhalese, while 65% are male.

These workers are controlled by one overseer and five head labourers called "Kanganis", meaning supervisor in Tamil. The overseer is officially categorized as a Health Supervisor (Saukiya Paripalaka), while four of the Kanganis are registered as labourers and one as other clerical staff. All of the Kanganis used to be labourers and still receive the same salary as a labourer.¹⁵

2.5.3.2 Findings from the Waste Collection Workers Survey

A questionnaire survey was conducted among 30 UCC cleansing workers during early August 2002, in order to obtain a basic socio-economic profile of these workers and an appreciation of their working conditions. Analysis of the survey data shows:

- 80% of the sample population is Tamil, 3% Muslim and 17% Sinhalese.
- The average number of members per household is 5.3 persons.
- The average monthly income is 8,699Rs per household and 1,641Rs per person. This is higher than the average low income figure, but less than the average middle income figure found in the household public opinion survey.
- The average number of years of work is 14.1 years.
- Either the mother or father of 67% of surveyed workers also worked as a cleansing worker.
- Difficulties and dissatisfaction with their work are as follows.
 - First: Heavier workload due to the improper discharge of waste by people
 - Second: Insufficient wage
 - Third: Not enough tools for collection work
 - Fourth: Unsanitary waste such as human waste is mixed with other waste
 - Fifth: Lack of protective clothing such as gloves, boots, etc.

Sixth: Health problems

Among these six issues, the first, third and fourth ones seem to be genuine difficulties directly affecting their work. Addressing these issues may help to improve SWM service provision.

- When work related difficulties arise, 66% of them first talk to the supervisor and 23% to the kanganis. Only 5% of them directly talk to the PHI.

These results show that UCC waste collection work is both historically and now still dominated by Tamil labourers as their traditional work with little change in their working conditions. This is similar to the situation in both Kandy and Matale.

2.5.4 Awareness Programmes and Environmental Education

UCC Health section staff and the Divisional Environmental Officer (DEO) stationed at UCC currently play vital roles in carrying out awareness programmes on environmental issues and solid waste problems in collaboration with the community, NGOs and schools.

2.5.4.1 Involvement of Chilaw Urban Council

The organisational structure of UCC's Health section (excluding SWM details) is shown below.

UCC's community-based activities have focused mainly on health activities such as Dengue fever awareness campaigns and have been conducted by a small number of health section personnel, who are quite competent, under the SPHI. UCC also have one DEO¹⁶, who is involved in organising school environmental education programmes, described further below. She has also initiated an Environmental Committee based on CEA guidelines, which has held approximately monthly meetings since February 2000. Participants include the Chairman of UCC, the PHI, the DEO, the CDO, council members, school teachers and children, representatives of NGOs and Grama Niladhari officers¹⁷.

¹⁵ Applications for promotion to a Kangan position were called once, with any workers being eligible to apply. The UC Chairman selected the new kanganis.

¹⁶ Divisional Environmental Officer assigned to them by the Central Environmental Authority (CEA) in February 2000.

¹⁷ Grassroots' level administrative officer.

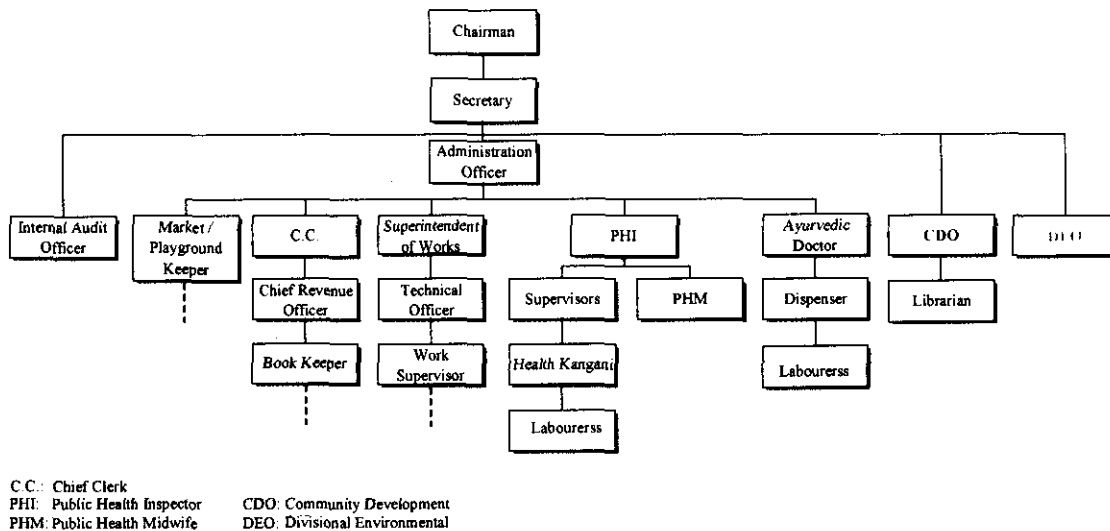


Figure 2-9: UCC Organisational Chart (excluding SWM)

Although UCC only have a small range of community-based activities, due to limited personnel, relevant officers¹⁸ work closely and effectively together. This was witnessed by the Study team through its involvement in an Environmental Committee meeting (24 July, 2002) and a series of community-based meetings on SWM arranged by the SPHI and DEO. These demonstrated UCC’s ability to organize effective and workable community-based awareness programmes.

2.5.4.2 Involvement of NGOs and Other Organizations¹⁹

UCC has limited experience of working with NGOs on SWM awareness programmes, other than its involvement with ORDE through their composting facility.

There is another NGO, the Small Fishers Federation, which has a lot of experience of working with fishing communities to improve their living conditions and is also involved in lagoon conservation.

2.5.4.3 School Environmental Education Programmes

Environmental education programmes have been developed by the CEA since its establishment in 1980. CEA has introduced two nationwide school programmes, namely the "Environmental Pioneer Brigade (EPB)" programme for secondary schools in 1984 and "Eco Clubs" for primary schools in 2001, with the DEOs playing an active role in promoting these programmes.

At present, all seven 7 secondary schools in Chilaw have participated in EPB programmes, and two primary schools have participated in Eco Clubs, with Vijaya Vidyalaya, Nazriya Muslim College, St. Mary’s Boys’ College and Carmel Girls’ College being relatively active.

¹⁸ Relevant officers means mainly the SPHI and DEO. UCC has one Community Development Officer (CDO), who currently only looks after libraries and pre-schools.

¹⁹ For more detailed information on ORDE and the Small Fishers Federation, refer to the supporting report.

The CEA has also appointed "Commissioners", by selecting some teachers to be Environmental Commissioners in each district and Assistant Environment Commissioners in each division. In Chilaw, the District Environmental Commissioner is Ms. Deepani Priyangika from Vijaya Vidyalaya.

This experience and resources (both schools and teachers) should be fully utilised for any future environmental educational programs focusing on SWM.

Chapter 3 Assessment of the Current SWM Condition

3.1 Healthy Aspects

3.1.1 Good Performance by UCC in Some Areas

UCC's SWM performance is good in a number of areas, including:

- Reasonable SWM "service coverage" of 75-85%.
- Most household users are somewhat or very satisfied (81%) with the UCC collection service.
- Active environmental committee and public education/awareness programme.
- A keenness to improve!

3.1.2 Resource Recovery is Working Well

Many resource recovery initiatives are currently operating within Chilaw, most of which are based on traditional values/approaches and represent important social capital. These include:

- "Aparade" is in common use, but requires promotion.
- Many people involved in reuse activities (e.g. shoe repairs, umbrella repairs, etc.).
- An excellent traditional recycling system, involving households and other waste generators, individual collectors (Bothal pathara karaya) and middlemen. Most high value recyclables (metals, glass bottles, plastic containers and some paper/cardboard) are recovered via this system, leaving primarily low value recyclables in the garbage taken for final disposal.
- Some organic wastes are collected for animal feed.
- The ORDE composting facility is processing around 0.81T/d of Chilaw's waste (Jul-Aug 2002 data), but has capacity to process up to about 4T/d of compostable materials.
- There is a large scrap iron recycling factory (Bhuwalka), located at Suduwella outside Chilaw, which recycles 2,200T/month of scrap iron from all over Sri Lanka.

These initiatives should be supported while additional measures should be implemented to further promote waste minimisation.

3.2 Problems

3.2.1 Very Serious Problems

3.2.1.1 Institutional and Organisational Strengthening Urgently Needed

The main institutional and organisational issues related to SWM within Chilaw are:

- Current SWM management structure does not reflect the significance of SWM within UCC. It should be much stronger, with more authority being given to the responsible people and adequate human, facilities and financial resources allocated for SWM works because many UCC staff are engaged in SWM works, while UCC spends a lot of its budget on SWM (e.g. 2002 budget: 77 (30%) UCC staff working in SWM by cadre; 10.9M Rs allocated to SWM (35% of total budget)).

- Shortage of senior staff dedicated to SWM works, while the inter-disciplinary nature of SWM makes it difficult for one person to handle SWM alone.
- A lack of short, medium and long term development plans.
- Poor labourer performance and high absenteeism, with around 50 out of 77 labourers being present each day, resulting in a shortage of labourers to undertake the required works. Some labourers suffer from poor health, some take long tea breaks during work hours, finish work early and/or work under the influence of alcohol. This results in a shortage of labourers to undertake the required works. The relatively close relationship between supervisors and labourers (refer collection worker survey) suggests that improved supervision is the key to improving labourers' work efficiency.
- Poor public-LA relations, characterised by a lack of clear instructions to the public detailing citizens' responsibilities, waste discharge rules, fines, etc.; weak enforcement of bylaws; and political intervention. Existing by-laws need to be strengthened and vigorously enforced.
- High SWM expenditure.
- Difficulties in finding out how much money is actually spent on SWM and the SWM cost breakdown (e.g. administration, collection, disposal, etc.)

3.2.1.2 Inadequate Final Disposal

Proper final disposal is the most important component, required to establish the reliability of SWM works. UCC use many different sites for final disposal, generally on private land and with very limited lifetimes, ranging from 6 months to 3 years. No environmental protection measures are taken at any sites, other than the provision of soil cover by some private land owners from time to time. This has resulted in environmental and public nuisance problems including odour, pests, smoke, leachate, etc., with nearby residents being particularly badly affected. UCC needs to change this system, finding and developing a proper landfill site with sufficient capacity to satisfy UCC's needs for 10-20 years.

3.2.1.3 Improvements to Technical System Needed

Current waste discharge and storage is characterised by:

- A lack of public cooperation with many people discharging garbage in any container or none, at any time and any place, resulting in lots of garbage discharged at the roadside, or at public collection points, causing waste scattering and creating mini-dumps.
- Many animals (goats, dogs, etc.) search for food amongst the garbage, creating poor sanitary conditions.
- Many public bins are poorly designed, being difficult to empty.
- Lots of garden and building waste is discharged at the roadside, including coconut palm thatching. Often, the garden waste is burnt.
- Many drains are full of or blocked with garbage, causing nuisance or health problems.
- The lagoon and sea, valuable assets for Chilaw, are being damaged by illegal dumping, especially in zones 5 and 6.

The establishment of a proper discharge and storage system is vital.

In addition, collection and transportation is inefficient and unreliable, being characterised by many collection points, double handling of garbage and long loading times and vehicle breakdowns and repair delays. These problems need to be overcome so that UCC can provide an efficient garbage collection service that is on time and to schedule.

3.2.2 Serious Problems

3.2.2.1 Supporting ORDE Composting Facility

The main objectives of any processing/treatment technology are to reduce the final amount of waste to disposal. Chilaw currently sends between 3-10 trailer loads of garbage per day to the ORDE composting facility at Munneswaram. ORDE is providing a service of great benefit to Chilaw and is producing good quality compost. However, it faces a number of problems, including:

- Difficulties selling their compost, leading to financial problems.
- Pre-sorting of the mixed waste received by ORDE is time consuming and expensive. In particular, small quantities of hospital hazardous wastes and razor blades from salons must be removed.
- Difficulties in disposing of rejects.
- No financial assistance from local or central government.

These problems need to be addressed, particularly strengthening ORDE's financial viability. Otherwise, it may collapse, which will result in UCC having to send all its collected waste to disposal.

3.2.2.2 Increase Public Cooperation through Education/Awareness

Presently, public cooperation with UCC in SWM activities is poor, with many people still discharging their garbage and litter to public places. UCC is partly to blame for this, primarily due to the collection service being unreliable.

Household surveys/interviews conducted during this study indicate that Chilaw's citizens are willing to cooperate with UCC in SWM. They have also realized the importance of public awareness raising and many people are keen on beautifying the town.

Responses from the commercial/institutional and industrial enterprises survey show that there is considerable room for improvement in SWM service provision to these sectors, with stakeholders being willing to cooperate with UCC in this regard, with quite a lot of places indicating a willingness to pay a garbage collection fee.

These observations suggest that immediate education/awareness programmes conducted in cooperation with schools and other parties should be highly effective both to increase peoples' understanding of the SWM issues facing Chilaw and to encourage public participation in SWM.

3.2.3 Less Serious Problems

Less serious problems are listed below.

- Poor design of the four wheel tractor trailer, resulting in only 60% of its capacity being utilised.
- Poor design of many of the public garbage collection bins, including the fish and vegetable market bin and stationary trailer transfer point.
- The retail market does not have a bin. Currently, retail market garbage is discharged near the roadside, partially obstructing an accessway, which is used for delivering meat and chickens to the market several times each day.
- Poor equipment quality. In particular, the handcarts have wheels made of metal rims with wooden spokes, rather than tyres, which are difficult to push.
- Inefficient system for ordering diesel, equipment and repairing vehicles.
- Waste scattering from collection vehicles during transit.
- No vehicle trip recording system at any of the final disposal sites.
- Difficulties encountered by middlemen in obtaining sufficient materials for recycling and high land/building and utilities operational costs, together with a general lack of support to the recycling sector from central government.
- Poor collection, transportation and disposal of hazardous healthcare waste, particularly from the Base Hospital.
- Difficulties in cleaning the many open concrete drains in CUA, partly due to a perceived shortage of labour for this task and the nature of some of the drains, making manual cleaning difficult. The so-called "Malaria drain" is the most difficult to clean and is believed to be heavily silted.

Chapter 4 SWM Improvement Pilot Project

4.1 Rationale

Assessment of the current SWM situation revealed many serious problems facing SWM in Chilaw. The Chairman and several staff members have shown great interest and cooperation in the study and are keen to address these problems. However, UCC lacks the necessary knowledge, equipment and resources to tackle some problems. Hence, it was considered appropriate to conduct a broad range of SWM pilot improvement projects within Chilaw, creating a good model for other urban councils to follow.

4.2 Objectives

An outline of the pilot projects and their main objectives is given below.

Table 4-1: Outline of Pilot Projects

| Item | Components | Objectives |
|-----------------------------------|--|---|
| General | As below | Capacity development of UCC staff |
| Managerial Capacity Strengthening | Assistance in preparing SWM by-laws Assistance in implementing various SWM management tools (control board, monthly report, SWM manual) PHI/Supervisor training Provision of transportation facilities for SWM supervision and public promotion activities Preparation of 10 year SWM Action Plan | Capacity development of UCC staff |
| Waste Collection improvement | Introduction of bell collection Introduction of stationary trailer collection Installation of a waste transfer station Installation of litter bins in public places and schools Public education/awareness | Improvement of current garbage discharge, storage, collection and transportation system Increased public awareness and cooperation |
| Environmental education | Construction of Environmental Education Centre (EEC) Procurement of educational equipment Production of environmental education materials Preparation of environmental education action plan Counterparts training in equipment utilisation and education material production (e.g. banners, leaflets) Use and operation of EEC and on-site education | Capacity development of UCC staff for implementing a sustainable environmental education programme Design and verification of effective education approaches and materials Increased public awareness and cooperation |

4.3 Description

4.3.1 Managerial Capacity Strengthening

4.3.1.1 Assistance in SWM By-law Preparation

UCC have prepared their own SWM bylaws which were approved by the Council and submitted to the Provincial Council for their approval in Jan/Feb 2003.

Copies of the draft model SWM by-laws, prepared by the Sri Lankan Institute of Local Governance (SLILG) in cooperation with JICA, were given to UCC in May 2003, while the Study Team obtained a

copy of UCC's own bylaws at the same time. Both sets of by-laws were reviewed by each party, there being some common items as well as items unique to each set of by-laws. UCC decided that it would like to continue the process of ratifying its own by-laws and forwarded a copy of their by-laws to SLILG for their consideration.

However, as of September 2003, UCC had not yet received any feedback on its by-laws from the Provincial Council. Hence, UCC intends to recall their draft bylaws, get them translated into English and Tamil and resubmit them to the Provincial Council. They will also meet with the Minister of Local Government to convince him of the necessity for these bylaws and that they are consistent with Sri Lankan law. These two steps should help to speed up the approval process. UCC hopes to implement these bylaws during 2004.

4.3.1.2 Implementation of SWM Management Tools

Three tools have been introduced to UCC for improving SWM management, comprising:

- **Monthly report:** This is divided into two parts – a daily report form for each month and a summary report for each year. All relevant SWM information should be recorded in this report on a daily or monthly basis as appropriate, with it then being used to monitor SWM performance, assess progress against targets and identify required actions to address issues that arise. A draft monthly report was given to UCC, which was then adapted to fit their requirements. This has been partially filled in since May 2003.
- **Control board:** The control board is basically a large white board (up to 5' x 7' in size) with a large scale digitized map of UCC on it. Relevant SWM information should be recorded and updated regularly on the board such as collection zones; collection vehicle routes and frequencies; locations of public garbage bins, stationary trailers, litter bins, large waste generators, public noticeboards, problem areas, etc. The control board format was designed with input from UCC, printed commercially and then mounted on a wall in the PHI's office. This should be in use from October 2003.
- **SWM Manual:** The SWM Manual is an Operations tool that outlines necessary SWM works required to be undertaken on a daily, weekly, monthly and annual basis, together with who is responsible for doing such works. It also explains how to use the monthly report and control board, including some suggestions on how to collect the necessary data. A standard format has been provided to UCC which they can then adapt to suit their particular circumstances.

4.3.1.3 PHI/Supervisor Training

PHI/Supervisor training was conducted for UCC PHIs and supervisors, as summarised below.

Table 4-2: PHI/Supervisor Training Summary

| Date | Attendees (no) | Presentation | Topics |
|-------|----------------|-----------------------------|--|
| 8 Mar | 7 | Introduction to SWM | Why SWM? (main objectives) Current SWM sanitation conditions in Sri Lanka (discharge and storage) Health and environmental risks associated with SWM Final disposal in Sri Lanka SWM planning data (waste generation, composition, waste stream, converting loads to tonnes) |
| | | SWM – Challenges for Change | SWM – a changing field Reducing waste scattering (discharge rule, litter bins, etc.) Improving garbage collection efficiency Reducing SWM costs |
| 7 Aug | 6 | Human Resource Training | PHI/supervisor as part of an organisation, part of a team and with an individual job/role Important Phi/supervisor skills |

Each training session involved some input on the topics indicated above in the form of a powerpoint presentation, combined with group activities at relevant places. The powerpoint presentations were developed based on the actual SWM situation in Sri Lanka, with handouts being given to all participants in English, Sinhala or Tamil, as appropriate. The group activities were based on real life situations relevant to participants' jobs as much as possible (e.g. converting UCC load data to tonnes, designing a stationary trailer collection system, dealing with a labourer who refuses to follow orders, investigating why some drains are not being cleaned properly, investigating the cause of human excrement being mixed with garbage, etc.).

4.3.1.4 Transport Facilities

Two small motorcycles were provided to UCC by JICA to make it easier for them to supervise SWM works and to do public education/awareness programmes.

4.3.1.5 Preparation of 10 Year SWM Action Plan

A 10 year SWM action plan was developed for Chilaw as follows:

- Preparation of a draft SWM Action Plan by JICA, which was revised by the UCC Chairman, Council member, PHI, DEO and other relevant staff through a series of internal meetings and meetings with the Study Team to produce a second draft and then a final draft.
- Translation of the final draft into Sinhala and circulation to Council members for discussion and approval at a Council meeting.
- Conduct of a workshop in September 2003 to inform all stakeholders about the Action Plan.

4.3.2 Waste Collection Improvement

UCC has implemented a number of pilot projects to improve the current garbage discharge and storage, collection and transportation system, including:

- The introduction of a waste discharge rule and bell collection system throughout Chilaw, with these initiatives being publicised by various means including:
 - Loudspeaker announcements, leaflets and public noticeboards.
 - Asking Catholic priests to inform people, via announcements during Mass.
 - Community meetings in different zones.
 - Environment committee meetings in schools.
 - Formation of a community animator system throughout Chilaw, the main purpose of which is to provide an effective public-UCC communication channel for SWM and other environmental issues.

Under this system, people are required to discharge their garbage in containers (bags, dustbins, etc.) in accordance with certain rules and a specified collection schedule, bringing their garbage directly out to the collection vehicle when they hear special music being played or, if they are not going to be at home, placing it at the kerbside in a closed container before the specified collection time.

- The provision of three stationary trailers and five modified handcarts by JICA to UCC for improving the present stationary trailer collection system.
- The provision of 20 fixed and 20 movable half barrel (100L) litter bins and 50 50L plastic litter bins for use in busy streets/public places, special events and other places.

4.3.3 Environmental Education

With funding from JICA, UCC has recently established an Environmental Education Centre, which displays information on all aspects of SWM in Chilaw as well as promoting relevant items (e.g. durable/reusable bags, ORDE compost). The unit has appropriate education/training equipment, including a laptop computer and printer, multi-media projector and screen, digital camera, 6,000 educational leaflets and a series of 10 mobile, re-usable educational banners, describing all aspects of SWM with a focus on the situation in Chilaw for on-site education in schools or public places. The DEO is in charge of the Education Centre.

4.4 Assessment

4.4.1 General

Implementation of these pilot projects has been hindered by a number of serious human resource issues. First, the SPHI who had been involved in much of the planning of the pilot projects retired and was not granted an extension to his employment to enable him to see the pilot projects through to completion. Then, his young replacement, showed great enthusiasm initially but tended to act on his own, causing some tensions between different staff members within UCC, which eventually led to him stopping working recently. This has resulted in the Chairman and DEO being the main people responsible for SWM. Hence, promising initial progress on implementation of the pilot projects has now slowed in

some cases (e.g. bell collection). Hence, it is vital for UCC to find a new PHI to share the work burden more evenly and enable them to implement the pilot projects and Action plan fully.

4.4.2 Managerial Capacity Strengthening

By-laws: UCC has shown considerable initiative in preparing its own SWM by-laws, which take account of local conditions and problems. However, it may take a long time to enact these by-laws, due to difficulties in getting approval from the Provincial Council. UCC have advised that if the time delay is excessive, they may adopt the model SWM bylaws instead.

UCC have also prepared a standard form to handover to people not following the discharge rules, based on existing provisions within the Urban Council Ordinance. This form is now being used and is proving effective at improving peoples' behaviour.

Management Tools: Progress has been reasonable in implementing the monthly report, with this being filled in by the Health department clerk. One problem with the monthly report has been collecting all the relevant data. Approximately one third of the monthly report is now being filled in. However, it may take some time, possibly as long as 1-2 years for it to be fully implemented. The control board has only been ready to use recently due to printing problems. The SWM manual was handed over to UCC in October, summarising relevant local information and including feedback from discussions with SWM staff in all LAs, particularly from the supervisor training, monthly report and control board discussions.

PHI/supervisor training: Most of the participants were very appreciative of the PHI/supervisor training, commenting that the programme was very good - they had gained new ideas, knowledge and a better understanding of SWM. For many of the supervisors, it was the first time they had received any such training in their jobs and they supported such training being continued.

Transport Facilities: The motorcycles are proving very useful to UCC. One has been used a lot by the PHI for field supervision, while the other is mainly kept at UCC premises for use to investigate and deal with any sudden problems that arise.

Action Plan: The Chairman took a strong leadership role in preparation of the SWM Action plan and has very clear ideas for the future direction of SWM in Chilaw. Other UCC staff, Council members and the public have been involved in this process through meetings (internal, JICA, Council) and workshops, but at this stage, it is only the chairman that has a very good understanding of the Action plan. Hence, it will be very important to distribute the final draft in Sinhala as much as possible to facilitate discussion and understanding of the plan and to gain support for its implementation.

4.4.3 Waste Collection Improvement

Initial feedback from the bell collection pilot programme has been encouraging, with the vast majority of the public approving of and supporting the bell collection system, while loading work is now much easier for labourers. The main problem identified to date is the ability of UCC to keep to the collection

schedule, due to vehicle problems. A number of measures are being pursued to counter this as part of the Action plan, including possible use of a manual “school” brass bell instead of the speaker/amplifier unit to eliminate problems caused by amplifier malfunction. UCC are now using the bell collection system throughout the town and have set an action plan target of strict compliance with the collection schedule by 2004.

Whilst leaflet distribution and community meetings have been useful, curiosity as to what the “new music” is for, has also been an important, informal publicity method.

It is important that as this system becomes well established, UCC should consider how to run the bell collection with minimum resource input from them and maximum public participation, this being one of the key objectives. Practically, this should involve, as a first step, reducing the collection frequency, decreasing the number of labourers (handcarts and collection vehicles) and removing unnecessary public bins. These points have been emphasised to the UCC Chairman and staff.

Full use is being made of the stationary trailers. UCC is not using the modified handcarts on a daily basis but only on special occasions (e.g. Church feasts, Grand Exhibition, Chilaw, 28-31 Aug). For such events, UCC sends labourers with these handcarts to clean the relevant areas.

All 20 fixed litter bins, 10 movable 100L litter bins and 10 plastic litter bins have been installed or distributed throughout Chilaw.

4.4.4 Environmental Education

Training in equipment utilisation and educational material production was done from January to March 2003, while counterparts also prepared on environmental education plan with support from the Study team. Through this training, UCC counterparts, especially the DEO, have built up their skills well. UCC staff were also actively involved in producing the 10 educational banners, discussing the content of each banner with the Study team and taking many photographs around Chilaw using their new digital camera for use in the banners.

Since opening of the EEC on 7 March 2003, UCC has been operating the EEC and carrying out their environmental education programme without much support from the Study Team, including use of the banners in the EEC and for on-site education.

During September 2003, UCC focused on educating the public about good waste discharge practices. Hence, on-site education is going well. However, the number of visitors to the EEC has been fewer than expected. *One reason for this is that the DEO is very busy, having many other works to do other than just environmental education activities, while the EEC is also not so familiar to citizens yet.* To improve this situation, UCC has assigned one permanent staff member (Health department clerk) as an assistant to the DEO and to look after the EEC. The DEO will train this assistant to carry out environmental education programmes.

An unanticipated effect is that the EEC is functioning as a communication place between citizens and UCC. For example, some people come to the EEC to inform the DEO that UCC's waste collection is not being done properly or to complain about illegal dumping near their house. It is recommended that UCC expand and utilise this function of the EEC to improve SWM.