

The compost facility comprises a large open area, together with an approximately 190m<sup>2</sup> storage area, comprising a concrete floor, open sides and corrugated iron roof. It also has an electrically powered Jinasena 6-8hp chopper, manual screens, and vibrating table screen that was developed locally but never used.

The compost facility accepted an average of eight tractor loads of garbage per day (~50% of Badulla's waste), reaching a maximum of 15-20 tractor loads/day at one stage and employed around 5-11 labourers. Initially, the incoming material was pre-sorted manually by 6-8 labourers, but this was very time consuming and expensive<sup>9</sup>. Hence, pre-sorting was abandoned and the incoming waste was simply unloaded, formed into up to 20 piles (1.8x1.8-3.0x2.4m) outside and covered with a polythene sheet to minimise rainfall infiltration. These piles were turned approximately twice over a 3-6 month period, following which the compost was dried on a polythene sheet for about half a day, chopped mechanically and then hand sieved.

Reject and non-compostable materials comprised about 60% of incoming waste. Some coconut shells were sold to Anturian Cultivators, while others were stored on-site, later being added to the compost piles to improve air circulation through them<sup>10</sup>. Polythene and plastic waste was largely burnt on-site.

Poultry manure, collected mixed with paddy husks, was initially added to the compost piles but this practice was stopped following complaints from customers that the paddy husk content of their compost was too high. They also added ash to the piles, primarily for odour and rodent control. Other additives include sawdust, woodchips/bark and coconut coir fibre. Leachate was discharged to the main drain and hence to the Badulla Oya.

An average of 1T/d of compost<sup>11</sup> was produced, 75% of which was sold in bulk at 2Rs/kg to Horizon Lanka, a Colombo based company, while the remaining 25% was sold for retail at 3.5-5.0Rs/kg. Compost demand was not a problem as Badulla is a big agricultural area. Horizon Lanka would mix their compost with other products and resell it at higher prices to tea estates in the Badulla area.

Compost quality data was obtained for a single sample, analysed by the Ceylon Institute of Scientific and Industrial Research, CISIR) in December 1999, giving the following results: BOD<sub>3</sub> <15mg/L at 30°C, pH = 8.7 (30°C), 24wt% moisture, 29.3wt% organic content, carbon to nitrogen ratio of 17.2, 2% total nitrogen, 0.4% phosphorus as P<sub>2</sub>O<sub>5</sub>; 0.9% potassium as K<sub>2</sub>O. Another sample analysed by the Regional Agricultural Research Centre, Bandarawela, in July 2000 had a very high sand content (53%).

Income averaged around 75,000-100,000Rs/mth over eight months of the year, with there being no demand for compost from October to January. Expenses (excluding loan repayments) amounted to 50,000-75,000Rs/mth (roughly 1.9Rs/kg), giving a net income of around 25,000Rs/mth. The main

<sup>9</sup> Eight labourers could sort around 2-2.5 tractor loads/d.

<sup>10</sup> Initially they used S-lon pipes to enhance pile aeration but this failed. They then tried Humes concrete pipes, which was successful but expensive, followed by coconuts which was relatively effective and low cost.

expenditure items were Project Manager <sup>12</sup> (25,000Rs/mth), labourers (22,000-34,000Rs/mth <sup>13</sup>), motorcycle running costs (3,000Rs/mth), land rental (1,000Rs/mth). Other expenses included polythene (for covering piles), training and publicity, electricity and water.

Their main problems during operation were:

- Contamination and poor quality of the composting raw materials.
- A lack of sound technical advice, meaning that they tended to make improvements to the facility through a trial and error process.
- A lack of market for their compost, as although they could sell their compost, they only had one main buyer for it, Horizon Lanka, resulting in them getting a low price for their compost.
- Non-availability of land and high land/building rental costs.
- Poor cash flow, with Horizon Lanka delaying payments to them.
- Poor compost product quality, with high sand content being a major issue.

Inspection of the compost facility in September 2002 found that many compost piles are still in place, together with a large amount of reject materials, while some sifted compost is still stored under the roofed area (see photos).

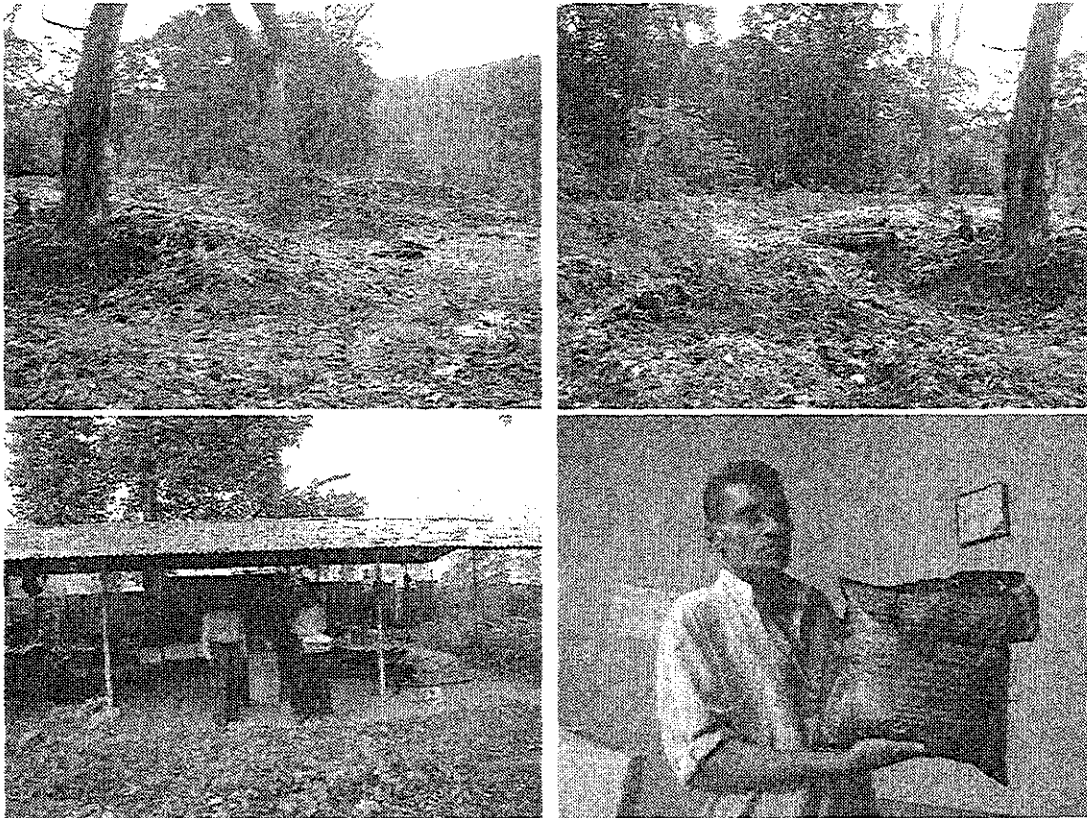
The CCI is very keen to continue operation of the compost facility, with assistance from JICA. However, UDA has advised that the land on which the BMC disposal site and CCI compost facility are located is zoned for recreational use and they do not support such facilities being present in these areas. If composting is not resumed, the site will require rehabilitation.

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<sup>11</sup> Production sometimes reached 1.5T/d.

<sup>12</sup> This position was terminated around August 2001.

<sup>13</sup> Salary + EPF (employee provident fund)



*Chamber of Commerce Compost Facility: Top – piles of partially composted and reject material remaining on-site; bottom – left – compost storage facility; right – final compost product.*

### 1.9.2 Middlemen

Eight middlemen operating within BMA were identified and interviewed as part of this study. General information on these businesses is set out below.

Table 1-12: Middlemen General Information

Business Name	Manager/Owner, Address	Years of operation	Total workers		Recyclables <sup>3</sup> (Rs/mth)	
			Total	FTE	Purchases	Sales
Ravi Stores	Mr Rasik, 297 Muthiyangana Rd	4	2	1.9	8,750	10,350
Not stated	Mr P Meeganadan, 16/2 Station Rd, Wiharagoda	10	4	2.0	198,950	318,850
S.L. Stores	Mr W Tiruchelwam, 235B Pahala Veediya	0.5	9	9.4	169,025	189,200
Not stated	Mr Rajeendran, Station Rd	8	2	2.1	15,000	19,500
Susil Trade Centre	Mr A Sundaralingam, 24 Station Rd	1.5	1	0.7	96,940	110,750
Dharma Stores	Mr JS Fernando, 279 Passara Rd	0.5	3	1.7	12,450	14,910
Not stated	Mr S Ganeshan Murthi, 4 Church Rd	0.5	5	3.0	118,500	151,050
Sanmugam Sons	Mr K Sanbun, 17A Mosque Rd	10	6	4.8	92,588	113,050
<b>Total</b>			<b>32</b>	<b>25.6</b>	<b>712,153</b>	<b>927,660</b>

**Note:** The number of full-time equivalent (FTE) staff is based on a normal working month in the private sector of 8h/d x 26d/mth = 208h/mth. Recyclable materials purchases and sales costs were calculated based on the average quantity of each item collected and sold per month and the average purchase and sales prices.

All of them are primarily involved in the collection and selling of recyclable materials, with three having been in business for eight or more years, one for four years, one for 1.5 years and three for only six

month. At least 32 people (managers/owners, full and part-time workers) are employed by these businesses, representing 25.6 full-time equivalent jobs.

Their estimated monthly expenditure on purchasing recyclable materials is 712,153Rs/mth, which shows that the scale of these operations is significant. Corresponding estimated monthly income from the sale of recyclable materials is 927,660Rs/mth, representing a markup of 30%. Respondents were generally reluctant to give total expenditure and income information, while the income/expenditure data obtained is not considered very reliable, particularly in three cases where stated income and/or expenditure were less than the corresponding recyclable purchases and sales figures. The overall net income quoted by businesses ranged from 4,000-10,000Rs/mth. This is considered a minimum value, for the reasons explained here.

Most of the recyclable materials are brought to them by other middlemen (8) or collected by themselves or their own workers (3). Their demand for all recyclable materials is generally stable. The supply is generally less than the demand for plastics, polythene, newspaper, exercise books, cardboard/boxes, broken glass, glass bottles, metals and batteries and approximately equal for bags.

The main sources of most materials is set out below and summarised here:

- Households are the main source of plastic, paper/cardboard, broken glass, metals and batteries.
- Hotels are significant sources of plastics and glass bottles.
- Commercial enterprises are the main source of bags/sacks and significant sources of polythene, paper/cardboard, broken glass, glass bottles and batteries.
- Government offices are a significant source of paper/cardboard.
- Industries are a significant source of plastic, polythene and metals.
- Garages (“other” response) are a significant source of metals and batteries.

Around 41% of these materials are collected from within BMA, 51% within the Badulla district and 8% from within the Uva province<sup>14</sup>.

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<sup>14</sup> Percentages are weighted averages, taking into account the relative quantities of materials collected by different middlemen.

Table 1-13: Main Sources of Recyclable Materials

Item	Plastic	Polythene	Bags/ sacks	Paper/ cardboard	Broken glass	Glass Bottles	Metals	Batteries	Overall (in BMA)
No collecting these items	1	1	4	6	3	5	7	5	8
Responses	1	1	4	6	3	5	7	4	8
Source of Materials									
Households	50	0	1.6	54.8	55.4	54.8	60.4	66.0	56.2
Hotels	30	0	0	0.0	7.5	17.8	4.0	0.0	2.5
Commercial	0	40	98.4	39.5	34.6	18.5	0.0	18.5	27.4
Govt offices	0	0	0	5.7	0.0	0.0	0.0	0.0	2.8
Industries	20	60	0	0.0	0.9	4.9	19.3	0.0	4.8
Other	0	0	0	0.0	1.6	4.1	16.3	15.4	6.4
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

**Notes:**

Above values are average percentages calculated from the survey data, taking into account the relative quantities of materials purchased by different middlemen.

The final column estimates the proportion of recyclable materials collected from different sources within BMA only, assuming 23%, 100%, 50%, 20% and 35% of materials from hotels, government offices, commercial enterprises, industries and "other" (mainly garages) are obtained from inside BMA respectively, with the proportion of materials obtained from households calculated by difference so as to get an overall rate of 41% for materials collected within BMA.

The total quantities of materials recycled by these middlemen are summarised in the next table, amounting to 2.48T/d, while the table after that provides further details, including purchase and sale prices. Adjusting this total to allow for an estimated 41% of these materials being collected from within BMA gives a recycling amount of 1.02T/d.

Table 1-14: Total Quantities of Different Materials Recycled

Materials	Quantity (kg/mth)	Qty (kg/d)	Comments
All plastics	8,625	284	4,500kg plastics, 1,300kg polythene, 28,250 bags per month (= 2,825kg; measured weight of 1 polysack = 0.1kg => 1,566kg).
Paper/ cardboard	15,475	509	1,875kg newspaper, 2,000kg exercise books, 11,600kg cardboard boxes per month
Glass	12,700 kg broken glass + 6,501kg bottles = 19,201	631	Whole bottles are usually beer or arrack bottles; average measured weight = 0.66kg; 9,850 bottles = 6,501kg.
Metals	27,305	898	24,700kg iron, 920kg copper/brass, 1,520kg aluminium and 165kg beer cans.
Old battery cases	4,920	162	Battery cases are drained and then weighed, being recycled primarily for their lead content.
Total	75,526	2,483	
Total (within BMA)	31,082	1,022	Adjusted total to account for 41% of these materials being collected from within BMA.

**Note:** Monthly quantities, as determined from survey interviews. No independent check was made on the accuracy of these quantities. Refer next table for further details. Daily quantities calculated from monthly data by multiplying by 12/365.

Table 1-15: Quantities of Recyclable Materials collected by Middlemen and Corresponding Purchase and Sales Prices

Material	Units	MM1	MM2	MM3	MM4	MM5	MM6	MM7	MM8	Total			
										Quantity	Purchase price	Sales price	Units
Plastics													
Plastic	Kg/mth		4,500							4,500	8	15	Rs/kg
Polythene	Kg/mth							1,300		1,300	2-4	8-10	Rs/kg
Various bags/sacks	No/mth		3,500	2,250		2,500		20,000		28,250	3.5-7.0	4.0-8.5	Rs ea
Paper													
Old newspaper	Kg/mth	300	200			1,000	100	200	75	1,875	3-20	4.5-21	Rs/kg
Old exercise books	Kg/mth		1,000			200		500	300	2,000	1.5-8.0	6-10	Rs/kg
Cardboard	Kg/mth		10,000			100		1,500		11,600	2.5-3.0	3.5-6.25	Rs/kg
Bottles													
Broken glass	Kg/mth		2,000			200	500		10,000	12,700	0.5-2.5	1.0-3.5	Rs/kg
Arrack, beer, other bottles	No/mth		4,000	4,000		800	500		550	9,850	3.5-6.0	6.0-7.5	Rs ea
Metals													
Aluminium	Kg/mth	20	300	750		200	50		200	1,520	60-70	68-75	Rs/kg
Beer cans	Kg/mth	5	30	10		50	20		50	165	15-65	25-72	Rs/kg
Copper/brass	Kg/mth	40	250	300		200	30		100	920	70-90	80-100	Rs/kg
Ferrous	Kg/mth	500	5,000	6,000	3,000	5,000	200		5,000	24,700	5.0-7.5	6.5-8.5	Rs/kg
Old battery cases	Kg/mth		3,000	1,500		60	60		300	4,920	9-10	9-12.5	Rs/kg

Most enterprises act as retail/wholesale outlets, onselling the recycled materials directly from their shops to individuals or commercial enterprises. Two transport the paper/cardboard they collect directly to the National Paper Company factory at Walachchena and one transports the broken glass and bottles they collect to the National Glass Corporation factory in Ratmalana, near Colombo.

The main costs incurred by these businesses in their recycling activities and the associated main problems are summarised in the next two tables respectively.

Table 1-16: Main Costs

Main Costs	Rank				Wt. Avg.
	1	2	3	4	
Buying recyclable materials	8	0	0	0	20.0
Transportation	0	5	1	2	13.5
Utilities	0	1	4	1	9.5
Land/building rental	0	1	1	5	8.5
Labour	0	1	1	0	4.5

Table 1-17: Main Problems

Main Problems	Rank				Wt. Avg.
	1	2	3	4	
Difficulties in obtaining credit	1	3	1	0	10.0
Utilities	2	1	0	1	8.0
High transportation costs	1	0	3	0	8.0
Shortage of Recyclable Materials	1	1	1	0	7.0
Other	2	1	0	0	7.0
Loss of market	0	1	0	2	4.0

Note: other = paying loan interest (1); security/theft problems (2).

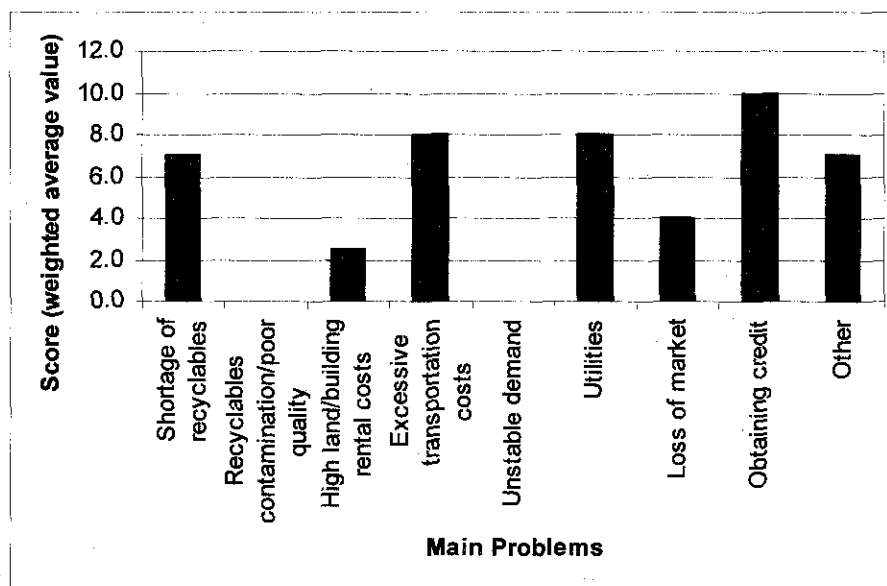


Figure 1-4: Main Problems Faced by Middlemen in Badulla

Chapter 2  
MCB SWM System –  
Additional Details



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## Chapter 2 MCB SWM System – Additional Details

This appendix provides supplementary information to that in the main report concerning different aspects of MCB's SWM system. This data was collected during September-October 2002 and has not been updated since then.

### 2.1 Waste Management Equipment – Detailed Data

Table 2-1: Waste Management Vehicle Fleet and Supporting Equipment

Vehicles/ equipment	No	Use (Capacity)	Registration	Registrati on date	Cost	Approx. Life (yrs)
Handcarts	5	SWM collection, road and drain cleaning	N/a	N/a	10,250	2-4yrs
Two wheel tractor (2WT)	1	Badulupitiya Housing scheme SWM collection	74-1732	23/6/1992	Donated	15-20yrs
Four wheel tractor (4WT)	3	SWM collection	37-6053 37-7716 49-0682	13/4/1987 29/8/1990 19/7/1993	425,000 No data 645,000	15-20yrs
Four wheel tractor trailers	3	SWM collection	44-C1134 44-C2033 46-3045	12/1/1987 17/11/1989 7/2/1990	No data	8-10yrs
Compactor	1	SWM collection	68-7907	26/8/1998	Donated	8-10yrs
Gully sucker	1	Septic tank/toilets emptying	43-2883	12/11/1992	Donated	10-20yrs

**Notes:**

- Tractor lifetime is based on the age of actual tractors still in service, the oldest tractor being 15years old. Tractors should be able to be used for at least 10 years, if maintained well.
- Trailers require repairs after two years, but can last up to 8-10years, if maintained well.
- The two wheel tractors and the gully sucker were donated by UNICEF. The second 2WT is used by all sections of BMC.
- BMC also has five wheelbarrows which are used for SWM (cost = 1,600Rs), particularly when any handcarts are out of service.
- Six new handcarts with solid rubber wheels and five new wheelbarrows (for drain cleaning) arrived at BMC on 30 September 2002. These were purchased from the private sector and have yet to be allocated to collection areas. However, the Mayor has instructed the Head Overseer to use two of the new handcarts for collecting polythene waste separately in the commercial area.
- Bulldozers are hired as required for use at the final disposal site at the following rates: D-30: 1,725Rs/hr with diesel; D-50: 1,975Rs/hr with diesel.

### 2.2 Gully Sucker Collection Fees – Additional Data

Gully bowser charges are summarized below, while the table after that summarises gully sucker income over the 12 month period May 2001 – April 2002.

Table 2-2: Gully Sucker Collection Charges

Location	Residential	Commercial	Government and Religious
Within BMA limits	1,250	2,750	350
Outside BMA limits	2,750	2,750	2,750

Notes: Outside BMA, an additional charge of 75Rs/km is levied.

Table 2-3: BMA Gully Sucker Income

Month	Gully Sucker Income (Rs/mth)
May 2001	18,000.00
June	2,385.00
July	7,991.25
August	3,903.75
September	2,812.50
October	15,080.00
November	41,871.00
December	44,169.00
January 2002	38,545.00
February	6,187.50
March	39,630.00
April	19,125.00
<b>Total</b>	<b>239,700.00</b>
Average	19,975

## 2.3 SWM Discharge/Collection – Additional Information

### 2.3.1 SWM Collection Zone Data

Detailed BMC SWM collection zone data is set out below.

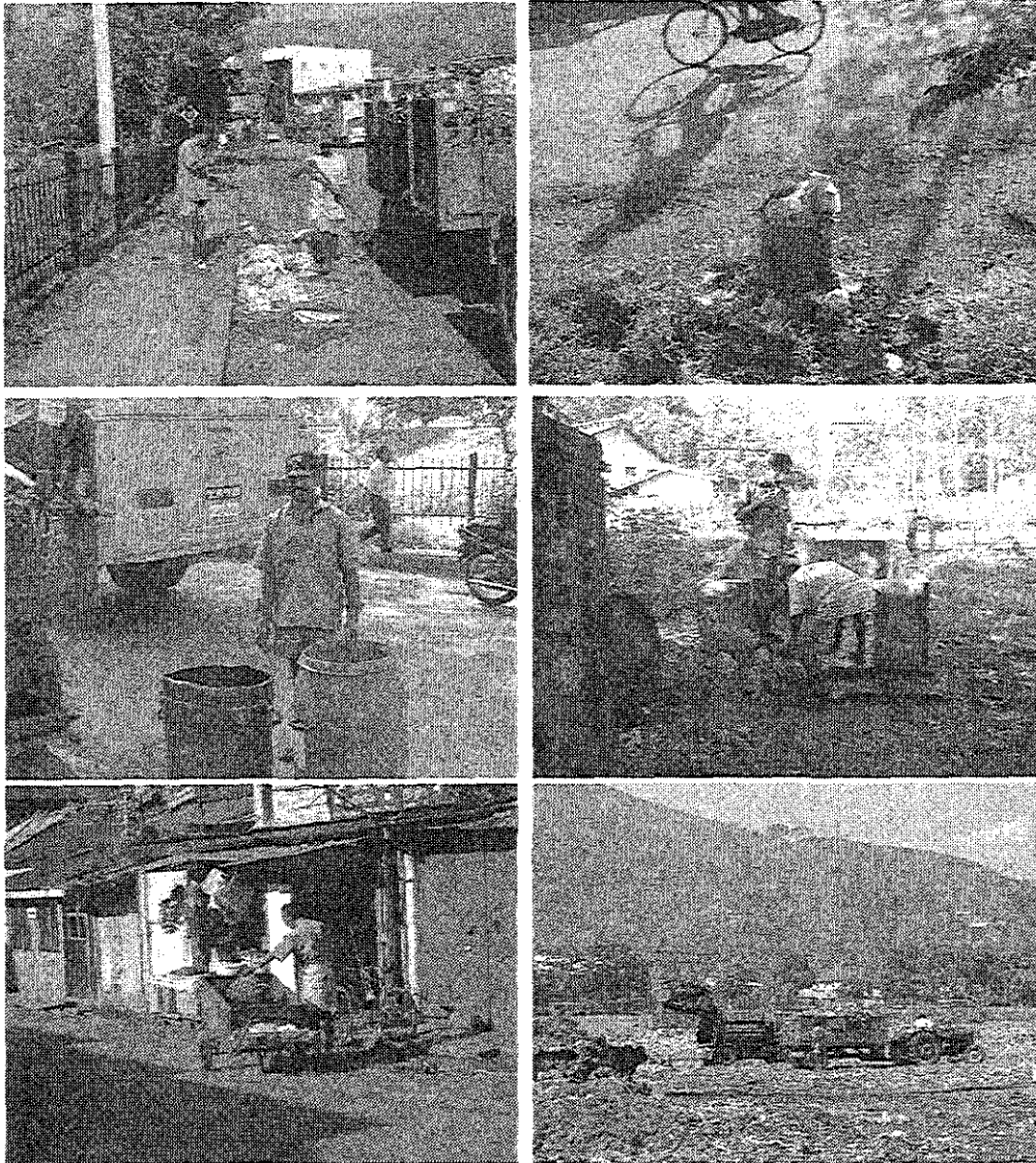
Table 2-4: BMC SWM Collection Zone Data

SWM Area	Area
Head Overseer	<ul style="list-style-type: none"> <li>Central and Dharmadutha wards (commercial), Pitawelagama ward (residential) + Muthiyangana Rd; 80% comm., 20% resid.</li> <li>Daily collection in Central and Dharmadutha wards using compactor; approx. weekly collection in Pitawelagama, according to 4WT availability (shared with another area); handcarts work in Bazaar, market, bus stand and Muthiyangana Rd areas.</li> <li>Large waste generators: Chief Charlie; Salgadu, Muslim, Hargiyar &amp; Central hotels, Dance Textiles, Riverside Inn.</li> <li>Some rice mills direct haul their waste to the BMC disposal site.</li> <li>Handcarts collect and empty their loads to bins/temporary collection points – collected by compactor/tractor.</li> </ul>
Minor Supervisor 1	<ul style="list-style-type: none"> <li>Muthiyangana (60% comm, 40% resid), Mailagastenna (60% comm., 40% resid), Kanupelalla, Hingurugamuwa, Hindagoda (all resid).</li> <li>Daily collection in Muthiyangana and Mailagastenna (in reality usually less than this due to tractor problems), 1-2 times per week collection in other wards.</li> <li>Large waste generators: Wed and Sun Pola.</li> <li>All three handcarts are currently under repair, with three wheelbarrows being used instead.</li> <li>Most people discharge their waste at community collection points.</li> </ul>
Minor Supervisor 2	<ul style="list-style-type: none"> <li>Kailagoda, Puwakgodamulla, Helagama, Katupellagama, Pinarawa, Welekade and Maiwatta wards (mainly residential).</li> <li>Two 4WTs cover these wards, except for Katupellagama which is only provided with a collection service on request.</li> <li>Large waste generators: Welekade market, New Tourist Inn, Dunhinda Falls Inn, Greenwood Hotel, General hospital.</li> </ul>
Green Spaces (parks, etc.)	<ul style="list-style-type: none"> <li>Children's Park, Botanical Gardens, Dewala Park, cemetery, Sportsgrounds.</li> <li>Cleaned by a combination of Works and Health department labourers using a handcart and wheelbarrows.</li> </ul>
Minor Supervisor 3	<ul style="list-style-type: none"> <li>Large waste generators = Botanical Gardens (most waste composted on-site) and Children's Park (4-5 polysacks/d discharged for BMC collection).</li> </ul>

**Notes:**

1. Current SWM system status as at September 2002.
2. BMC does not offer a garden waste collection service. If BMC knows who has discharged garden waste outside their property, they will ask the offending party to remove it within three days under threat of prosecuting them if the offending material is not removed. Otherwise, they will generally try to collect the garden waste within five days of it being discharged. In reality, labourers said that they tend to collect garden waste "little by little".

### 2.3.2 Sample Photos



*Some examples of Badulla's waste discharge and collection system*

### 2.3.3 Garbage Collection Daily Routine

Working hours are from 6am-3pm on Monday-Friday in two sessions: 6-11am and 1-3pm (same labourers per shift) and on Saturday for five hours, giving a working week of 40hours. Some labourers work on Sunday, getting paid overtime. Maximum overtime accrual per month is 20hours per person.

Normally, there are three four wheel tractors for SWM collection. However, one is currently out of service. Hence, BMC are currently operating an additional shift using one tractor from 2-9pm to make up for the out of service tractor. A different driver and up to six labourers work on this shift, which is supervised by one of the Community Health Assistants.

Each morning, a roll call is taken by the Senior Overseer at the BMC Workshop at 5:45am, following which drivers and labourers are assigned their work for the day, this being recorded on a day sheet, which is checked/signed off by the Overseer at the end of the day. Another roll call is taken at 1pm.

All garbage collection vehicles and trailers are parked near the BMC Workshop, while handcarts are generally parked near their working areas. Supervisors are expected to use their own transport (usually personal bicycle) for inspecting their zones. They are not reimbursed for any work related bicycle expenses.

No records are kept of the number of trips being collected by different vehicles and taken to disposal. BMC also has no records of large waste generators within the city.

Drivers must complete a "running chart" record book, including the date, journey description, start and finish odometer readings, trip distance (km), time in/out and fuel and oil purchases. These records must be signed daily by the Senior Overseer.

Drivers obtain diesel by filling out a request form. The Overseer will balance the running chart record which will only be very approximate as none of the odometers on any of the vehicles work (some have been broken deliberately). The running chart is then given to the Works Section and signed by the Transport Officer.

### 2.3.4 Time and Motion Data

Time and motion studies were undertaken by JICA for a four wheel tractor and the lorry on 19 September 2002, the results of which are summarized below.

Table 2-5: Time and Motion Study Summary

Item	Four Wheel Tractor	Lorry
Zone	Muthiyangana, Malagastenna	Town centre
Type of area	Mainly commercial	Commercial
Collection crew	1 driver and 2 labourers	1 driver and 3 labourers
Start Time	06:40	06:40
Time for collection round	2h39min	61, 96, 63min
Travel to landfill	6min	3, 2, 2min
Unloading at landfill	2min	3, 9, 3min
Return from landfill	~6min	~3, 2, 2min
Time at end of round	09:33	07:50, 09:39, 11:49
Total round loading time	134.5min	53, 83, 54min
Total round time	173min	70, 109 (+60min tea time), 70min
Round loading time (% of total round time)	78%	76, 76 (excluding teatime), 77%

**Notes:**

1. There were only 38 labourers present on this day, due to two funerals being held which many labourers attended. Hence, only two labourers were assigned to the 4WT rather than three.
2. The 4WT had not collected garbage in the area covered today for 4-5 days, due to the compactor being out of service last week and the 4WT covering for the compactor during that time. Hence, more garbage was present at collection points than normal. There were very few permanent collection points in this area, with most waste generators discharging their waste directly to temporary collection points.
3. The compactor first and third trips were exactly the same. However, the waste amounts at the same collection points were approximately the same. The compactor crew spent 60min on a tea break between the 2<sup>nd</sup> and 3<sup>rd</sup> trips.
4. Unloading time is also short, being 2-9min for both vehicles.

### 2.3.5 BMC Collection Vehicle Unit Costs

BMC collection vehicle unit costs were calculated for handcarts, tractors and the lorry using actual trips (Sep 24-30, 2002) and cost data supplied by BMC, supplemented by data from other sources where necessary. These costs are tabulated below.

Table 2-6: BMC Collection Vehicle Unit Costs

Item	Handcart	2WT	4WT	Compactor
No of labourers	3	2	3	3
Driver	0	74,220	74,220	74,220
Labourers	201,600	134,400	201,600	201,600
Staff equipment	2,010	930	1,170	1,170
Diesel/oil	0	17,661	54,347	83,368
Repair/maintenance	2,500	74,359	35,572	38,513
Trailer maintenance	0	0	9,017	0
Insurance	0	154	584	14,120
Licence/ registration	0	150	150	3,050
Depreciation	3,417	6,044	41,127	150,000
<b>Total (Rs/yr)</b>	<b>209,527</b>	<b>307,919</b>	<b>417,787</b>	<b>566,041</b>
Average trips/d	3-5	1.4	1.4-2.7	2.3
Collection (T/yr)	112-187	375	1,559-1,643	1,453
<b>Unit cost (Rs/T)</b>	<b>1,865-1,119</b>	<b>822</b>	<b>268-254</b>	<b>390</b>
Kandy MC (Aug 02)	1,983 (3Lr)	N/a	496 (4Lr)	707 (4Lr)
Matale MC (Aug 02)	501 (2Lr)	N/a	403 (4Lr)	451 (4Lr)
Negombo MC (Aug 02)	1,320-792 (3Lr) (3-5tr/d)	N/a	418 (3Lr)	N/a
Chilaw (Aug 02)	1,322-749 (3Lr) (2.8-5tr/d)	698 (2Lr)	629 (3Lr)	N/a
Gampaha (Aug 02)	1,482-2,185 (2-3Lr, 3tr/d)	764 (2Lr)	799 (4Lr)	N/a
Nuwara Eliya (Sep 02)	1,858-1,115 (3Lr, 3-5tr/d)	N/a	517 (3Lr)	447 (3Lr)

**Notes:**

1. Lr = labourer, tr = trips.
2. Average number of trips per day based on an assumed range of 3-5 trips/d for handcarts and JICA disposal site survey data (Sep 24-30, 2002) for two wheel tractors (2WTs), four wheel tractors (4WTs) and the compactor. However, 4WT trips data was modified so that the average trips/shift are reported above, as during this period both 4WTs were doing more than one shift (i.e. different driver and labourers on same day) for at least some days. Similarly, compactor average trips/d data was modified to account for the compactor being out of service for three days during this period.
3. 4WT trips, tonnages and unit costs data are specified separately for the 4WT with the large trailer (numbers on left) and 4WT with the small trailer (numbers on right), with the larger number of trips undertaken by the tractor with the smaller trailer compensating for the higher tonnage carried per load for the tractor with the larger trailer, giving similar unit costs in each case.
4. Maintenance costs include tyres and tubes.
5. Straight line depreciation has been included, based on the following capital costs and lifetimes: handcart = 10,250Rs, 3yrs; two wheel tractor = 105,775Rs, 17.5yrs (typical 2WT capital cost from other JICA study towns); four wheel tractor = 535,000Rs, 17.5yrs (average capital cost of two BMC four wheel tractors), tractor trailer = 95,000Rs, 9yrs (typical capital cost from other JICA study towns), compactor = 900,000Rs, 6yrs (typical capital cost from other JICA study towns).

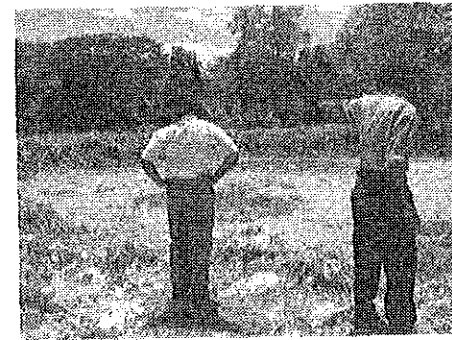
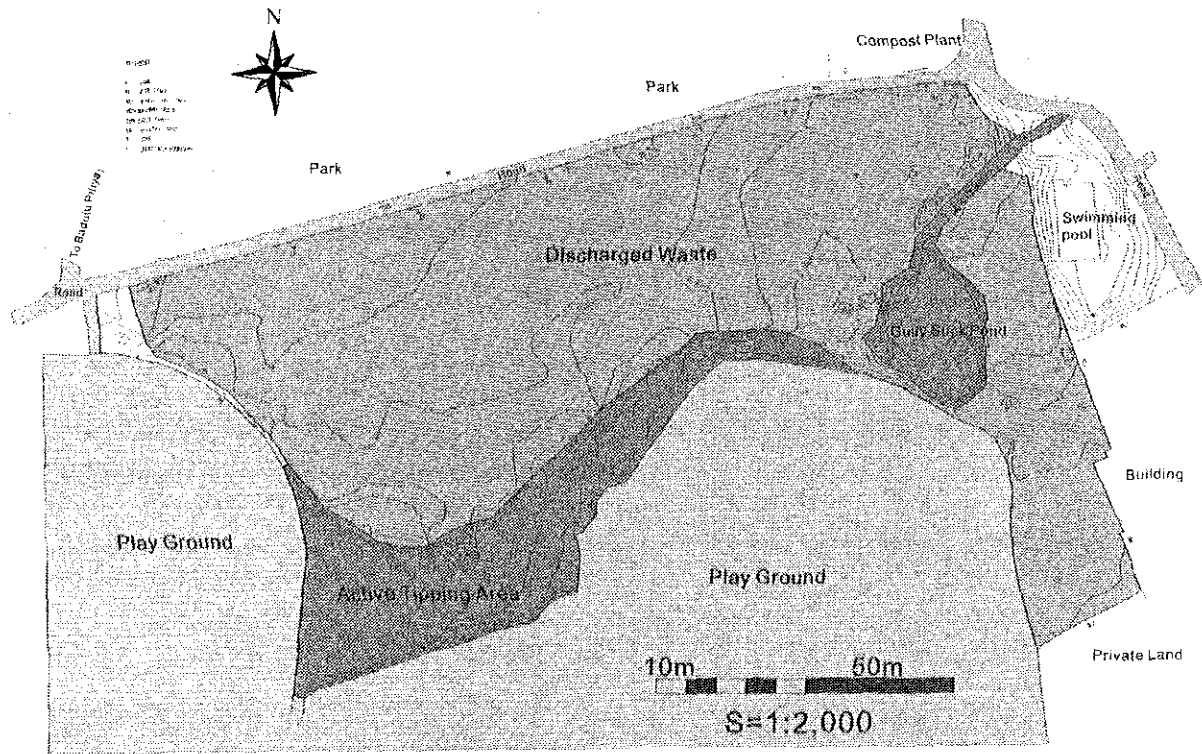
## 2.4 Final Disposal

### 2.4.1 Landfill Survey Results

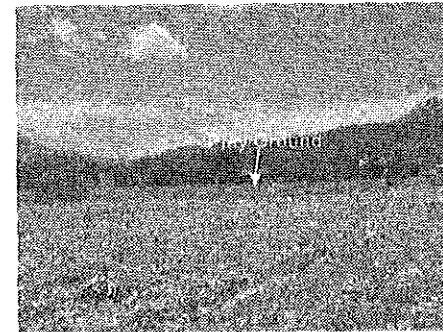
Landfill site survey results from Sept-Oct 2002 are summarised below.

Table 2-7: Landfill Survey Results

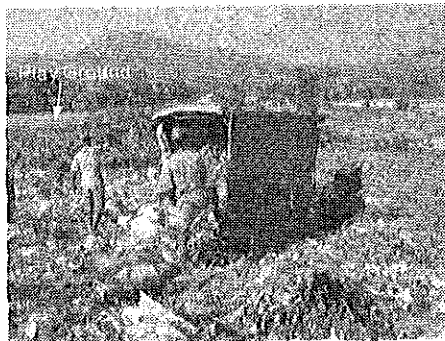
Item		Description				
1. Name		Racecourse disposal site				
2. Location		Malwatte area, Badulupitiya GS Division, about 500m from Badulla town centre.				
3. Start of filling operations		1964				
4. Ownership		Badulla Municipal Council				
5. General Site Description		Landfilling is taking place at the racecourse, close to the town centre and about 600m from the Badulu Oya (stream). Surrounding topography is flat.				
6. Surrounding land use		Residential, sports playground, Botanical Gardens				
7. Area		Current site Filled area: approx. 3.0 ha; area available for filling: 0.6ha				
8. Disposal site	Method	Controlled tipping				
	Reserve volume	Approximately 9,000m <sup>3</sup>				
9. Waste discharge	MSW	MSW collected by BMC; daily average: 19.7T/d (591T/mth)				
	Healthcare waste (HCW)	Daily average = 1.4T/d (all healthcare wastes), comprising mainly MSW with very little hazardous HCW.				
	Industrial waste	About 0.95T/d of rice/grinding mill waste is directly hauled to the disposal site, while BMC collects around 0.04T/d from other industrial sources. Hazardous waste content is believed to be very low.				
	Gully sucker waste	Collected by BMC (1 x 5,000L gully sucker) and discharged into pit at landfill site; weekly average: 5,000 L/week				
10. Environmental impact	Odour	Seriously affects surrounding households, playground and Botanical gardens throughout the year, due to lack of proper cover soil and burning of deposited waste.				
	Flies, crows & bats					
	Fire & Smoke					
	Leachate	Leachate will be generated and seep into the groundwater.				
	Gully sucker waste	Gully sucker waste will soak into the ground, with some entering the groundwater.				
11. Facilities	General	No control house, boundary fence weighbridge or buffer zone; two gates on either side of disposal site				
	Leachate and gully sucker treatment	None				
	Utilities	No electricity supply, water supply or telephone line				
12. Operation and Maintenance (O&M)	Responsibility	Badulla Municipal Council				
	Equipment	Bulldozer: one unit, rented from private contractor @ 1975Rs/ hr, (130 hrs per year); normal work hours: 8.2hr/d (16days per year).				
	Staff allocation	Position	No of Workers	Duty	Salary	Work hours
		Labourer	1	Directing unloading	6,000Rs/mth	6am to 1pm
13. O&M cost	Item	Unit	Unit rate	Time on SWM(%)	Qty (Rs/yr)	Cost (Rs/yr)
	Labour	Rs/yr	72,000	100	1	72,000
	Bulldozer	Rs/yr	256,750	100	1	256,750
	Total	Rs/yr				328,750
	Annual disposal amount	T/yr			7,191	
Unit O&M cost	Rs/tonne				45.7	
13. Surrounding villages or facilities	Botanical Garden, Sports ground, Green Wood Drive	Residential area (approx. 50 houses), Botanical Garden and Sportsground (both close to landfill site) all affected by landfill operations.				



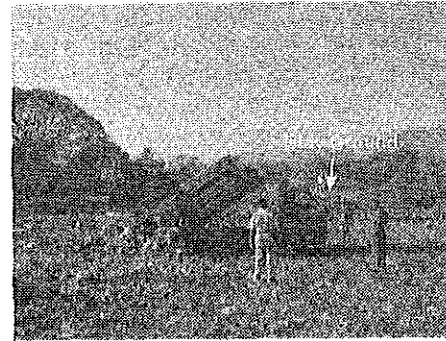
Gully Suck Pond



Discharged Waste



Unloading of Waste (Two wheel tractor)



Unloading of Waste (Compactor truck)

Figure 2-1: Badulla Landfill Site



## 2.4.2 Issues at the Racecourse Landfill Site

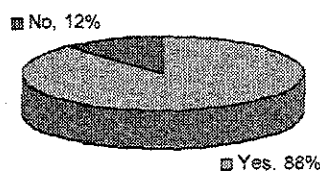
### 2.4.2.1 Remaining Lifetime

The estimated remaining lifetime of the landfill site is less than one year. Hence, BMC are looking for a new landfill site to replace this site. Note, that it is planned to use the current site as a playground following the end of landfilling.

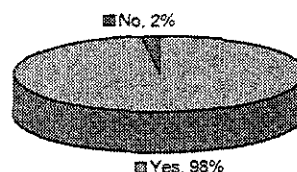
### 2.4.2.2 Odour, Pests, Crows, and Smoke

According to an interview survey carried out of 50 households in Greenwood Drive in October 2002, odour, pests, crows, bats and smoke are having a serious impact on them. The major cause of these problems is inadequate soil cover. Hence, BMC must cover the waste at the landfill site with soil more frequently in order to mitigate these impacts.

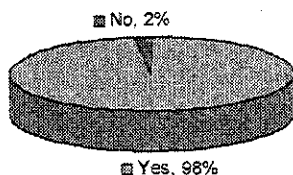
Is offensive odour from landfill site a problem ?



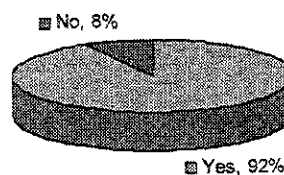
Has the landfill caused problems due to flies ?



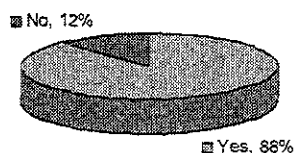
Has the landfill caused problem due to mosquitoes ?



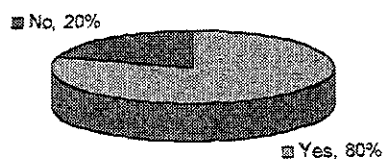
Has the landfill caused problems due to birds ?



Are waste scattered from the landfill a problem ?



Is smoke from landfill site a problem ?



#### 2.4.2.3 Leachate

Rainwater readily infiltrates the landfill site, due to a lack of soil cover and will generate much leachate. As there is no liner nor leachate collection facility, all leachate is expected to seep into the groundwater, which may cause a negative environmental impact on the area downgradient of the landfill.

#### 2.4.2.4 Gully Sucker Waste

Gully sucker waste is discharged weekly without any treatment into pits, excavated by machine at the landfill site. As for leachate, gully sucker waste will soak into the ground and enter the groundwater, which may cause negative associated environmental effects.

#### 2.4.2.5 Operation and Maintenance (O&M)

Current landfill O&M methods and corresponding issues are summarised below:

- BMC cover the landfill site with soil irregularly.
- The landfill supervisor burns waste at the landfill site in order to mitigate odour and pests and to reduce the waste volume. However, this results in lots of smoke being produced, which detrimentally affects nearby residents.

# Chapter 3

## Badulla Field Surveys

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## Chapter 3 Filed Survey

### 3.1 Public Opinion Survey for household in Badulla

#### Findings from Public Opinion Survey for Household in Badulla

A questionnaire survey was conducted among 120 households in Badulla Municipal Areas, in order to gather;

- A basic socio-economic profile of inhabitants of Badulla.
- An appreciation of public attitude to the provision of solid waste collection services.
- An appreciation of desired improvement in solid waste management services.
- An indication of willingness to pay for improved solid waste collection services.

Period of survey: September 30<sup>th</sup> to October 4<sup>th</sup>, 2002

Sample size: 120 ( 40 each from high, middle and low income areas)

Sampling areas: \*High income areas are Gangabada Rd. and Bandaranayaka Mawatta.

\*Middle income areas are Higurugamuwa

and Deiyannawela.

\*Low income areas are Galkanda and

Bangalawatta.

#### 1. General Questions

##### Q1-1 Ethnicity

	Low		Middle		High		Total	
	Number	%	Number	%	Number	%	Number	%
1 Sinhala	35	88%	34	85%	27	68%	96	80%
2 Muslim	2	5%	3	8%	7	18%	12	10%
3 Tamil	3	8%	3	8%	6	15%	12	10%
4 Other	0	0%	0	0%	0	0%	0	0%
Total	40	100%	40	100%	40	100%	120	100%

##### Q1-2 Religion

	Low		Middle		High		Total	
	Number	%	Number	%	Number	%	Number	%
1 Buddhist	34	85%	32	80%	26	65%	92	77%
2 Islam	3	8%	3	8%	7	18%	13	11%
3 Hindu	3	8%	2	5%	5	13%	10	8%
4 Christian	0	0%	3	8%	2	5%	5	4%
5 Other	0	0%	0	0%	0	0%	0	0%
Total	40	100%	40	100%	40	100%	120	100%

##### Q1-3 Household information

( person)	Low	Middle	High	Total
Avg. number of household members	4.6	4.8	4.7	4.7

(Rs.)	Low	Middle	High	Total
Avg. household income	6,060	8,906	20,175	11,714

(Rs.)	Low	Middle	High	Total
Income per person	1,317	1,875	4,293	2,501

Q1-4 How much is the total expenditure of your household per month on average?

(Rs.)	Low	Middle	High	Total
Avg. household expenditure	5,275	7,993	14,400	9,223

(Rs.)	Low	Middle	High	Total
Expenditure per person	1,147	1,683	3,064	1,969

Q1-5 Please specify the priority for your daily life regarding the improvement of the following aspects? (Fill all three priorities)

	Low	Middle	High	Total
1 First	Storm water drainage	Garbage collection	Garbage collection	Garbage collection
2 Second	Access road to my house	Storm water drainage	Waste water collection	Storm water drainage
3 Third	Garbage collection	Access road to my house	Storm water collection	Access road to my house

## 2. Questions on Garbage Collection Services in Your Area

Q2-1 Are there garbage collection services in your area?

	Low		Middle		High		Total	
	Number	%	Number	%	Number	%	Number	%
1 Yes	17	43%	40	100%	40	100%	97	81%
2 No	23	58%	0	0%	0	0%	23	19%
Total	40	100%	40	100%	40	100%	120	100%

Q2-2 Do you use these services?

	Low		Middle		High		Total	
	Number	%	Number	%	Number	%	Number	%
1 Yes	14	35%	22	55%	26	65%	62	52%
2 No	3	8%	18	45%	14	35%	35	29%
99 Irrelevant	23	58%	0	0%	0	0%	23	19%
Total	40	100%	40	100%	40	100%	120	100%

Q2-3(a) How is your garbage collected?

	Low		Middle		High		Total	
	Number	%	Number	%	Number	%	Number	%
1 Placing garbage outside the property for collection	0	0%	0	0%	2	5%	2	2%
2 Carrying garbage to a specified collection point	14	35%	21	53%	24	60%	59	49%
3 Carrying garbage to a collection truck directly	0	0%	1	3%	0	0%	1	1%
4 Others	0	0%	0	0%	0	0%	0	0%
99 Irrelevant	26	65%	18	45%	14	35%	58	48%
Total	40	100%	40	100%	40	100%	120	100%

Q2-3(b) (Only for those who choose 2 or 3 in question Q2-3) How far do you have to walk to reach this point?

	Low		Middle		High		Total	
	Number	%	Number	%	Number	%	Number	%
1 1 - 25m	6	15%	16	40%	12	30%	34	28%
2 26 - 50m	4	10%	1	3%	5	13%	10	8%
3 51 - 100m	2	5%	2	5%	2	5%	6	5%
4 100 - 250m	2	5%	3	8%	4	10%	9	8%
5 Over 250m	0	0%	0	0%	0	0%	0	0%
99 Irrelevant	26	65%	18	45%	17	43%	61	51%
Total	40	100%	40	100%	40	100%	120	100%

Q2-4 How often is your garbage collected?

	Low		Middle		High		Total	
	Number	%	Number	%	Number	%	Number	%
1 Daily	0	0%	0	0%	5	13%	5	4%
2 More than four times per week	0	0%	0	0%	9	23%	9	8%
3 Two to three times per week	12	30%	4	10%	7	18%	23	19%
4 Once a week	1	3%	4	10%	5	13%	10	8%
5 Less than once per week	0	0%	6	15%	0	0%	6	5%
6 Irregular	1	3%	8	20%	0	0%	9	8%
98 Don't know	0	0%	0	0%	0	0%	0	0%
99 Irrelevant	26	65%	18	45%	14	35%	58	48%
Total	40	100%	40	100%	40	100%	120	100%

Q2-5 Is the garbage collection service done at a fixed time on the collection day?

	Low		Middle		High		Total	
	Number	%	Number	%	Number	%	Number	%
1 Yes	4	10%	1	3%	12	30%	17	14%
2 No	10	25%	21	53%	14	35%	45	38%
98 Don't know	0	0%	0	0%	0	0%	0	0%
99 Irrelevant	26	65%	18	45%	14	35%	58	48%
Total	40	100%	40	100%	40	100%	120	100%

Q2-6 Have you ever given small allowance such as New Year's allowance and other seasonal allowance, including the reward to the extra work for you, to garbage collectors?

	Low		Middle		High		Total	
	Number	%	Number	%	Number	%	Number	%
1 Yes	0	0%	0	0%	3	8%	3	3%
2 No	14	35%	22	55%	23	58%	59	49%
99 Irrelevant	26	65%	18	45%	14	35%	58	48%
Total	40	100%	40	100%	40	100%	120	100%

Q2-7 How much is the total amount of (1) small allowance and (2) the reward you gave over the last one year?

(1) Small allowance

(Rs.)	Low	Middle	High	Total
Average annual small allowance	-	-	-	-

(2) Reward

(Rs.)	Low	Middle	High	Total
Average annual reward	-	-	37	37

Note: No. of effective answers on this question is 3.

Q2-8 Are you satisfied with the collection service?

	Low		Middle		High		Total	
	Number	%	Number	%	Number	%	Number	%
1 Very satisfied	4	10%	0	0%	8	20%	12	10%
2 Somewhat satisfied	4	10%	7	18%	9	23%	20	17%
3 Less than satisfied	6	15%	8	20%	7	18%	21	18%
4 Not satisfied at all	0	0%	7	18%	2	5%	9	8%
99 Irrelevant	26	65%	18	45%	14	35%	58	48%
Total	40	100%	40	100%	40	100%	120	100%

Q2-9 If you chose 2, 3 or 4, what are the reasons? (Choose one or more)

	Low		Middle		High		Total	
	Number	%	Number	%	Number	%	Number	%
1 Garbage collection / sweeping is not properly done	7	12%	18	20%	13	20%	38	18%
2 Garbage collection / sweeping frequency is too low	8	14%	21	24%	11	17%	40	19%
3 Garbage collection / sweeping is irregular	4	7%	14	16%	9	14%	27	13%
4 Garbage collection time is too early or too late or irregular	6	10%	15	17%	8	12%	29	14%
5 Behavior of garbage collection workers is bad	0	0%	0	0%	0	0%	0	0%
6 Garbage collection workers demand small allowance	0	0%	0	0%	0	0%	0	0%
7 Garbage collection small allowance is expensive	0	0%	0	0%	0	0%	0	0%
8 Collection service is not fair	0	0%	0	0%	0	0%	0	0%
9 Garbage collection point is too far	2	3%	2	2%	3	5%	7	3%
10 Other	1	2%	1	1%	0	0%	2	1%
99 Irrelevant	30	52%	18	20%	22	33%	70	33%
Total	58	100%	89	100%	66	100%	213	100%

Note: Other means "animal problems" and "not enough collection points".

Q2-10 Have you ever complained about the garbage collection service to the authorities in the last three years?

	Low		Middle		High		Total	
	Number	%	Number	%	Number	%	Number	%
1 Yes	3	8%	6	15%	7	18%	16	13%
2 No	11	28%	16	40%	19	48%	46	38%
99 Irrelevant	26	65%	18	45%	14	35%	58	48%
Total	40	100%	40	100%	40	100%	120	100%



Q2-11 ***(Only for persons who chose "NO" in question Q2-1)*** Do you want to receive a garbage collection service?

	Low		Middle		High		Total	
	Number	%	Number	%	Number	%	Number	%
1 Yes	18	45%	0	0%	0	0%	18	15%
2 No	5	13%	0	0%	0	0%	5	4%
99 Irrelevant	17	43%	40	100%	40	100%	97	81%
Total	40	100%	40	100%	40	100%	120	100%

### 3. Questions on Waste Discharge from Your Premises

Q3-1 How do you dispose of garbage generated in your premises?

	Low		Middle		High		Total	
	Main	Other	Main	Other	Main	Other	Main	Other
1 Discharge it outside of the house for the house to house collection	0	0	0	0	2	0	2	0
2 Discharge it at the specified place for the collection service	13	1	20	1	19	4	52	6
3 Open dumping outside of the house	5	1	1	1	5	1	11	3
4 Ask the relevant authority to send garbage collectors	0	0	0	0	0	0	0	0
5 Self-dispose	20	8	18	5	11	13	49	26
6 Composting (producing fertilizer from waste)	2	1	1	0	3	2	6	3
7 Give for recycling	0	0	0	0	0	0	0	0
8 Other	0	0	0	0	0	0	0	0
Total	40	11	40	7	40	20	120	38

	Low		Middle		High		Total	
	Main	Other	Main	Other	Main	Other	Main	Other
1 Discharge it outside of the house for the house to house collection	0%	0%	0%	0%	5%	0%	2%	0%
2 Discharge it at the specified place for the collection service	33%	9%	50%	14%	48%	20%	43%	16%
3 Open dumping outside of the house	13%	9%	3%	14%	13%	5%	9%	8%
4 Ask the relevant authority to send garbage collectors	0%	0%	0%	0%	0%	0%	0%	0%
5 Self-dispose	50%	73%	45%	71%	28%	65%	41%	68%
6 Composting (producing fertilizer from waste)	5%	9%	3%	0%	8%	10%	5%	8%
7 Give for recycling	0%	0%	0%	0%	0%	0%	0%	0%
8 Other	0%	0%	0%	0%	0%	0%	0%	0%
Total	100%	100%	100%	100%	100%	100%	100%	100%

Q3-2 How often do you dispose of garbage generated in your premises?

	Low		Middle		High		Total	
	Number	%	Number	%	Number	%	Number	%
1 As soon as waste arises	7	18%	1	3%	2	5%	10	8%
2 Once daily	29	73%	25	63%	29	73%	83	69%
3 Once every 2 or 3 days	3	8%	10	25%	8	20%	21	18%
4 Less frequently	1	3%	4	10%	1	3%	6	5%
Total	40	100%	40	100%	40	100%	120	100%

Q3-3 Who mainly handles wastes at home?

	Low		Middle		High		Total	
	Number	%	Number	%	Number	%	Number	%
1 An adult male member	2	5%	1	3%	5	13%	8	7%
2 An adult female member	38	95%	39	98%	27	68%	104	87%
3 Servant	0	0%	0	0%	8	20%	8	7%
4 Others	0	0%	0	0%	0	0%	0	0%
Total	40	100%	40	100%	40	100%	120	100%

Q3-4 (Only for persons who chose 2 in question Q3-1) Who mainly brings the wastes to a specific collection point?

	Low		Middle		High		Total	
	Number	%	Number	%	Number	%	Number	%
1 An adult male member	3	8%	6	15%	9	23%	18	15%
2 An adult female member	11	28%	13	33%	7	18%	31	26%
3 Child	0	0%	2	5%	1	3%	3	3%
4 Servant	0	0%	0	0%	6	15%	6	5%
5 Others	0	0%	0	0%	0	0%	0	0%
99 Irrelevant	26	65%	19	48%	17	43%	62	52%
Total	40	100%	40	100%	40	100%	120	100%

Q3-5 What type of container do you use for carrying garbage to a collection point or for placing the garbage outside of your house? (Choose one or more)

	Low		Middle		High		Total	
	Number	%	Number	%	Number	%	Number	%
1 Plastic bag	16	27%	17	33%	26	42%	59	34%
2 Paper bag	0	0%	0	0%	1	2%	1	1%
3 Metal/plastic/wood garbage bin	8	13%	24	47%	16	26%	48	28%
4 Box	9	15%	1	2%	0	0%	10	6%
5 Basket	3	5%	2	4%	12	19%	17	10%
6 None-place directly	24	40%	7	14%	7	11%	38	22%
7 Others	0	0%	0	0%	0	0%	0	0%
Total	60	100%	51	100%	62	100%	173	100%

Q3-6 Why do you use it? (Choose one or more)

	Low		Middle		High		Total	
	Number	%	Number	%	Number	%	Number	%
1 It is clean after collection work	8	13%	17	26%	12	17%	37	19%
2 It prevents foul odors	2	3%	2	3%	3	4%	7	4%
3 It is easy handling	39	63%	34	52%	38	53%	111	56%
4 It keeps away pests such as flies	2	3%	4	6%	7	10%	13	7%
5 It is cheap or easy to get	11	18%	8	12%	12	17%	31	16%
6 Other	0	0%	0	0%	0	0%	0	0%
Total	62	100%	65	100%	72	100%	199	100%

**Q3-7 (Only for those who did not choose 2 in Q3-1)** If you are requested to carry your garbage to a specified garbage collection point, would you cooperate to do so?

	Low		Middle		High		Total	
	Number	%	Number	%	Number	%	Number	%
1 Yes, if it is located within 25m distance (30 sec to walk)	5	13%	8	20%	9	23%	22	18%
2 Yes, if it is located within 50m distance (1 min to walk)	12	30%	0	0%	1	3%	13	11%
3 No, I do not prefer the collection system mentioned above anyway	9	23%	11	28%	7	18%	27	23%
4 Others	0	0%	0	0%	0	0%	0	0%
98 Don't know	0	0%	0	0%	0	0%	0	0%
99 Irrelevant	14	35%	21	53%	23	58%	58	48%
Total	40	100%	40	100%	40	100%	120	100%

**Q3-8** Do you have garden wastes (fallen leafs and branches or grass and weeds)?

	Low		Middle		High		Total	
	Number	%	Number	%	Number	%	Number	%
1 Yes	34	85%	31	78%	34	85%	99	83%
2 No	6	15%	9	23%	6	15%	21	18%
Total	40	100%	40	100%	40	100%	120	100%

**Q3-9** How do you discharge your garden wastes generally?

	Low		Middle		High		Total	
	Number	%	Number	%	Number	%	Number	%
1 Discharge it at the collection point with the other wastes for collection	3	8%	4	10%	6	15%	13	11%
2 Discharge it outside of my premises with the other wastes for collection	0	0%	0	0%	0	0%	0	0%
3 Ask the relevant authorities to send garbage collectors	0	0%	0	0%	0	0%	0	0%
4 Self-dispose	27	68%	25	63%	23	58%	75	63%
5 Composting (producing fertilizer from waste)	4	10%	2	5%	4	10%	10	8%
6 Give for composting	0	0%	0	0%	0	0%	0	0%
7 Others	0	0%	0	0%	1	3%	1	1%
99 Irrelevant	6	15%	9	23%	6	15%	21	18%
Total	40	100%	40	100%	40	100%	120	100%

Note: Other means "open dumping."

**Q3-10 (Only for those who chose 3 in Q3-1)** Where do you dispose of your garbage by open dumping?

	Low		Middle		High		Total	
	Number	%	Number	%	Number	%	Number	%
1 On banks of or in stream / river	0	0%	0	0%	3	8%	3	3%
2 On vacant land	5	13%	0	0%	3	8%	8	7%
3 In a gully	0	0%	2	5%	0	0%	2	2%
4 In the sea	0	0%	0	0%	0	0%	0	0%
5 Others	1	3%	0	0%	0	0%	1	1%
99 Irrelevant	34	85%	38	95%	34	85%	106	88%
Total	40	100%	40	100%	40	100%	120	100%

#### 4. Questions on Recycling and Waste Reduction

Q4-1 Recycling of waste is most effective if the waste can be sorted into different categories by the household. If the relevant authorities such as municipal councils and urban councils introduce a separate garbage collection system, you will be requested to separate your wastes into a number of categories, for example, such as i.) compostable waste such as food waste, paper and garden waste ii.) recyclable waste such as metals, glass, plastics, paper and iii.) other wastes. Are you willing to cooperate with this type of system?

	Low		Middle		High		Total	
	Number	%	Number	%	Number	%	Number	%
1 Very much willing to cooperate	27	68%	30	75%	25	63%	82	68%
2 Somewhat willing to cooperate	7	18%	2	5%	4	10%	13	11%
3 Less willing to cooperate /somewhat unwilling to cooperate	3	8%	5	13%	3	8%	11	9%
4 Not willing to cooperate at all	3	8%	3	8%	8	20%	14	12%
5 Am doing already	0	0%	0	0%	0	0%	0	0%
Total	40	100%	40	100%	40	100%	120	100%

Q4-2 If you answered either 1 or 2 and 5, why do you think recycling is important? (Choose one or more)

	Low		Middle		High		Total	
	Number	%	Number	%	Number	%	Number	%
1 Recycling would reduce the amount of waste going to landfill	11	12%	26	29%	24	34%	61	28%
2 Recycling would help to protect environment	32	36%	28	31%	28	40%	88	41%
3 Recycling would allow you to earn some money	22	24%	12	13%	7	10%	41	19%
4 Others	0	0%	0	0%	0	0%	0	0%
99 Irrelevant	25	28%	25	27%	11	16%	25	12%
Total	90	100%	91	100%	70	100%	215	100%

Q4-3 If you answered either 1 or 2 and 5, how many categories would you be willing to separate your wastes into?

	Low		Middle		High		Total	
	Number	%	Number	%	Number	%	Number	%
1 Two	15	38%	22	55%	15	38%	52	43%
2 Three	13	33%	10	25%	14	35%	37	31%
3 More than that	6	15%	0	0%	0	0%	6	5%
99 Irrelevant	6	15%	8	20%	11	28%	25	21%
Total	40	100%	40	100%	40	100%	120	100%

Q4-4 If you choose 2, 3, or 4 in Q4-1, what are the reasons? (Choose one or more)

	Low		Middle		High		Total	
	Number	%	Number	%	Number	%	Number	%
1 It is inconvenient and difficult	9	16%	10	19%	13	24%	32	19%
2 It may increase financial burden regarding to the discharging cost	2	3%	0	0%	3	5%	5	3%
3 It will take much time	3	5%	2	4%	6	11%	11	7%
4 Needs for the recycling system is not clear	4	7%	2	4%	0	0%	6	4%
5 Benefits of the recycling system is not clear	4	7%	4	8%	0	0%	8	5%
6 There may be poor contribution from household members	8	14%	4	8%	6	11%	18	11%
7 Others	1	2%	0	0%	2	4%	3	2%
98 Don't know	0	0%	0	0%	0	0%	0	0%
99 Irrelevant	27	47%	30	58%	25	45%	82	50%
Total	58	100%	52	100%	55	100%	165	100%

Note: Other means "not sure if it functions well" and "we prefer composting first."

Q4-5 Is there someone who comes around to collect or buy your reusable or recyclable materials?

	Low		Middle		High		Total	
	Number	%	Number	%	Number	%	Number	%
1 Yes	37	95%	34	85%	30	75%	101	84%
2 No	2	5%	6	15%	10	25%	18	15%
3 Don't know	1		0	0%	0	0%	1	1%
Total	40	100%	40	100%	40	100%	120	100%

Q4-6 Which materials do they collect or buy from you?

	Low		Middle		High		Total	
	Number	%	Number	%	Number	%	Number	%
1 Glass	18	36%	17	33%	13	25%	48	31%
2 Cardboard	0	0%	0	0%	0	0%	0	0%
3 Paper	2	4%	4	8%	12	23%	18	12%
4 Metal can	2	4%	3	6%	1	2%	6	4%
5 Other metal	2	4%	2	4%	0	0%	4	3%
6 Kitchen waste	0	0%	0	0%	0	0%	0	0%
7 Garden waste	0	0%	0	0%	0	0%	0	0%
8 Plastics	0	0%	0	0%	1	2%	1	1%
9 Textiles (e.g. clothes)	7	14%	3	6%	0	0%	10	7%
10 Leather, rubber	0	0%	0	0%	0	0%	0	0%
11 Wood / Timber	0	0%	0	0%	0	0%	0	0%
12 Tyres	0	0%	0	0%	1	2%	1	1%
13 Others	0	0%	0	0%	0	0%	0	0%
98 Not selling	16	32%	16	31%	14	27%	46	30%
99 Irrelevant	3	6%	6	12%	10	19%	19	12%
Total	50	100%	51	100%	52	100%	153	100%

Q4-7 Do you take for recyclable materials to shops for refund or sale?

	Low		Middle		High		Total	
	Number	%	Number	%	Number	%	Number	%
1 Yes	16	40%	6	15%	11	28%	33	28%
2 No	24	60%	34	85%	29	73%	87	73%
Total	40	100%	40	100%	40	100%	120	100%

Q4-8(a) Which materials do you return or sell to shops?

	Low		Middle		High		Total	
	Number	%	Number	%	Number	%	Number	%
1 Glass	16	40%	5	13%	10	25%	31	26%
2 Cardboard	0	0%	0	0%	0	0%	0	0%
3 Paper	0	0%	1	3%	1	3%	2	2%
4 Metal can	0	0%	0	0%	0	0%	0	0%
5 Other metal	0	0%	0	0%	0	0%	0	0%
6 Kitchen waste	0	0%	0	0%	0	0%	0	0%
7 Garden waste	0	0%	0	0%	0	0%	0	0%
8 Plastics	0	0%	0	0%	0	0%	0	0%
9 Textiles (e.g. clothes)	0	0%	0	0%	0	0%	0	0%
10 Leather, rubber	0	0%	0	0%	0	0%	0	0%
11 Wood / Timber	0	0%	0	0%	0	0%	0	0%
12 Tyres	0	0%	0	0%	0	0%	0	0%
13 Others	0	0%	0	0%	0	0%	0	0%
99 Irrelevant	24	60%	34	85%	29	73%	87	73%
Total	40	100%	40	100%	40	100%	120	100%

Q4-8(b) *(Only for those choosing Yes in either Q4-5 or Q4-7)* What are the major materials collected from you or returned / sold to shops, and how much do you sell these for per month?

	Low	Middle	High	Total
1 First	Bottle (28)	Bottle (17)	Bottle (17)	Bottle (62)
2 Second	Cloth (7)	Paper (5)	Paper (13)	Paper (20)
3 Third	Paper (2)	Cloth (3)	-	Cloth (10)

Note: Bracketed figures show the number of households that sell these materials.

(Rs.)	Low	Middle	High	Total
Avg. monthly income from recycling	54	25	97	71

Note: Number of effective answers is 32.

Q4-9(a) Are you using kitchen and/or garden waste for compost?

	Low		Middle		High		Total	
	Number	%	Number	%	Number	%	Number	%
1 Yes	5	13%	2	5%	6	15%	13	11%
2 No	35	88%	38	95%	34	85%	107	89%
Total	40	100%	40	100%	40	100%	120	100%

Q4-9 (i) If yes to the previous question, how much of these wastes do you compost per month?

Kitchen	Low		Middle		High		Total	
	Number	%	Number	%	Number	%	Number	%
1 Less than half	0	0%	0	0%	0	0%	0	0%
2 Half	0	0%	0	0%	1	3%	1	1%
3 More than half	3	8%	1	3%	2	5%	6	5%
4 All	1	3%	1	3%	2	5%	4	3%
5 Irrelevant	36	90%	38	95%	35	88%	109	91%
Total	40	100%	40	100%	40	100%	120	100%

Garden	Low		Middle		High		Total	
	Number	%	Number	%	Number	%	Number	%
1 Less than half	0	0%	0	0%	1	3%	1	1%
2 Half	0	0%	0	0%	0	0%	0	0%
3 More than half	1	3%	0	0%	1	3%	2	2%
4 All	4	10%	2	5%	4	10%	10	8%
5 Irrelevant	35	88%	38	95%	34	85%	107	89%
Total	40	100%	40	100%	40	100%	120	100%

(ii) How much compost do you produce per month?

(Kg.)	Low	Middle	High	Total
Monthly compost production	5.0	16.0	5.0	8.7

Note: No. of effective answer is three. Two of them who use compost system has just started recently and haven't produced any compost yet.

(iii) What do you do with it?

	Low		Middle		High		Total	
	Number	%	Number	%	Number	%	Number	%
1 Sell	0	0%	0	0%	0	0%	0	0%
2 Own use	3	8%	2	5%	6	15%	11	9%
3 Irrelevant	37	93%	38	95%	34	85%	109	91%
Total	40	100%	40	100%	40	100%	120	100%

Note: Two of them who use compost system has just started recently and haven't produced any compost yet.

Q4-10 Hazardous waste refers to items like dead batteries, used spray cans, old medicines, old household chemicals, solvents, paints, etc. Considering all the solid waste produced by your household, how many hazardous waste items would you dispose of per month?

	Low		Middle		High		Total	
	Number	%	Number	%	Number	%	Number	%
1 None	12	30%	23	58%	13	33%	48	40%
2 One to two	18	45%	15	38%	13	33%	46	38%
3 Three to five	9	23%	2	5%	10	25%	21	18%
4 Six to ten	1	3%	0	0%	2	5%	3	3%
5 More than ten	0	0%	0	0%	2	5%	2	2%
Total	40	100%	40	100%	40	100%	120	100%

Q4-11 Suppose that you are satisfied with the service of Municipal solid waste management, either as is or as a result of improvement. Think for a moment about the largest amount of money that your household would be willing to pay each month as a garbage collection fee. (Important: If the garbage collection fee is more than this amount, your household will not be able to afford to pay and will not be able to use the garbage collection service.)

(Rs.)	Low	Middle	High	Total
Avg. amount of WTP (willingness to pay)	24	37	79	47

## 5. Public cooperation / Community participation

Q5-1 Now, we would like to ask about the community you live. In your community, do you have any community-based organizations to solve not only the waste problems but also other community problems?

	Low		Middle		High		Total	
	Number	%	Number	%	Number	%	Number	%
1 Yes	38	95%	27	68%	19	48%	84	70%
2 No	1	3%	13	33%	17	43%	31	26%
98 Don't know	1	3%	0	0%	4	10%	5	4%
Total	40	100%	40	100%	40	100%	120	100%

Q5-2 If yes, when did the community-based organization start functioning?

	Low		Middle		High		Total	
	Number	%	Number	%	Number	%	Number	%
1 Within five years	8	20%	1	3%	1	3%	10	8%
2 Between six to ten years	3	8%	0	0%	1	3%	4	3%
3 More than eleven years ago	5	13%	12	30%	3	8%	20	17%
98 Don't know	22	55%	14	35%	14	35%	50	42%
99 Irrelevant	2	5%	13	33%	21	53%	36	30%
Total	40	100%	40	100%	40	100%	120	100%



Q5-3 How is the leader of this community chosen?

	Low		Middle		High		Total	
	Number	%	Number	%	Number	%	Number	%
1 Democratically elected	22	55%	21	53%	7	18%	50	42%
2 Appointed by elders	0	0%	0	0%	0	0%	0	0%
3 Appointed by administration	0	0%	0	0%	0	0%	0	0%
4 Inherited	0	0%	0	0%	0	0%	0	0%
5 Others	0	0%	0	0%	0	0%	0	0%
98 Don't know	16	40%	6	15%	12	30%	34	28%
99 Irrelevant	2	5%	13	33%	21	53%	36	30%
Total	40	100%	40	100%	40	100%	120	100%

Q5-4 How often do you have the meetings?

	Low		Middle		High		Total	
	Number	%	Number	%	Number	%	Number	%
1 More often than once a month	13	33%	10	25%	3	8%	26	22%
2 Once in two months to five months	8	20%	4	10%	4	10%	16	13%
3 Once in six months	0	0%	3	8%	0	0%	3	3%
4 Once in seven to eleven months	0	0%	0	0%	0	0%	0	0%
5 Less often than once in a year	0	0%	4	10%	0	0%	4	3%
6 No meeting	1	3%	0	0%	0	0%	1	1%
98 Don't know	16	40%	6	15%	12	30%	34	28%
99 Irrelevant	2	5%	13	33%	21	53%	36	30%
Total	40	100%	40	100%	40	100%	120	100%

Q5-5 Have you ever discussed the methods of proper garbage handling and discharge at the meetings?

	Low		Middle		High		Total	
	Number	%	Number	%	Number	%	Number	%
1 Yes	6	15%	1	3%	1	3%	8	7%
2 No	15	38%	18	45%	6	15%	39	33%
98 Don't know	17	43%	8	20%	12	30%	37	31%
99 Irrelevant	2	5%	13	33%	21	53%	36	30%
Total	40	100%	40	100%	40	100%	120	100%

Q5-6 Have you ever been taught methods of proper garbage handling and discharge?

	Low		Middle		High		Total	
	Number	%	Number	%	Number	%	Number	%
1 Yes	32	80%	30	75%	25	63%	87	73%
2 No	8	20%	10	25%	15	38%	33	28%
Total	40	100%	40	100%	40	100%	120	100%

Q5-7 If "Yes" to the previous question, who taught these to you? (Choose one or more)

	Low		Middle		High		Total	
	Number	%	Number	%	Number	%	Number	%
1 Parents	7	10%	3	5%	4	7%	14	7%
2 Community leaders	6	9%	5	8%	1	2%	12	6%
3 School teachers	24	34%	22	34%	21	35%	67	35%
4 Local government	12	17%	10	16%	3	5%	25	13%
5 Central government	0	0%	0	0%	0	0%	0	0%
6 NGOs	6	9%	0	0%	0	0%	6	3%
7 Others	7	10%	14	22%	16	27%	37	19%
99 Irrelevant	8	11%	10	16%	15	25%	33	17%
Total	70	100%	64	100%	60	100%	194	100%

Note: Other means "mass media" and "at working place".

Q5-8 Does anyone in your family or your servant clean the side of the road or adjacent public area in front of your premises?

	Low		Middle		High		Total	
	Number	%	Number	%	Number	%	Number	%
1 Yes, almost everyday	10	25%	27	68%	26	65%	63	53%
2 Yes, sometimes	18	45%	11	28%	10	25%	39	33%
3 No	12	30%	2	5%	4	10%	18	15%
Total	40	100%	40	100%	40	100%	120	100%

Q5-9 Here please tell me about the behavior of your community population, and not yours. What are the most common methods to dispose of the garbage in this community?

	Low		Middle		High		Total	
	Number	%	Number	%	Number	%	Number	%
1 Picked up by garbage collection service	15	37%	27	51%	35	71%	77	54%
2 Burnt	1	2%	4	8%	0	0%	5	3%
3 Thrown in the open space or rivers	6	15%	10	19%	13	27%	29	20%
4 Just dumped on the yard / in the garden	14	34%	2	4%	0	0%	16	11%
5 Buried on the yard / in the garden	5	12%	8	15%	0	0%	13	9%
6 Others	0	0%	2	4%	0	0%	2	1%
98 Don't know	0	0%	0	0%	1	2%	1	1%
Total	41	100%	53	100%	49	100%	143	100%

Note: Other means "dump into the stream".

Q5-10 Has anyone in this household, including children, received any health and environmental education or information relating to solid waste?

	Low		Middle		High		Total	
	Number	%	Number	%	Number	%	Number	%
1 Yes	40	100%	40	100%	39	98%	119	99%
2 No	0	0%	0	0%	1	3%	1	1%
Total	40	100%	40	100%	40	100%	120	100%

Q5-11 If yes, where did this information come from? (Choose one or more)

	Low		Middle		High		Total	
	Number	%	Number	%	Number	%	Number	%
1 Parents	2	2%	2	2%	3	2%	7	2%
2 School	34	27%	32	30%	30	20%	96	25%
3 Medical worker /center / hospital	16	13%	4	4%	4	3%	24	6%
4 Community organization/ NGOs	7	5%	1	1%	0	0%	8	2%
5 Newspaper	8	6%	11	10%	36	24%	55	14%
6 Radio program	23	18%	15	14%	26	17%	64	17%
7 TV program	24	19%	33	31%	36	24%	93	24%
8 Local government	12	9%	7	6%	4	3%	23	6%
9 Central government	0	0%	1	1%	0	0%	1	0%
10 Others	2	2%	2	2%	9	6%	13	3%
99 Irrelevant	0	0%	0	0%	1	1%	1	0%
Total	128	100%	108	100%	149	100%	385	100%

Note : Other means "at working places."

Q5-12 Do you think a campaign to raise awareness of people for maintaining the cleaner city and environment is necessary?

	Low		Middle		High		Total	
	Number	%	Number	%	Number	%	Number	%
1 Very necessary	28	70%	36	90%	33	83%	97	81%
2 Somewhat necessary	8	20%	4	10%	6	15%	18	15%
3 Not very necessary	4	10%	0	0%	1	3%	5	4%
4 Not necessary at all	0	0%	0	0%	0	0%	0	0%
Total	40	100%	40	100%	40	100%	120	100%

## **3.2 Commercial/Industrial and Institutional Waste Generator Survey Results**

Commercial/industrial and institutional interview survey results for 60 samples within BMA are summarized in this section.

### **3.2.1 Garbage Discharge and Collection**

The following table sets out the main interview survey results relating to garbage discharge and collection. Some key points are summarized below:

- 50 (83%) enterprises are provided with a garbage collection service by BMC, with 47 (78%) of these using this service.
- 12 (20%) enterprises pay garbage collection workers informally, the average payment being 1,454Rs/yr (range = 50 to 6,000Rs/yr).
- 10 (21%) of the 47 enterprises using the garbage collection service are satisfied with it. The main reasons for dissatisfaction are:
  - Poor garbage discharge system (31).
  - Garbage collection/sweeping is irregular (27).
  - Garbage collection/sweeping is not done properly (25).
  - Garbage collection/sweeping frequency is too low (23).
  - Collection point is too far away (21).

The Lanka Nursing Home is also concerned about the handling and disposal of hazardous healthcare wastes.

- Nine (15%) enterprises have complained to BMC about the garbage collection service at least once in the last 3 years.

Table 3-1: Survey results - Garbage Discharge and Collection

Item	Small Waste Gen'rs	Large Waste Generators			Total
		Comm./ industrial	Other Inst'ns	Hospitals	
No of respondents	15	26	16	3	60
<b>Q1.5 - Garbage storage within premises (main method) - No of responses<sup>2,3</sup></b>					
a. Plastic bag	0	2	0	0	2
b. Open container	7	17	11	1	36
c. Container with lid	3	4	3	1	11
d. Place on ground/floor	1	2	2	0	5
e. Direct disposal	4	0	0	0	4
f. Other	0	1	0	0	1
<b>Q1.6 - Main method of garbage disposal - No of responses<sup>3</sup></b>					
a. Place outside for collection	8	1	4	0	13
b. Carry to collection vehicle	4	2	0	0	6
c. Take to collection point	3	8	4	2	17
d. Labourers collect from premises	0	5	4	1	10
e. Bury on site	0	0	0	0	0
f. Burn on site	0	3	4	0	7
g. Recycle	0	4	0	0	4
h. Compost	0	0	0	0	0
i. Open dumping	0	1	0	0	1
j. Other	0	2	0	0	2
<b>Q1.8 - Walking distance to garbage collection point - No of responses (only if chose Q1.6c)</b>					
a. 0-25m	0	6	4	2	12
b. 25-50m	2	1	0	0	3
c. 50-100m	1	1	0	0	2
d. 100-250m	0	0	0	0	0
e. Over 250m	0	1	0	0	1
<b>Q1.12 to 1.13 - Provision and use of garbage collection service - No of responses</b>					
Provided	15	19	13	3	50
Not provided	0	7	3	0	10
Use	15	17	12	3	47
Want	N/a	2	1	N/a	3
<b>Q1.14 - Garbage discharge and collection frequency - No of responses</b>					
Discharge at least once daily	13	16	12	3	44
Collection at least daily	13	11	9	3	36
<b>Q1.15 to 1.17 - Garbage collection worker payment<sup>3</sup></b>					
No giving payments	5	5	1	1	12
Average payment (Rs/yr)	70	2,120	6,000	500	1,454
Range (Rs/yr)	50-100	200-6,000	N/a	N/a	50-6,000
Total (Rs/yr)	350	10,600	6,000	500	17,450
<b>Q1.18 - Satisfaction with existing garbage collection service</b>					
Satisfied (no)	3	4	2	1	10
Dissatisfied (no)	12	13	10	2	37
Reasons for dissatisfaction:					
a. Poor discharge system	11	11	9	0	31
b. Collection point too far away	8	7	6	0	21
c. Coll'n/sweep. not done properly	8	10	5	2	25
d. Collection/sweeping is irregular	7	10	8	2	27
e. Coll'n/sweep. frequency too low	5	9	7	2	23
f. Collection time is too early/late	3	6	7	0	16
g. Garbage workers behave badly	0	3	0	0	3
h. labourers demand payment	1	0	0	0	1
i. LA garbage fee is too high	0	5	0	0	5
j. Lack of recycling	6	3	5	1	15
k. Problems handling hazardous healthcare waste	N/a	N/a	N/a	1	1
<b>Q1.19 - Complaints to CUC in last 3 years - No of responses</b>					
a. None	13	12	9	2	36
b. Once only	0	0	0	0	0
c. Several times	2	3	1	1	7
d. More than 5 time	0	1	1	0	2

Notes: Hospital garbage storage and disposal results apply to normal garbage; N/a = not applicable.

### 3.2.2 Improvements to Garbage Collection and Disposal

The following table sets out the main interview survey results relating to desired improvements to garbage discharge and collection. Some key points are summarized below:

- The five most desired improvements to garbage collection and disposal in descending order are:
  - Improved discharge system (Weighted average rank, WAR = 50.5).
  - Public education (WAR = 38.5).
  - Shorter distance to collection point (WAR = 25.5).
  - Greater recycling/composting (WAR = 21.0).
  - More reliable service (16.0).

Improved collection and disposal of healthcare hazardous waste was also of concern to the General Hospital.

- Most enterprises thought that BMC (43, 72%) should pay for improved garbage collection and disposal. However, 18 (30%) supported the introduction of an individual garbage collection fee.
- 41 (68%) enterprises indicated they were willing to pay a garbage collection fee, while five were not willing to pay anything. The average willingness to pay (WTP<sup>1</sup>) was 487Rs/mth (range = 100 to 1,200Rs/mth). Another 14 enterprises did not respond to this question. The non-respondents felt unable to make such a decision without referring it to more senior management, or in the case of institutions, to provincial/central government.

**Table 3-2: Survey Results – Improvements to Garbage Collection and Disposal**

Item	Small Waste Gen'rs	Large Waste Generators			Total
		Comm./ industrial	Other Inst'ns	Hospitals	
No of respondents	15	26	16	3	60
<b>Q2.1 - Desired improvements to garbage collection/disposal – weighted average rank</b>					
a. Improved discharge system	7.0	25.0	16.5	2.0	50.5
b. Closer collection point	10.0	9.0	5.0	1.5	25.5
c. More reliable service	6.0	10.0	3.5	2.5	16.0
d. Improved collection frequency	0.5	8.0	3.0	1.5	13.0
e. Greater recycling/composting	6.0	6.0	6.0	3.0	21.0
f. Improve landfill operation	3.0	8.5	1.0	2.0	14.5
g. Public education	13.0	14.0	10.0	4.5	38.5
h. Other	2.0	6.0	3.0	2.5	13.5
i. Improved collection/disposal of hospital hazardous waste	N/a	N/a	N/a	1.0	1.0
<b>Q2.2 – Who should pay for improved garbage collection/disposal – No of responses</b>					
a. Central government	1	3	4	0	8
b. Provincial Council	0	2	0	0	2
c. Local authority	11	21	10	1	43
d. Individual garbage fee	5	9	2	2	18
e. Other	1	1	5	1	8
f. No response	0	1	0	0	1
<b>Q2.3 - Willingness to pay for improved garbage collection/disposal</b>					
Willing to pay (no)	14	20	5	2	41
Not willing to pay (no)	1	0	3	1	5
No response (no)	0	6	8	0	14
Willingness to pay (Rs/mth)	227	730	375	467	487

Notes: N/a = not applicable

<sup>1</sup> WTP includes non-zero and zero responses.

### 3.2.3 Recycling and Possible Source Separation Collection System

The following table sets out the main interview survey results relating to recycling and a possible source separation collection system. Some key points are summarized below:

- 60 (100%) enterprises believed recycling is necessary, with 54 (90%) enterprises being either very willing (52) or somewhat willing (2) to cooperate in separating their garbage at source, while two are doing this already. The main reasons given by those enterprises not willing to cooperate are that it is inconvenient/difficult (4) or takes too much time (1). The main reasons given by those willing to cooperate are that recycling protects the environment (52), followed by it reduces the amount of waste to disposal (13). 35 of these respondents are willing to sort their wastes into three (24) or more (11) categories, with the preferred source separation system being coloured plastic bags followed by permanent containers, collected from outside their premises.
- Six enterprises were willing to pay for permanent containers, while three were not willing to pay anything, the average WTP being 192Rs. There were 49 non-responses mainly from hotels and institutions, for the reasons described above.

Table 3-3: Survey Results – Recycling and Possible Source Separation System

Item	Small Waste Gen'rs	Large Waste Generators			Total
		Comm./ industrial	Other Inst'ns	Hospitals	
No of respondents	15	26	16	3	60
<b>Q2.4 – Recycling – No of responses</b>					
Necessary	15	26	16	3	60
<b>Q2.5 – Willingness to cooperate in separating wastes at source – No of responses</b>					
a. Very willing	15	22	13	2	52
b. Somewhat willing	0	0	1	1	2
c. Less/somewhat unwilling	0	0	0	0	0
d. Not willing at all	0	2	2	0	4
e. Already sort	0	2	0	0	2
f. No response	0	0	0	0	0
<b>Q2.6 – Reasons for not being willing to cooperate – No of responses (only if chose Q2.5c or d)</b>					
a. Increased financial burden	0	0	0	0	0
b. Inconvenient/difficult	0	2	2	0	4
c. Takes too much time	0	0	1	0	1
d. Needs/benefits not clear	0	0	0	0	0
e. Other	0	0	0	0	0
f. No response	0	0	0	0	0
<b>Q2.7 – Reasons for being willing to cooperate – No of responses (only if chose Q2.5a, b or e)</b>					
a. Reduces waste to landfill	7	5	1	0	13
b. Protects environment	15	20	14	3	52
c. Earn some extra money	0	2	3	0	5
d. Other	0	0	0	0	0
<b>Q2.8 – No of categories willing to separate waste into – No of responses (only for Q2.5a,b or e)</b>					
a. Two	8	8	3	0	19
b. Three	5	10	8	1	24
c. More than three	2	4	3	2	11
d. No response	0	4	2	0	6
<b>Q2.9 – Preferred separate collection system – Weighted average rank (only for Q2.5a,b or e)</b>					
a. Coloured plastic bags collected from outside premises	15.0	24.0	10.5	2.5	52.0
b. Permanent coloured containers collected from outside premises	4.5	4.5	6.0	2.5	17.5
c. Own bags/containers collected from outside premises	0.0	6.0	1.5	2.5	10.0
d. Own bags/containers taken to community collection point	3.0	0.0	3.0	0.0	6.0
e. Other	0.0	0.0	0.0	0.0	0.0
<b>Q2.10 – Willingness to pay for permanent containers for source separation system – (only for Q2.5a,b or e)</b>					
Willing to pay (no)	2	2	2	0	6
Not willing to pay (no)	1	0	1	1	3

No response (no)	12	22	13	2	49
Willingness to pay (Rs)	73	250	333	0	192

### 3.2.4 Composting

The following table sets out the main interview survey results relating to on-site composting. Some key points are summarized below:

- Eight (13%) enterprises are willing to undertake on-site composting, while two are doing so already. However, the majority (50, 83%) of enterprises are not in favour, mainly due to a lack of space on site (30) and it taking too much time (21). Only three enterprises indicated a WTP for a compost container, giving an average WTP of 417Rs. However, this is not considered representative due to the low number of responses. Another four enterprises did not respond to this question.
- 35 (58%) enterprises were willing to store their organic wastes for up to one day, if they were to be collected for composting at a centralized facility, while another 23 enterprises are willing to store their organic wastes for longer periods.

Table 3-4: Survey Results – Composting

Item	Small Waste Gen'rs	Large Waste Generators			Total
		Comm./ industrial	Other Inst'ns	Hospitals	
No of respondents	15	26	16	3	60
<b>Q2.11 – Willing to compost – No of responses</b>					
a. Already compost	0	0	2	0	2
b. Willing	0	3	4	1	8
c. Not willing	15	23	10	2	50
d. No response	0	0	0	0	0
<b>Q2.12 – Willingness to pay for compost system – (only if chose Q2.11b)</b>					
Willing to pay (no)	Not asked	1	2	Not asked	3
Not willing to pay (no)		0	0		0
No response (no)		2	2		4
Willingness to pay (Rs)		750	250		417
<b>Q2.13 – Reasons for not being willing to compost – No of responses (only if chose Q2.11c)</b>					
a. Not enough space on site	Not asked	21	9	Not asked	30
b. Takes too much time		15	6		21
c. LA/contractor should do		0	0		0
d. No equipment		0	0		0
e. Lack of knowledge		1	0		1
f. Concern about smell/pests		0	0		0
g. Not interested		3	1		4
h. Other		2	3		5
i. No response		1	0		1
<b>Q2.14 – Factors that would encourage on-site composting (only if chose Q2.11b or c)</b>					
a. Free compost container	Not asked	2	3	Not asked	5
b. Availability of cheap, easy to use, nuisance free system		3	5		8
c. Reduction in LA taxes		1	0		1
d. Education/training		2	2		4
e. Earning extra money		0	0		0
f. No response		21	11		32
<b>Q2.15 – Willingness to store organic wastes between collection – No of days</b>					
a. Half a day	2	1	1	0	4
b. One day	7	13	9	2	31
c. Two days	2	2	3	0	7
d. Three days	0	1	0	1	2
e. More than 3 days	4	7	3	0	14
f. No response	0	1	0	0	1



### 3.2.5 Environmental Education and General Cleanliness

The following table sets out the main interview survey results relating to on-site composting. Some key points are summarized below:

- 26 (43%) enterprises indicated they have received some health/environmental education related to SWM.
- Most people had received this training as part of their work, including vocational training (e.g. hospitals), on the job training (e.g. hotels) and seminars.
- 60 (100%) enterprises consider a campaign to raise peoples' awareness for maintaining a cleaner city and environment is very necessary.

**Table 3-5: Survey Results – Environmental Education and General Cleanliness**

Item	Small Waste Gen'rs	Large Waste Generators			Total
		Comm./ industrial	Other Inst'ns	Hospitals	
No of respondents	15	26	16	3	60
<b>Q3.1 to 3.2 – Receipt of Health/environmental education/knowledge about SWM</b>					
No of responses	3	7	13	3	26
Source:					
a. School	1	0	2	0	3
b. Leaflets/posters, etc.	3	2	4	1	10
c. Health worker/centre	1	0	4	2	7
d. Community organization/NGO	0	3	0	0	3
e. Newspaper	1	2	5	2	10
f. Radio programme	1	2	5	2	10
g. TV programmes	1	2	4	2	9
h. Local authority	0	2	2	0	4
i. Local authority contractor	0	1	0	1	2
j. Central government/MOH	0	0	7	2	9
k. Other	3	3	7	0	13
l. No response	0	0	0	1	1
<b>Q3.2 – Necessity for campaign to raise peoples' awareness of need for cleaner city/environment</b>					
a. Very necessary	15	26	16	3	60
b. Somewhat necessary	0	0	0	0	0
c. Not very necessary	0	0	0	0	0
d. Not necessary at all	0	0	0	0	0
e. No response	0	0	0	0	0

Note: MOH = Ministry of Health

### 3.2.6 Other Comments

Other comments covered a broad range of issues and are summarized below. The most common comments relate to:

- A need for public education/awareness raising (16)
- Widespread support for recycling (15).
- Polythene should be banned (9).
- Daily cleaning (6).

The Colombo Commercial Engineering Co. offered technical assistance to produce energy from waste, including household biogas units.

Table 3-6: Survey Results – Other Comments

Comments	Small Waste Genr's	Large Waste Generators			Total
		Comm./ Indust.	Other Inst'ns	Hosp -itals	
<b>Five or more comments</b>					
Education/awareness raising, including on recycling (6), reducing polythene use (1), targeting school children and encouraging them with incentive system (1) and using multi-media (1)	4	6	3	3	16
Supports recycling	5	3	7	0	15
Ban polythene	1	5	3	0	9
Daily cleaning	0	3	3	0	6
<b>Three or four comments</b>					
Limit/reduce polythene use	0	3	1	0	4
Introduce biodegradable bags	0	1	3	0	4
Improve SWM system	2	0	1	1	4
Supports composting	0	0	3	0	3
<b>Two comments</b>					
Control stray animals	0	0	2	0	2
Proper supervision	0	1	1	0	2
Put bins in suitable places	0	2	0	0	2
Improve labourers' working conditions	0	0	1	1	2
Provide facilities for recycling/start recycling projects	0	2	0	0	2
Implement Q2.1 suggestions	0	1	0	1	2
<b>One comment</b>					
Clean the city	0	1	0	0	1
Implement JICA's suggestions	0	0	1	0	1
Use regulations to encourage recycling	1	0	0	0	1
Privatise SWM service	1	1	0	1	1
Get PHIs to do their duties well	0	0	1	0	1
Give responsibilities to different people and incentives for proper management	0	0	1	0	1
Train labourers	1	0	0	0	1
Increase number of labourers and vehicles	0	1	0	0	1
SWM at household level	0	0	1	0	1
Suitable transport system	0	0	0	1	1
Regular waste collection	0	0	0	1	1
Scheduled collection time	0	0	1	0	1
Increase collection frequency	0	1	0	0	1
New bins	0	1	0	0	1
Covered bins	0	1	0	0	1
Provide SWM facilities	0	0	1	0	1
Use machinery rather than humans	0	0	1	0	1
Clean drains and roads properly	0	1	0	0	1
Proper waste management system for meat/fish stalls	0	0	1	0	1
Provide bins for classrooms	0	0	1	0	1
Use polythene in an environmentally friendly manner	1	0	0	0	1
Start recycling programme with Uva Chamber of Commerce	0	1	0	0	1

Comments	Small Waste Genr's	Large Waste Generators			Total
		Comm./ Indust.	Other Inst'ns	Hosp -itals	
Promote composting by advertising using CTB vehicles	0	1	0	0	1
Community participation in recycling	0	1	0	0	1
Separate area for middleman shops	0	1	0	0	1
Can provide technology to produce energy from waste. including household biogas units (Colombo Commercial Engineering Co)	0	1	0	0	1
Provide technology/assistance to households for composting	0	1	0	0	1
Biogas	0	0	1	0	1
Centralised treatment plant for Badulla	0	0	1	0	1
Better incinerator for general hospital	0	0	0	1	1
Technical/financial assistance to start compost project at hospital	0	0	0	1	1
Proper hospital hazardous waste disposal system	0	0	0	1	1
<b>Other comments</b>					
Clean drains regularly	1	2	0	0	3
Proper drainage system	0	0	3	0	3
Repair drains	0	2	0	0	2
Toilet facilities	0	0	1	0	1
Control toilet effluent entering drains, especially from prison	0	1	0	0	1
Introduce tree planting programme – can help such a programme (Unicorn garment factory)	0	1	0	0	1
Reforestation	0	0	1	0	1