



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

FINAL REPORT VOLUME I SUMMARY



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

**FINAL REPORT
VOLUME I
SUMMARY**

DECEMBER 2003

KOKUSAI KOGYO CO., LTD.

List of Volumes

Volume	Name of Reports
I	Summary
II	Main Report
III	Supporting Report
IV	SWM Guideline for Local Governments
V-1A	Action Plan for Badulla, Main Report
V-1B	Action Plan for Badulla, Supporting Report
V-2A	Action Plan for Chilaw, Main Report
V-2B	Action Plan for Chilaw, Supporting Report
V-3A	Action Plan for Gampaha, Main Report
V-3B	Action Plan for Gampaha, Supporting Report
V-4A	Action Plan for Kandy, Main Report
V-4B	Action Plan for Kandy, Supporting Report
V-5A	Action Plan for Matale, Main Report
V-5B	Action Plan for Matale, Supporting Report
V-6A	Action Plan for Negombo, Main Report
V-6B	Action Plan for Negombo, Supporting Report
V-7A	Action Plan for Nuwara Eliya, Main Report
V-7B	Action Plan for Nuwara Eliya, Supporting Report

This is Summary.



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

PREFACE

In response to a request from the Government of the Democratic Socialist Republic of Sri Lanka, the Government of Japan decided to conduct a development study on Improvement of Solid Waste Management in Secondary Cities and entrusted the study to the Japan International Cooperation Agency (JICA).

JICA selected and dispatched a study team headed by Mr. Akira Doi, KOKUSAI KOGYO CO., LTD. to Sri Lanka three times between May 2002 and November 2003.

In addition, JICA set up an advisory committee headed by Dr. Isamu Yokota, a professor of Graduated School of Nutritional and Environmental Sciences, University of Shizuoka, between April 2002 and October 2003, which examined the study from specialist and technical point of view.

The team held discussions with the officials concerned of the Government of the Democratic Socialist Republic of Sri Lanka and conducted field surveys at the study area. Upon returning to Japan, the team conducted further studies and prepared this final report.

I hope that this report will contribute to the promotion of this project and to the enhancement of friendly relationship between our two countries.

Finally, I wish to express my sincere appreciation to the officials concerned of the Government of the Democratic Socialist Republic of Sri Lanka for their close cooperation extended to the Team

December, 2003
Kazuhisa Matsuoka
Vice President
Japan International Cooperation Agency

December, 2003

Mr. Kazuhisa Matsuoka
Vice President
Japan International Cooperation Agency

Letter of Transmittal

Dear Mr. Matsuoka,

We are pleased to submit to you the report on The Study on Improvement of Solid Waste Management in Secondary Cities in the Democratic Socialist Republic of Sri Lanka.

This study aimed to overcome waste related problems in the whole country. In the seven selected towns including Chilaw, Negombo, Gampaha, Matale, Kandy, Nuwara Eliya and Badulla, council staff and the Study Team jointly conducted the survey to understand the present conditions, formulated the action plans, and implemented the pilot projects in order to not only improve the problems but also develop their capacities. The many valuable lessons obtained through the series of operations were compiled in the solid waste management guideline to be utilized by many local authorities.

As for the national level, the Study recommended the central government to establish a National Solid Waste Management Support Centre for local authorities and to strengthen the financial scheme for solid waste management projects.

We would like to emphasize that the prompt implementation of the recommendations is essential to ensure Sri Lanka's sustainable development because the waste problems are getting more and more serious.

We wish to take this opportunity to express our sincere gratitude to your Agency, the Ministry of Foreign Affairs and the Ministry of Environment. We would also like to extend our sincere gratitude to the Government of Sri Lanka, the seven selected towns, the Embassy of Japan and the JICA Colombo office.

Finally, we hope that this report will help improve and enhance solid waste management in all towns in Sri Lanka.

Respectfully,

Akira Doi
Team Leader
The Study on Improvement of Solid Waste Management in Secondary Cities

Outline

1. Introduction

The Study aimed to formulate a plan to cope with waste related problems in the whole country of Sri Lanka. Chilaw, Negombo, Gampaha, Matale, Kandy, Nuwara Eliya and Badulla were selected as model towns for the Study, which was implemented by using the following approach.

- 1) An appropriate and practical solid waste management action plan for each model town was formulated taking the characteristics of each town into account.
- 2) Pilot projects in model towns aiming at the actual improvement of some aspects of solid waste management were jointly implemented.
- 3) Taking experiences and lessons learned into account, the guidelines for local authorities for improvement of solid waste management was formulated.
- 4) Policy recommendations for the central government were made.
- 5) Technologies were transferred to the counterpart personnel in the course of the Study

2. General Problems and Causes in LAs

Common Problems

- 1) Widespread scattering of waste in the towns
- 2) Terrible conditions of landfill sites and little remaining capacity of existing landfill sites
- 3) Difficulty in establishing new landfill sites
- 4) Stagnation or failure of many compost and recycling projects
- 5) Huge SWM expenditure, approximately 20% to 50% of the LA's total budget
- 6) Difficulty in controlling many waste collection workers; approximately 30% to 50% of the LA's total employees
- 7) Very high absentee and leaving work rate; ranging from 10% to 20%
- 8) Many complaints from citizens
- 9) Lack of public cooperation
- 10) Political intervention

Main Causes

The following factors LAs generally have are main causes of problems.

- 1) Insufficient understanding of the importance of SWM works
- 2) Insufficient knowledge of SWM works
- 3) Difficulty in Acquisition of Land for Landfill Site
- 4) Lack of Social Consideration, Transparency, Accountability and Public Participation
- 5) Lack of Cost Control, Future Planning and Public Relations due to Weak Organisation

- 6) Lack of utilization of the external resources
- 7) Lack of Waste Discharge Rules
- 8) Lack of Social and Economic Consideration and Technology Oriented
- 9) Shortage of Financial Sources
- 10) Poor Governance

3. Pilot Projects

3.1 Pilot Projects for the National Level

Name of Pilot Projects	Input by the Study Team (1000 JY)
1) Formulation of model by-laws for local governments	550
2) Introduction of the bell collection system	(920)
3) Production of picture books on waste for children	3,630
4) Trial lecture on SWM in PHI (Public Health Inspector) training course	40
5) Lecture for university students and university staff on the social issues in SWM	120
6) Seminar for interested NGOs on the findings obtained through the Study	140
7) Seminar on SWM administration for decision making level staffs in PCs and LAs	850

3.2 Pilot Projects for Model Town

Name of LA	Chilaw	Negombo	Gampaha	Matale	Kandy	Nuwara Eliya	Badulla
Institutional building	●	●		●		●	●
Waste minimisation				●		●	●
Waste collection improvement	●	●	●	●	●	●	●
Environmental education	●		●	●		●	●
Landfill improvement				●			●
Input by the Study Team (1000 JY)	1,480	1,900	1,290	6,150	12,730	28,590	3,580

Note: The bulldozer amounting to 8.2 million JY which was procured by the JICA Colombo office for the landfill operation in Nuwara Eliya is excluded in the above table.

3.3 Evaluation of Main Pilot Projects

a. Bell Collection

In bell collection, the waste collection vehicle plays music to inform people it is approaching. People have to wait until it arrives to discharge their waste and directly give it to waste collection workers. If the bell collection method succeeds with public cooperation, waste scattering in towns can be greatly reduced, which will lead to a decrease in waste collection and street sweeping workers. The introduction of bell collection in the seven model towns resulted in a

decrease in waste scattered on roads by encouraging public cooperation. The introduction of bell collection into many local towns is expected because the method has been proven to be widely applicable in Sri Lanka.

b. Improvement of Existing Landfill Sites

The Gohagoda landfill site for Kandy which has been used for more than 30 years was having serious environmental impacts on the surroundings. These impacts were greatly mitigated by the improvement project including a leachate collection and treatment facility, greenery of slopes, prevention fences for waste scattering, a drainage system, access road, etc. This would be a good example for other local authorities.

The Moon Plains landfill site has been improved to the most sanitary landfill site in Sri Lanka at present. The improved site which has a leachate collection and treatment facility, a disposal pit for infectious waste, an education facility for sanitary landfill system, etc. is expected to demonstrate the sanitary landfill method and transfer the importance of sanitary landfill to many people in Sri Lanka as the model landfill site.

c. Environmental Education Centre

Environmental education centres were set up in four of the model towns and the capacity to execute the education at the centre and the on-site education were established. When the environmental education was executed to promote public cooperation for bell collection during the Study period, the staff in charge of education at each model town worked in close cooperation with the staff in charge of solid waste management works. The staff in these towns understood that the success of bell collection highly depends on the implementation of environmental education. It is expected that these towns will continue to carry out environmental education and show other towns the importance of such education.

d. School Recycling

The Study provided the funds for building storage facilities such as in-school collection centres in each of the six schools in the Gampaha Municipal area. Students collect recyclables such as glass bottles and paper at home and bring them to school on one or more designated days a month. Schools then sell them to the local recyclers. The income generated can be used to buy necessary goods for schools. Students are able to learn the importance of saving and recycling through the experience. The fact that all the schools still continue the activity eight months after it was introduced has proven that it is a practical method for teaching students the mentality to save.

e. Picture Books on Waste

A hundred thousand picture books on waste, which were prepared mainly by Ministry of Environment and Natural Resources, were distributed to all schools in the country by Central

Environmental Authority. Many people have given very positive responses to the picture book praising the effective use of pictures to convey the message. The pictures should be utilized not only as textbooks but also as cards and calendars as well.

f. Formulation of Model Solid Waste Management By-Laws

The solid waste management model by-laws prepared during the Study are in the process of being published by the Ministry of Home Affairs, Provincial Councils and Local Government. However, in some of local authorities such as Kandy the model by-laws have already been approved by the council and they are in the process of being approved in some local authorities. It is expected that they will be adopted by many local authorities.

g. Seminars

Various seminars, workshops and training were prepared in accordance with the targets including politicians, high ranking officers, staff in charge of solid waste management, trainees for public health, interested NGOs, academicians, etc. The fact that they were very eager to participate and asked various questions proves the lack of such information and opportunities.

4. Seminars and Trainings

Two seminars in each of the seven model towns and Colombo, altogether 16 seminars, were executed. As for the training of staff in the model towns, a total of 45 training activities were executed.

5. Improvement Plan

5.1 Improvement Plan For LAs

- 1) The waste collection cost will be reduced by the promotion of public cooperation and improvement of the waste collection system. The budget saved by this mean will be spent for waste treatment, the final disposal of waste, environmental education, etc. to improve the SWM quality.
- 2) The fundamental improvement of SWM problems will be materialized by an increase in the SWM budget, which will be obtained by an increase in revenue. The new revenue should incorporate the Polluter Pays Principle as much as possible.
- 3) Full utilisation of the existing internal resources (human, equipment, technology).
- 4) Full utilisation of external resources (citizens, business entities, private waste companies, NGOs, donors).
- 5) Full utilisation of social capital. (traditional recyclers, mentality to save “aparade”, etc.)

5.2 Improvement Plan For the Central Government

The continuous efforts by local authorities to improve solid waste management are obviously the top priority. However, this is not sufficient because solid waste management will become more serious. Therefore, the Study recommended the central government to give necessary support to local authorities as follows.

- **Establishment of a National Solid Waste Management Support Centre**
- **Strengthening of the Local Loan System for Facilitating SWM Projects of LAs**

a. **Establishment of a National Support Centre for the Improvement of SWM in LAs**

In order to strengthen the solid waste management capacities of local authorities, the above mentioned centre will be established under the Ministry of Home Affairs, Provincial Councils and Local Government. The Centre should have the function to provide local authorities with solid waste management technologies, formulation of improvement plan, useful information, trainings, seminars, etc. It should work as the focal point of foreign assistance in the field of solid waste management and additionally give useful information to the national coordinating committee for solid waste management to enable them to make the proper policy decisions.

b. **Strengthening of the Local Loan System for Facilitating SWM Projects of LAs**

Of a total of 300 LAs, about 10%, say 30 LAs, might urgently require the modernized solid waste management system. In this case, the total investment cost would be around one billion rupees. It is not necessary to start all projects immediately, but the first 30 LAs may commence the project within the next five years, as the number of cities which require new investment increases with the pace of urbanization in Sri Lanka. However, the mode of financial support should be both grants (around 50% of total) and low-interest loans in order to promote the solid waste management improvement projects considering the local authorities' poor financial capabilities.

In order to maintain the efficiency and sustainability of the project, it is important to seek the commitment to better services from the participating local authorities. The preconditions for the financial scheme should be a revenue increase plan, the preparation of long term SWM plan, council approval for land acquisition and compensation for the Project, a financial plan for the project, and an improvement plan of solid waste management efficiency.

6. Recommendation to the Central Government

a. **Implementation of the National Strategy for SWM**

- 1) Establishment of a National SWM Support Centre (NSWMSC)
- 2) Strengthening of Provincial and LA level coordinating committees for the implementation of the NSSWM.
- 3) Preparation of implementation plans for the NSSWM.

b. Establishment of A Financial Base for SWM

- 1) Establishment of a financial base for SWM in LAs
- 2) Implementation of the project for strengthening the local loan system for facilitating SWM projects of LAs
- 3) Promotion of the improvement of SWM by financial scheme
- 4) Establishment of the subsidy system to SWM projects
- 5) Establishment of incentive mechanism in the current subsidy system to LAs' ordinary budget towards the cost reduction

c. Strengthening of the Administrative capability for SWM

- 1) Strengthening of the administrative capability of PCs
- 2) Establishment of a principle to dispose of MSW within the juridical areas of LAs
- 3) Instruction to LAs of importance of landfill site acquisition
- 4) Promotion of private sector participation into SWM service
- 5) Acquisition of public cooperation
- 6) Strengthening of education and training functions on SWM

d. Implementation of the 3Rs and Proper Disposal

- 1) Establishment of PPPs
- 2) Promotion of reuse and recycling
- 3) Promotion of MSWM composting
- 4) Strengthening of enforcing and monitoring capability for SWM in LAs with public participation
- 5) Preparation of guidelines and standards for SWM

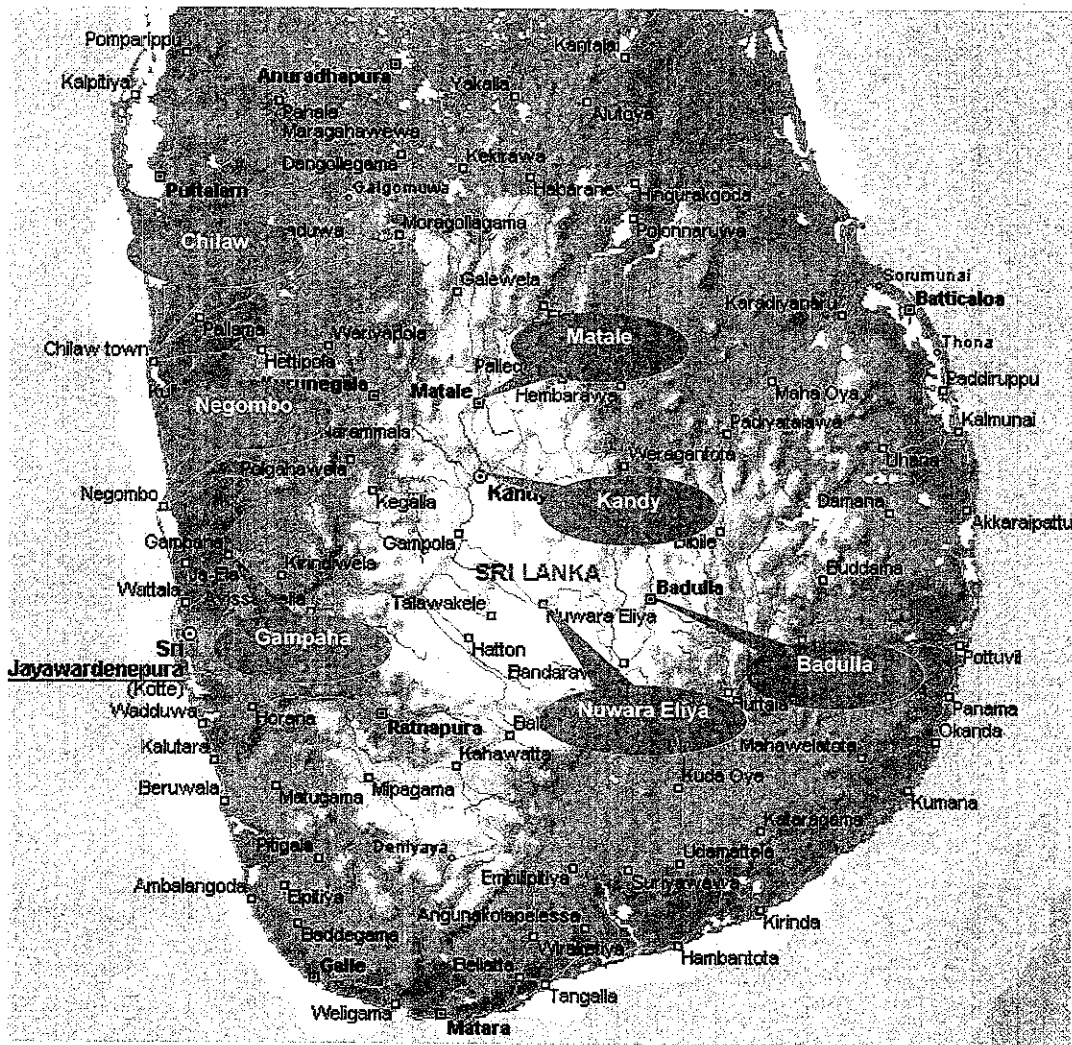
e. Social Actions

- 1) Eliminating bias to cleansing workers and traditional recyclers and to socially equitably evaluate them.
- 2) To provide cleansing workers to be reduced with another job opportunities as a safety net as the very limited job opportunity for them
- 3) Prevention from worsening workers' employment conditions to be brought with the introduction of market competition mechanism, and ignorance of environmental protection by contractors and price rise to be lead by the monopoly and oligopoly.
- 4) Public participation into the preparation process of the SWM action plan

f. Development of a Health Care Waste Management System



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



LOCATION MAP OF STUDY AREA

Plate 1: Waste Amount and Composition Survey

In Kandy and Matale, the basic data for SWM such as the waste discharge rates, the waste discharge amount, the waste collection amount per trip, etc. were measured. Based on these data and supplemental surveys at other towns, the waste discharge amounts, waste collection amounts, recycling amounts, uncollected waste amounts, self disposal amounts, etc. were estimated for drawing the waste stream of each model town. The waste survey was executed separately for residential waste by three income levels, market waste and municipal waste.



Waste discharge rate survey
30 waste samples from each of three income level households (high, middle, low) were collected for a week continuously. The amount was divided by the number of residents to get the waste discharge rate.



Mixing waste samples
Waste samples were well mixed together before the analysis to get the representative data.



Reducing amount by quartering method.
Waste samples were quartered and two quarters were disposed of and the remainder was mixed again. This process was repeated until the sample was reduced to the proper amount.



Measuring the bulk density
The weight and volume of the reduced waste sample was measured to get the bulk density. The bulk density was high, around 0.3, due to the small packaging waste content.



Physical composition of waste (Wet basis)
Waste samples were sorted into 11 categories by the type of waste, income level, market, etc.



Physical composition of waste (Wet basis)
Each waste sample sorted was weighed to get the percentage in weight.

Plate 2: Social Surveys

The formulation of a SWM system appropriate for the local condition requires an understanding of the local conditions related to waste issues and people's consciousness of waste. Social surveys were, therefore, executed to understand the waste discharge pattern and manner, the collection condition, people's level of satisfaction, willingness to pay for the waste collection service, etc. by interviewing. In addition, focus group discussion surveys were conducted to understand their opinions and conditions more widely and deeply.

One of the characteristics of the SWM works in Sri Lanka is the dominance of descendants of Indian Tamil immigrants from the British colonial era as cleansing workers. Their socio-economic conditions were understood through the interview survey for comprehensively planning the SWM works.



Training of interviewees was executed to ensure they understand the meaning of each question correctly.



The interview survey mainly targeting housewives was carried out for households.



To obtain the representative opinions from households, 30 samples were taken from each of the three different income categories: high, middle and low.



The focus group discussions targeting residents were executed in each model town. They actively expressed their opinions



The interview survey for cleansing workers was conducted in each model town.



The Study team employed a Tamil interviewer for Tamil workers who are dominant in cleansing works.

Plate 3: Pilot Project (PP) “Bell Collection”

Most of the LAs pointed out lack of public cooperation in SWM as one of the problems they faced, while in the public consciousness survey more than 90% of respondents expressed their willingness to cooperate. Which is true? Since public cooperation is a key factor in the improvement of SWM, whether it can be obtained is one of the most important factors in the formulation of the improvement plan. Examining the possibility of public cooperation was, therefore, targeted. In order to get public cooperation, the bell collection was introduced with the execution of an awareness programme, staff training, etc.



CDO and PHI visit houses one by one to explain the new waste discharge rule with leaflets and request people's cooperation. (Badulla MC)



MC staff explain the new waste discharge rule using a vehicle with megaphone, and request people's cooperation. (Badulla MC)



The majority of citizens very actively cooperate with the waste discharge rule. Sri Lankan people are very cooperative if they are clearly informed of what they should do. (Kandy)



Citizens cooperated very much in bell collection in the evening and even at night. (Badulla)



A notice board showing the new waste discharge rule was installed where there used to be a waste pile. A cow, which used to scavenge for food leftovers, looks hungry. (Badulla)

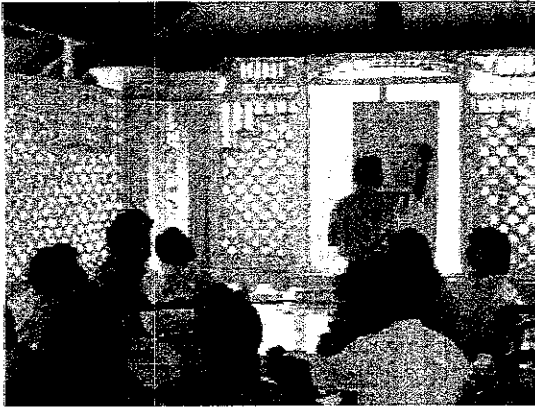
Citizens discharged waste onto roads when there was no waste discharge rule because they did not know when the waste collection tractor came. This mainly caused waste scattering. Most citizens appreciated the bell collection for helping to clean up the surroundings even though it limits them to discharge waste only on collection days.

Finally, we could confirm that Sri Lankan people are very cooperative in keeping the town clean.

Plate 4: PP “School Recycling ” (1/2)

The collective activity for collecting recyclable waste started at six schools to teach school children the system of separate discharge and the importance of resource recovery through the actual practice. In this programme, school children are requested to bring recyclable materials from home to their schools. They are sold to middlemen after being accumulated in the store room. Schools then purchase brooms, sports goods, etc. with the revenue from recyclables and school children can learn that recyclable waste can be a resource if it is sorted.

During the preparation process of the school recycling programme, the Study team conducted environmental education activities for school teachers and school children with the Mayor of Gampaha and municipal staff in order to raise their awareness of waste issues.



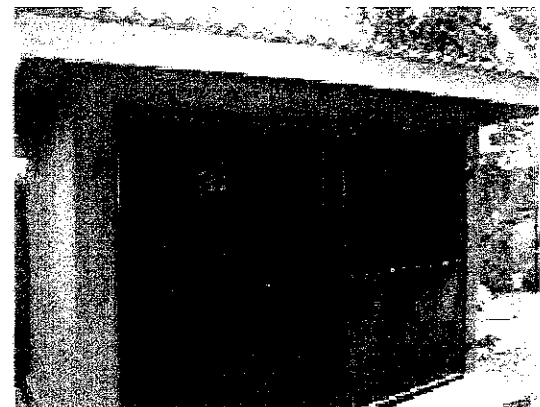
The school recycling programme was discussed and planned with the participation of the Mayor, commissioner, environmental officer, and other staff. Finally, six schools were selected.



The Mayor himself explained about the importance of environmental education and the current SWM work situation of the municipal council to teachers in selected school.



School children studied waste issues with enthusiasm in the environmental education workshop which was conducted before the school recycling programme.



A store room for recyclable materials 10 m² in size was constructed at each of the selected schools by JICA.

Plate 4: PP “School Recycling” (2/2)



The inauguration ceremony of the school recycling programme was held at each selected school with the attendance of the Mayor, an environmental officer and municipal staff. It helped to increase their sense of ownership of the project.



School children actively collected and sorted recyclables immediately after the opening ceremony.



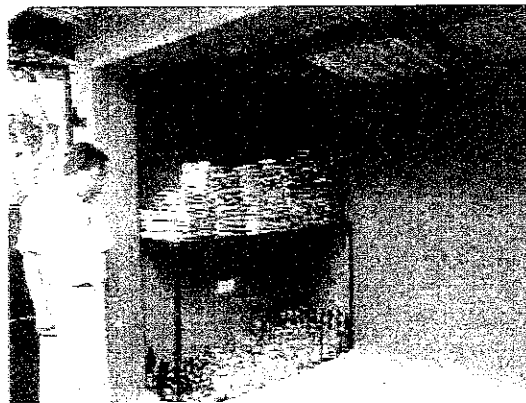
The environmental officer periodically visits selected schools to follow up the programme. She checks the condition of the programme and gives useful advice.



As for the schools which did not keep their store rooms clean, the Study team advised teachers to set a “Clean Day”. It encouraged all school children to clean the school in order to enhance their awareness of cleanliness.



Composting waste was promoted in this programme as well. However, it failed at all project schools due to lack of interest. Clean Day helped to raise awareness and encourage the students and, as a result, composting activities were greatly improved.



In the schools where teachers and school children care about the environment, the store room is always kept very clean.

Plate 5: PP “Improvement of the Gohagoda Landfill” (1/2)

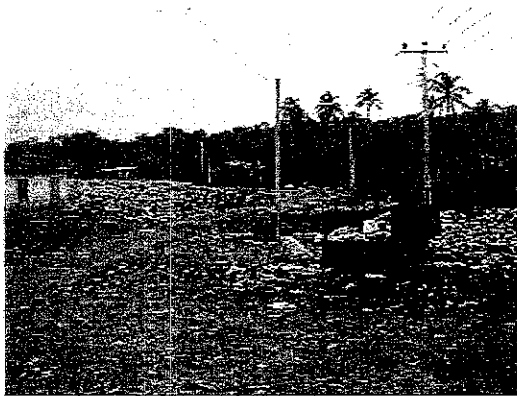
The Gohagoda landfill site in Kandy, which has been used for dumping waste since the 1970's, has had a serious impact on the surrounding environment and the Mahaweli River flowing nearby. This improvement project adopted several technologies to mitigate the existing negative impacts which can be used for other landfill sites.



Slope before the improvement
Waste dumped was completely exposed and offensive odour, fire, smoke, and many flies mosquitoes, and crows caused serious nuisance.



Slope after the improvement
The slope was nicely graded, covered with soil and turfed. A fence to prevent waste from scattering was installed along the top of the slope. This mitigated most of the impact and improved view.



Border before the improvement
There was no boundary between the landfill site and the road. This was a serious nuisance to people walking along the road.



Border after the improvement
An embankment was constructed along the edge of the landfill site using waste and it was turfed. People can now walk along the road without noticing the landfill site.



Before the improvement
Local residents were seriously threatened by the huge mountain of waste.



After the improvement
The turfed slope changed the view of landfill site completely.

Plate 5: PP “Improvement of the Gohagoda Landfill” (2/2)

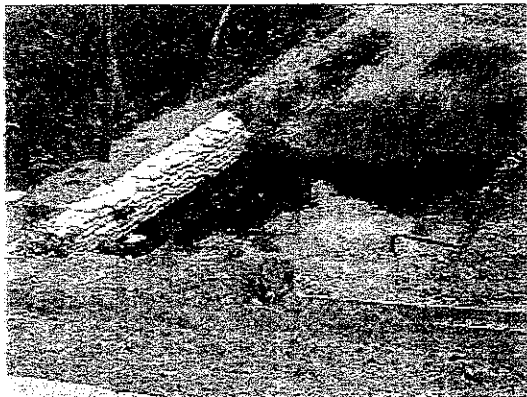
The pilot project targeted not only the improvement of landfill conditions but also the transfer of operation and maintenance technology, social consideration methods and conditions of monitoring by the monitoring committee.



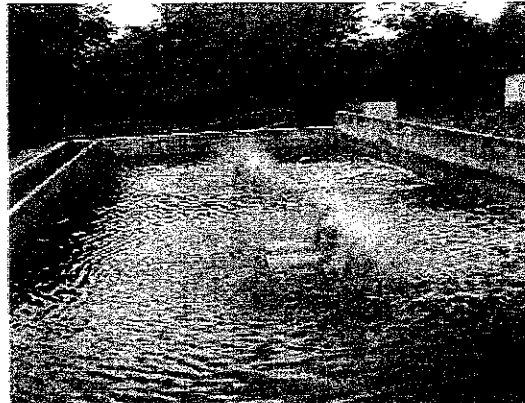
Leachate before the Improvement
Leachate used to flow into the stream without any treatment, resulting in its pollution.



Leachate collection on the step of slope
Leachate seeped to the step is collected and carried to the pond by the subsoil drain.



Leachate collection pond
The leachate is collected at this pond and pumped to the leachate treatment tanks for aeration treatment.



Oxidation treatment tank for leachate
Aerators for prawn ponds were installed in the existing sewage tank. The leachate in the pond is pumped up to this tank for oxidation treatment.



Training of grading slopes
The method for grading a slope and turfing was transferred to the counterparts during the improvement because they have to do it by themselves in the future.



Joint site visit by the monitoring committee
A monitoring committee involving citizens was established. They have to periodically visit the site to observe its operation.