SOLID WASTE REDUCTION

Service Delivery Training Module 2 of 4

MINISTRY OF LOCAL GOVERNMENT AND
PROVINCIAL COUNCILS

GOOD GOVERNANCE FOR LOCAL DEVELOPMENT
SLILG

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2008

MINISTRY OF LOCAL GOVERNMENT
AND PROVINCIAL COUNCILS

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PREFACE

The Asia Foundation (TAF) implemented the Transparent Accountable Local Governance (TALG) Program with financial support from the United States Agency for International Development (USAID) from January 2005 - September 2007. The Foundation's main counterparts were the Ministry of Local Government and Provincial Councils and the Sri Lanka Institute of Local Governance. The International City/County Management Association (ICMA) and Environmental Management Lanka (EML) provided additional technical assistance and support.

The TALG Program developed a number of training modules and publications as part of its institutional strengthening programme for Local Authorities (LAs) in Sri Lanka. Each of the TALG training modules was used to train officials in thirty-five LAs in Southern, Eastern, Central, North Western, North Central and Uva provinces. These were very successful in promoting effective, transparent and accountable local governance. Preparing the training modules was a painstaking process and support from the Australian Agency for International Development (AusAID) enabled The Asia Foundation to complete and publish this and the other publications in the series.

INTRODUCTION

Through the interventions made by the Foundation for the betterment of the Local Governance system in Sri Lanka, publications were developed in the following areas:

- Citizen Participation
- Local Planning
- Service Delivery
- Financial Management
- Policy and Regulations

These publications range from one-page documents of Leading Practices to Training Modules. Major categories of the publications are:

- Training Modules
- Guidebooks
- Reports and Documents
- Video Films
- Computer Applications

TALG developed many training modules mainly in the areas of Financial Management and Service Delivery. **Solid Waste Reduction** is Module 2 under Service Delivery Training. Other training modules in the series include:

Module 1: Solid Waste Collection and Transport

Module 3: Road and Drainage Maintenance

Module 4: Solid Waste Planning and Disposal

In addition to these training modules, TALG developed video films showing successful solid waste management (SWM) initiatives implemented by the Sri Lankan and regional LAs.

Users should note that there are a range of TALG publications including Technology of Participation and Resource Directory for Local Authorities that can be used by LAs to create an enabling environment for improved SWM.

About this Training Module

Module 2: Solid Waste Reduction

This module focuses on waste reduction techniques and how these can be implemented by LAs. Recycling programmes, home composting initiatives, segregation of waste at source and networking with recycling industry vendors/brokers are some of the key techniques discussed in this module.

What is Inside this Module

The publications developed by TALG can be used by different users, ranging from beginners to practitioners, those working in LAs and for those working as partners with LAs. This publication contains all of the resources developed for the delivery of a two-day workshop in Solid Waste Reduction.

This training module provides comprehensive and detailed learning materials on Solid Waste Reduction that can be used as reference material for practitioners in LAs and as background information for trainers. Additional resources can be found at the end of the module, comprising of supporting documents and useful materials such as checklists, templates and manuals.

Attached to this module is a CD, which provides a 'PowerPoint' version of the reference materials with a focus on the needs of LAs.

The Main Objectives of this Module

- To provide guidance to LAs in Sri Lanka and officials who engage in SWM activities.
- To provide knowledge, techniques and tools for planning LA initiatives aimed at the reduction of generated waste.
- To assist LAs to deliver efficient and effective management of solid waste services.
- To assist LAs to ensure a satisfactory level of waste management services through waste reduction to meet the needs and demands of citizens.

How to Use this Module

The resources in this publication may be used:

- To enhance knowledge in this specific topic.
- To share the knowledge with others.
- To support a training programme and awareness campaigns.
- To improve the existing system and enhance performance monitoring.

Trainers and beginners can use these learning materials to obtain knowledge on present practices and issues of solid waste reduction in LAs. Learning materials will provide guidance to all decision-makers and staff who are involved in waste management activities, including how to reduce waste management costs by using available resources in LAs.

Trainers can use the prepared 'PowerPoint' presentations to conduct awareness programmes for LA staff, decision-makers and other individuals. Group exercises can be used to improve practical experience on waste reduction.

User-friendly worksheets will help relevant officers to monitor daily activities on waste reduction. This can be used not only for monitoring but also for the decision-making process.

SESSION 1: WHY WORRY ABOUT SOLID WASTE REDUCTION?

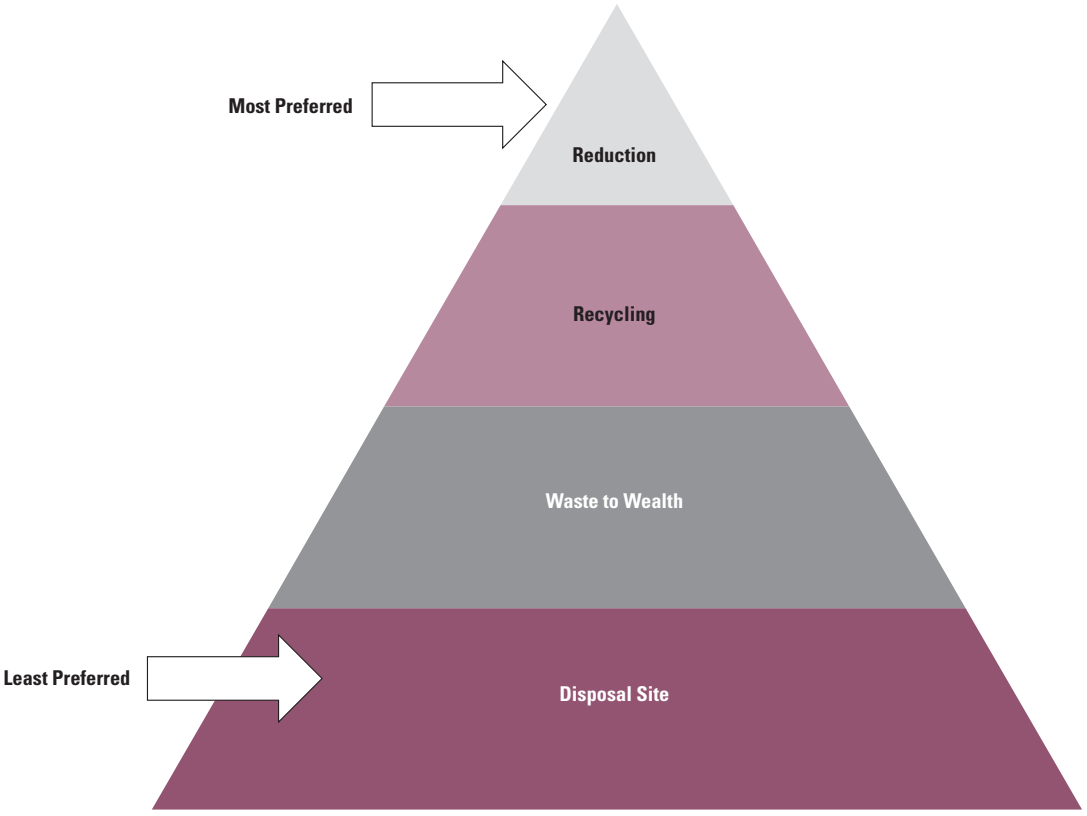
Summary

This session will define what is Solid Waste Reduction and explain the 'Three R's of Solid Waste Reduction: Reduce, Reuse and Recycle' and begin by asking "Why should we worry about solid waste reduction?". Additionally, a General Quiz will be conducted on how you practice Solid Waste Reduction techniques in your own life.

Why Worry About Solid Waste Reduction?

There are many **ways** of answering this question and certainly many **answers** associated with the **ways**. But first the explanation of the SWM Hierarchy should be presented.

The SWM Hierarchy ranks the most preferable ways to address solid waste. One should think of this hierarchy as a pyramid, with source reduction or waste prevention (also includes reuse) at the very top of the pyramid, which means this is the most preferred method in the SWM Cycle. The next lower level of the pyramid is recycling. The lowest level of the hierarchy is the use of a disposal site.



Why is source reduction at the top of the hierarchy? Because the best approach to managing solid waste is to avoid creating it in the first place. This means reducing the amount of trash you discard and reusing containers and products instead of throwing them away.

Solid Waste Reduction Benefits

- **Saves natural resources.** Waste is not just created when people throw items away. Throughout the life cycle of a product or package - from extraction of raw materials, to transportation, to processing and manufacturing facilities, to manufacture and use - waste is generated. Reusing items or making them with less material decreases waste dramatically. Ultimately, fewer materials will need to be recycled or collected and sent to disposal sites or waste combustion facilities.
- **Reduces toxicity of waste.** Selecting non-hazardous or less hazardous items is another important component of source reduction. Using less hazardous alternatives for certain items (e.g. cleaning products and pesticides), sharing products that contain hazardous chemicals instead of throwing out leftovers, reading label directions carefully, and using the smallest amount necessary are ways to reduce waste toxicity.
- **Reduces costs.** The benefits of preventing waste go beyond reducing reliance on other forms of waste disposal. Preventing waste can also mean economic savings for LAs, businesses, schools and individual consumers.

In most LAs in Sri Lanka, it is estimated that 15 - 25 % of the annual budget is utilized for SWM, out of which 60 - 70 % is spent on collection and transport of waste. By reducing the amount of waste to be collected, LAs could use savings to expand or improve these services.

Businesses Industry also has an economic incentive to practice source reduction. When businesses manufacture their products with less packaging, they are buying fewer raw materials. A decrease in manufacturing costs can mean a larger profit margin, with savings that can be passed on to the consumer.

Consumers Consumers can also share in the economic benefits of source reduction. Buying products in bulk, with less packaging, or items that are reusable (not single-use) frequently means a cost saving. What is good for the environment can be good for the wallet as well.

LAs LAs have the opportunity to see monetary, environmental and quality of life benefits by waste reduction. These opportunities will help create a cleaner environment, create efficiencies for the constituents of the LA through the advantages provided by solid waste reduction.

Environmental and Social Impacts of Open Dumping in Sri Lanka

Water and Air Quality

1. Contamination of groundwater and surface water.
2. High level of odour, dust and litter because waste is not covered.
3. High levels of particulate matter and toxic fumes from burning waste.

Health and Safety

1. Risks from water-borne diseases.
2. Potential for the spread of communicable diseases via pests, i.e. Dengue, Rabies, Malaria etc.
3. Contact with clinical and industrial wastes.
4. Methane gas build-up and migration, with the potential to cause explosions or asphyxiation.
5. Instability of high and steep slopes of deposited waste.

Aesthetic and Socio-Economic

1. Visual blight from uncovered waste, blown litter and odours from rotting garbage.
2. Loss in property values.

Flooding

1. Reduction in flood storage capacity of wetlands and flood detention basins through use of these areas for disposal.
2. Increased risk of flooding upstream of the dumpsite where improper disposal, blocks the drainage ways.

Pests and Ecology

1. Loss of wetland habitats.
2. Change in ecological balance of the area through the attraction of scavengers and pests.
3. Vermin, pests and scavenging animals attracted to fresh and exposed waste.

Additional Impacts to Sri Lanka

There is the opportunity for expanding **Economic Growth** through the sale of recyclable products, reducing the overall waste stream and reducing the need for disposal sites. In addition, reducing the impact of contaminated air and water, and removing the potential for disease and mosquito breeding, **Public Health** would be improved. Present methods of disposal LIMIT ECONOMIC GROWTH.

What is Solid Waste Reduction?

Definition - Solid Waste Reduction is defined as any change in the design, manufacture, purchase, or use of materials or products (including packaging) to reduce their volume and amount of toxicity before they become municipal solid waste. Source reduction also refers to the reuse or recycling of products or materials. Focusing on source reduction is an attempt to move away from making all of these changes the responsibility of LAs.

Waste prevention, also known as 'source reduction', is the practice of designing, manufacturing, purchasing or using materials (such as products and packaging) in ways that reduce the amount or toxicity of trash created. Reusing items is another way to stop waste at the source because it delays or avoids that item's entry into the waste collection and disposal system.

Source reduction, including reuse, can help reduce waste disposal and handling costs, because it avoids the costs of collection, transport, recycling, municipal composting, disposal sites and combustion. Source reduction also conserves resources and reduces pollution, including greenhouse gases that contribute to global warming.

Source Reduction Facts

- In 2005, there was 12,490,000 kg of municipal solid waste collected by LAs. This amount could be source reduced by 8,743,000 - 11,241,000 kg or 70 - 90% according to current waste characterization studies.
- In Sri Lanka (2005) in the Colombo District, 83.4% was biodegradable waste, 5.6% plastics, 2.0% metal and 7.0% paper. In general, more than 75% of the waste generated in Sri Lanka is biodegradable.
- In all of Sri Lanka (2005) there was less than 24 LA-sponsored Source Reduction Programmes (composting, recycling, biogas etc.).

- Between 2 - 5% of the waste stream is potentially reusable. In Sri Lanka 70 - 90% of municipal waste has the potential to be part of a waste reduction programme.
- Since 1977, the weight of a 2-litre plastic soft drink bottle has been reduced from 68 grams to 51 grams. This relates to a 25% reduction in the gross weight of plastic in the municipal solid waste stream by this change in production technique alone.

Primary Tools for LAs to Use in Promoting Solid Waste Reduction

Conduct educational campaigns for:

(a) public support of waste reduction and recycling and

(b) improving the image attached to waste work.

- Study waste streams (quantity and composition analyses), recovery/recycling systems, markets for recyclables, and problems of existing practices to decide where there may be a collaborative and/or regulatory role for the municipal authority.
- Support source separation, recovery, and trading networks with information sharing (especially of market information) and forums for stakeholders.
- Facilitate small enterprises and public-private partnerships by new or amended regulations for cooperatives, loans to small-scale businesses, changing local regulations, low-rent space for recycling centres, etc.
- Promote home and commercial composting.
- Sell recyclables or license a private company to sell it for you.

Reduce, Reuse and Recycle – Simple Ways to Achieve Solid Waste Reduction

Each LA should practice the simple way to Solid Waste Reduction by following the three R's: 'Reduce, Reuse and Recycle'. These methods can be used by the LA as a way of business or operation and also to educate their citizens to follow the same steps.

Reduce

Waste prevention or 'source reduction', means consuming and throwing away less. It includes:

- Purchasing durable, long-lasting goods.
- Using products with less packaging.

Source reduction actually prevents the generation of waste in the first place, so it is the most preferred method of waste management and goes a long way towards protecting the environment and reducing costs. Source reduction reduces the amount of materials we produce and the harmful environmental effects associated with producing and disposing of them. It includes:

- Reduced material use in product manufacture.
- Increased useful life of a product through durability and repairability.
- Decreased toxicity.
- Material reuse.
- Reduced/more efficient consumer use of materials.
- Increased production efficiency resulting in less production waste.

Reuse

Reusing items by repairing them, giving used items to needy groups or selling them will also reduce waste. Reusing products, when possible, is even better than recycling because the item does not need to be reprocessed before it can be used again.

Ways to Reuse

- Reuse cloth napkins or towels.
- Refill bottles.
- Donate old magazines or surplus equipment.
- Reuse boxes.
- Turn empty jars into containers for leftover food or small parts.
- Participate in a paint collection and reuse programme.

Recycle

Recycling turns materials that would otherwise become waste into valuable resources. In addition to creating revenue, it generates a host of environmental, financial and social benefits. Materials like glass, metal, plastics and paper are collected, separated and sent to facilities that can re-process them into new materials or products.

Recycling is one of the best environmental success stories. In Sri Lanka the potential for 'Solid Waste Reduction' can also be very dramatic, as the 2005 Waste Characterization Studies performed by the Ministry of Environment and Natural Resources show. There is a potential for Municipal Solid Waste Reduction of the solid waste stream from 70 - 90% or up to 11,241,000 kg annually.

Recycling Facts and Figures

- While recycling has grown in general, recycling of specific materials has grown even more drastically: 42% of all paper, 40% of all plastic soft drink bottles, 55% of all aluminium beer and soft drink cans, 57% of all steel packaging, and 52% of all major appliances are now recycled. In Sri Lanka, 60 - 80% of paper waste is the result of product packaging.
- In Sri Lanka, there is the potential to have a 70 - 90% reduction in the municipal solid waste stream by having LAs begin, improve and expand 'Solid Waste Reduction Programmes'.

SOURCE REDUCTION QUIZ

Every day we make choices that affect the amount of waste we produce. Take a few minutes to consider your contribution to solid waste stream. Add up the circled numbers in each column to find your total score.

Use the information detailed at the end of the Quiz to find out if you are utilizing **'Solid Waste Reduction'.**

CIRCLE THE NUMBER THAT APPLIES TO YOU

Do you:	*never*	*Sometimes*	*often*
1. Consider the amount of packaging on an item before you buy it?	3	2	1
2. Consider the recyclability of an item before you buy it?	3	2	1
3. Consider whether you really need something before you buy it?	3	2	1
4. Think about what will happen to a product or a package when you no longer have any use for it?	3	2	1
5. Try to reuse things you already have instead of disposing of them and buying new things?	3	2	1
6. Wash out and reuse plastic bags in your home?	3	2	1
7. Consider what pollution and wastes were created in the manufacture of the things you buy?	3	2	1
8. Take advantage of the opportunities to recycle in your area?	3	2	1
9. Use dishcloths, sponges and cloth napkins instead of disposable paper products?	3	2	1
10. Avoid items such as disposable diapers, razors, lighters and pens when longer lasting alternatives are available?	3	2	1
11 Avoid eating in places which wrap your food in lots of paper and plastic or ask that less wrapping be used for your order?	3	2	1
12. Compost kitchen scraps and other compostable matter?	3	2	1
13. Talk to store managers about stocking bulk items or avoiding packaging?	3	2	1
14. Buy items in bulk?	3	2	1
15. Read consumer information articles to find out about the quality and durability of products you buy?	3	2	1
		_____	
Totals for Each Column:	_____	_____	_____
Add Column Totals for the Grand Total:		_____	

If Your Score Was:

40 or More

Like many residents, you are probably contributing your full share of solid waste to our disposal facilities, including many kgs of useable, recoverable materials.

What Can You Do?

Be aware of the amount of trash you have each week. Note how heavy it is. What could be reused, recycled or avoided entirely? Next time you go to the store, check to see if any of the products you normally buy in non-recyclable containers are also available in reusable, refillable or recyclable containers. Avoid products with excess packaging.

Between 21 and 39

You are doing some reducing, reusing and/or recycling. These patterns need to be practised consistently by the majority of the population if we are going to reduce the increasing amount of waste requiring disposal.

What Can You Do?

Do some comparison-shopping. Consider various types of packaging and the alternatives that are available. Consider buying products in larger quantities or in bulk quantities. Take your own carrying bags with you when you shop or reuse store bags.

20 or Less

Congratulations! You've obviously done some serious thinking about the need for resource conservation. Think about the things you do to conserve resources. Which are you most proud of? Encourage other people to consider doing the same. Get involved in the SWM programmes in your LA. Thanks and keep up the good work!

SESSION 2: LOCAL PROGRAMMES THAT SUPPORT SOLID WASTE REDUCTION

Summary

This session will discuss some of the local programmes that support Solid Waste Reduction in the local region. The Municipality of Kotte has implemented a SWM Plan, which includes several programmes that support Solid Waste Reduction. The details of these programmes will be discussed.

Municipality of Kotte

Kotte generates over 100 metric tons of waste daily of which only 70% is collected. The citizens from neighbouring areas bring and dump their household waste in Kotte area aggravating the problem. In Sri Jayewardenepura-Kotte, the demonstration projects were focused on reducing household waste and addressing the market waste problem through the introduction of domestic compost barrels, operation of a recycling centre and installation of a bio gas centre. The success of these activities led Kotte to be the first LA in Sri Lanka to develop a citywide SWM Strategy.

Residential Composting

Household level composting is being promoted by many LAs in Sri Lanka as a relatively simple and low cost solution to reduce organic waste at source. There is a range of technical options for household level composting but preference is given to bin composting due to convenience and less impact on appearance, especially in urban areas. There are a range of bins available for composting, generally about 200-300 litre in size and made from a range of material such as cement, plastic, metal or wood.

The Sri Jayewardenepura-Kotte Municipal Council (KMC) initiated the distribution of composting bins in the year 2000 as a pilot demonstration project aimed at reducing the quantity of organic waste and thereby reducing the financial costs and environmental deterioration at final disposal. The compost can be used as a soil conditioner, which improves the soil characteristics for those who are in favour of gardening. Household compost production has also been identified as an option to enhance the economic condition of urban poor people through selling of compost and/or home gardening.

The KMC has already distributed 1350 metal compost bins (Drum type) and 600 concrete bins to the citizens in randomly selected areas. An initial awareness programme was carried out for the selected locations and only the requested households (90-95% of total population in the area) were given the bins. Those bins have been fabricated by SEVANATHA (a local NGO) and the KMC has distributed those on a subsidized unit price of Rs 200-300.

Residential Recycling

Present Activity

The Re-cycling Centre in Baddegana was set up in mid 2003 and is being used as a sorting and storage centre for recyclable material salvaged from waste. Thirteen full-time manual workers and a Health Supervisor working part-time carry out the operation. It is a limited area application and therefore, a mini project. The workers collect the materials from individual homes and take them to the Centre in handcarts. On an experimental basis, the Municipal Council has issued biodegradable polythene bags to every home for collection of recyclable material such as, glass, paper, shopping bags (sili-sili), coconut shells, plastic cans, metal foil bags and plastic goods.

The materials brought to the Centre are sorted out into different categories and stored in separate rooms. There are 12 rooms in the Centre and already 10 rooms are being utilised for storage of material.

Present Stocks

Material that arrives at the Centre is not weighed or quantified at present. However, a quick attempt to quantify the amount, estimated that there were around 3 metric tons of waste whose value was estimated at approximately Rs 45,000.

Spatial Capacity of the Centre

The Centre is situated on about 50 perches of land. If the full area is utilised, about 200 tons of different materials could be restored. These however will have to be stacked in a loadable form e.g. bottles in gunnies and stacked. Since regular sale and turnaround of salvaged material can be arranged, the space available at the Centre is sufficient to service a much larger area than covered presently.

Methane Generation from Organic Market Waste

This project stems from the requirement of the Council to dispose of market waste along with the unavailability of suitable lands for dumping. Therefore, the Council is compelled to search suitable alternate methods to managing waste. The Biogas Pilot Project is one small step in the Council's efforts towards finding innovative solutions.

The project has as its beneficiaries nearly 230 destitute children displaced from the war affected areas as well as from the Council's limits. The installation of the Biogas Plant has helped the Home to cut down on their meal preparation costs substantially by reducing the need to purchase cooking fuel and lighting. While biogas is a known and tried alternate energy source in rural societies, this is the first time it is being used in an urban setting

The KMC is governed by the Municipals Councils Ordinance Cap 252 of the Legislative Enactments and derives authority from the same as well as delegated authority from the Central Environment Authority Act 47 of 1980, as amended by National Environment Act 56 of 1988. Under S 46 (c), (d), (e) and (f) of the Municipal Councils Ordinance, it is authorized to "establish and maintain any public utility service.....for the welfare, comfort or convenience of the Public" and also ".....to promote public health, welfare and convenience, and the development, sanitation amenities...". The National Environment Act also gives the Central Environment Authority the ability to delegate its powers to LAs. The Municipal Council Ordinance S 129-131 assigns duties to the Council for the conservancy and scavenging of items, going further to give ownership of such collected items to the LA. Further, the act gives full power to the Council to sell or dispose of such material. Therefore, the Municipality has all the necessary powers to implement projects of this nature for the welfare of residents.

The Biogas Pilot Project in the Vajira Children's Home is an ideal demonstration of the Council's ability to assist the numerous charitable organizations, while solving its own basic service problems. Market waste generated in the city can provide substantial energy at low rates to institutions such as the Victoria Home for Incurables, Elders Homes and Children's Homes, for lighting purposes and for the preparation of food. The institutions have sufficient space to house 1 or 2 biogas tanks.

Impacts of these Projects

- The orphanage has been able to reduce its energy expenses by 30%.
- The KMC saves transport costs of approximately Rs 70,000 per annum for not having to take the waste to a distant dumpsite.
- The experience in Kotte has been replicated in 4 other LAs, namely: Kolonnawa, Moratuwa, Panadura and Negombo.
- The volume of garbage from this settlement to the Municipal waste stream was reduced by about 30%.
- The quality of the environment of roads and canals has improved.

- The community manages the sorting centre and provides employment for 3 persons. Each participating family earns approximately Rs 100.

Nuwara Eliya Municipal Council (NMC)

In early 2000, with the election of the new council of the NMC, the newly elected body decided to find solutions for the SWM problems as a priority task. The Mayor of the NMC initially appointed a team comprising the Commissioner, Engineer and Chief Public Health Inspector to review the current status of SWM, and to recommend the immediate corrective measures to the collection issue. The NMC tried to resolve the collection and transport issues by taking the followings steps:

- Additional resource allocation
- Good labour management practices
- Performance evaluation and monitoring
- Community participation

All the activities are well coordinated by the Chief Public Health Inspector and Engineer with the assistance of the Mayor and the Commissioner. The NMC has utilized this opportunity to improve the SWM situation in the city.

- Newly designed collection bins were placed at key locations where more waste was collected. The design of the bins facilitated easy transfer of waste from the bins to the collection vehicles without much difficulty for the workers. The new bins with closures stopped scavenging animals and the new design gives a better appearance. The NMC makes sure that the bins are emptied regularly on a schedule.
- A recycling centre was set up by the NMC to encourage recycling practices among citizens. All the recyclable materials are purchased from the collectors at reasonable rates. The recyclable materials collected by the scavengers, households, collection workers and small-scale commercial recyclable collectors bring materials to this centre. This initiative, not only reduced a considerable amount of waste reaching the disposal bins but also provided an opportunity for the collectors to generate more income.

Recycling Programme at Rayong, Thailand

Rayong, a city on the eastern seaboard of Thailand is known for its mangrove forests, holiday beaches and fishing areas. With a municipal population of over 100,000 and a provincial population of over 500,000, Rayong works hard to provide a good living environment for its citizens. Rayong took matters into their own hands and started a Comprehensive Waste Management Programme. The aim was to reduce the amount of waste generated by the city through reduction, reuse and recycling of trash, resulting in the extension of the life of the disposal site. Since 2000, Rayong has successfully implemented a citywide composting programme, opened new recycling exchange centres, and now produces fertilizer from organic waste and generates increased electricity and energy through a newly built biogas plant.

SESSION 3: WHAT MAKES SOLID WASTE REDUCTION SUCCESSFUL?

Summary

This session discusses some factors, ideas, programmes and techniques that make a successful Solid Waste Reduction Programme.

Public Participation

One of the main reasons for failure of many SWM initiatives in Sri Lanka is lack of community participation. Increasing public participation requires establishing and maintaining an effective public-LA communication system. This involves the LA reaching consensus and clearly deciding what the LA should do and what the public should do. It is a two way process – the public must do what it is asked to do (improved public participation) and the LA must do what it says it is going to do (improved LA performance). It is a common complaint from LAs that the public throw trash everywhere instead of confining disposal to the assigned places for collection. Only a few LAs have taken the time to inform the public of 'proper' ways to dispose of trash or about the collection schedule for each particular area/place. The LA should listen to the publics' ideas and requests. They must also follow-up and resolve public complaints, provide them with reminders and feedback on progress/problems. By doing such things, the LA will gain the public's trust, which is vital to increasing and maintaining public cooperation. The public should be informed about any proposed changes to SWM practices relatively early in the planning stages, so that their ideas and comments can be taken into account in finalising the programme. This is particularly important when the LA is going to ask for their increased participation. The LA could use existing participatory mechanisms or develop new ones to reach the public. This will help ensure public participation in SWM initiatives. Some of the participation mechanisms identified throughout the country are:

- Community Based Organisations such as village death donation societies, water user groups, small trader associations etc.
- Appointing citizen members to a council's standing committee is a strategy for improving communication and information gathering.
- Structured consultations with community leaders and representatives.
- Forming citizen committees in each ward of the LA.

Education, Education and Education

A successful waste management programme requires widespread public participation. Such participation can best be obtained through early and effective public education programmes, which must continue even after the programme is in full swing. A successful educational campaign should include strategies that are easy to implement. Some of the following can be included in a LA's campaign:

- **Effective Education –** This starts out with the education of our children who often become the best teachers of adults. How often are we surprised by the very simple logic of our children when they say to us, "Why do you do ..... that is bad?", "Why do you do ....., that hurts the environment?". So the education building blocks can be our children to help change adult behaviour. Effectively using the notice board, local newspapers and radio can help ensure the success of all of the Source Reduction Programmes. Consumer information can be offered through a variety of means, including local advertising and bill inserts. Information can cover many aspects of source reduction, such as explaining the municipality's planning process and providing tips on practices that promote source reduction (such as reuse of containers and packaging, buying in bulk to minimize packaging and providing information

on how to start food waste composting at home). Educational programmes through retail businesses can be encouraged to offer paper packaging as a more recyclable alternative to plastic packaging and to use reusable materials whenever possible. Local supermarkets and retail stores could establish an environmental shopping campaign to inform consumers about an item's environmental impact, durability, reusability, and ability to be recycled. Employers can also be encouraged to provide information to workers regarding source reduction both at work and at home.

- **Technical Assistance -** Businesses and residents can be provided technical and informational assistance by conducting workshops, seminars, and public demonstrations focusing on source reduction and on-site recycling.

- **Social Marketing -** LA-based social marketing techniques include identifying barriers and benefits to sustainable behaviour, such as waste prevention; designing a strategy that uses behaviour change tools, such as pledges or commitments from a resident or business; implementing a pilot programme; and evaluating the pilot programme to determine the costs and benefits of implementing the programme throughout the LA. Information gathered from social marketing techniques is used to refine marketing strategies and will provide information to justify continued funding for a project.

- **Public Recognition -** Voluntary source reduction activities can be documented and publicly recognized through the establishment of an awards programme, such as WRAP (Waste Reduction Awards Programme). A model source reduction recycling awards programme would recognize businesses, LA organizations, schools, or individuals that demonstrate 'model' source reduction/recycling behaviour through in-house activities or through public outreach and education.

Sample LA Educational Programme

A source reduction education campaign can include some of the following strategies that consumers could easily implement to purchase products based on how the product and packaging will be disposed of after use. This programme can be implemented at markets.

- **Reusable shopping bags:** The first step in this programme would be to encourage the consumer to arrive at the store with one or more reusable, durable shopping bag. An alternative would be to take back paper or plastic grocery and shopping bags for reuse.

- **Buy concentrates:** Buying concentrates when available, reduces packaging.

- **Buy in bulk:** Buying in bulk reduces packaging and is often preferable. However, buying in bulk achieves reduction only if the item purchased will be used before it spoils and becomes a waste. Consumers should, therefore, purchase items with unlimited shelf-life in bulk and perishable items according to the rate of use.

- **Purchase reusable products**: Consumers should have the option of choosing reusable items instead of single-serving or single-use disposables. Reusable items include cloth napkins, tablecloths, ceramic plates, reusable cups, silverware, rechargeable batteries, refillable razors and pens. Beverages purchased in bulk can be used as individual servings by pouring them into a reusable container. Non-recyclable single-use drink containers result in considerably more waste. Plastic produce bags can be reused at the store. Plastic and metal containers are packaging items that can be reused as storage containers in place of new items that might be purchased specifically for that function.

Recycling Programme

A systematic approach to collecting and utilizing the recyclable materials is a key factor in a successful waste reduction programme. Informal recycling by means of scavengers and recycling enterprises can be seen in almost all the LAs in the country. The recycling efficiency can be much higher if LAs strengthen the informal sector with a formal recycling programme. LAs should adopt properly designed recycling programmes in order to reach recyclable materials generated by different types of waste generators. LAs can implement recycling programmes in several ways, including:

- Specific type of waste generator, such as separate programmes for households, industries, schools, etc.
- Operation of Recycling Centres to purchase recyclables.
- Networking recycling marketers and potential generators.

Public/Private Participation and Partnership

Businesses, households and local governments can all play an active role in implementing successful source reduction programmes. Businesses can implement source reduction through the design and manufacture of products that use less packaging or that use substitutes for toxic constituents. Many businesses have also used source reduction to significantly reduce the amount of material that enters the waste stream (e.g. reusing packaging for shipping products, double-sided copies, maintaining equipment to extend its useful life, reusable envelopes). These changes have often resulted in significant savings in waste management costs and raw material purchasing.

Recycling Programme in Chilaw

The Chilaw PS has partnered with an NGO and implemented a recycling programme for about 500 families within their LA limits. Initially, an awareness campaign was conducted in order to educate the public on recycling principles and collection of recyclable materials. The initiative started in June 2005 and is successfully being operated now. All the recyclable materials collected at the household level are sent to the large-scale recycling manufacturers/contractors.

Recycling Centre in Nuwara Eliya

The NMC operates a recycling centre to collect recyclable materials from citizens. The NMC contracted out the operation of the centre to the private sector. The private operator purchases recyclable materials from citizens and sells it to recycling manufacturers directly. Not only did the recyclable collectors benefit financially, but the LA and the private operator also earn money from this operation. A similar centre is in operation in Badowita, originated by Dehiwala-Mount Lavinia Municipal Council and run by a community-based organization.

SESSION 4: STARTING A RECYCLING PROGRAMME

Summary

This session is intended to give participants ideas, tips and suggestions for ways any LA, resident or citizen can begin to participate in Solid Waste Reduction by starting a recycling programme or personally participating in source reduction.

Each resident generates a large volume of waste every year. What can be done about it? While participating in local recycling programmes is an excellent way to divert waste from the disposal process, the most environmentally and economically sound solution is to create less waste in the first place. The choices that each person makes today affects the environment tomorrow. Simple decisions that are made everyday can conserve natural resources and reduce the need for additional disposal capacity and costs.

LAs can implement recycling programmes initially for institutions that are directly under the purview of the LA and can encourage and assist the other institutions and individuals to implement and practice recycling programmes. In essence, the LA becomes the role model for other organizations. Some of the potential places where LAs could immediately start recycling programmes are:

- Markets
- Shopping complexes
- Libraries
- Office and sub offices of the LA
- Community Health Centres
- Community Centres

Planning A Recycling Programme

Successful recycling programme planning includes (1) conducting a preliminary waste audit, (2) assembling a task force including citizens, (3) researching available markets, (4) developing a collection method, (5) developing a cost estimate, (6) developing policies and regulations at LA level, (7) developing an educational programme, (8) start-up and expansion and (9) monitor and evaluate.

1. Waste Audit and Characterization of Solid Waste Stream

Planning begins with a waste audit to determine waste composition and volume; the point of origin; what portion could be recycled, re-used, reduced or eliminated; and what recyclable/reusable materials could be substituted for materials currently in use. LAs should assess the generation pattern of waste within the whole LA area. It is suggested that LAs should carry out a preliminary waste audit for identified bulk waste generators, such as markets, industries, schools, etc., in the area.

Definition - Waste characterization means finding out how much paper, glass, food waste, etc. is discarded in your waste stream. Waste characterization information helps in planning how to reduce waste, set up recycling programmes and estimates cost savings that can be channelled into enhanced service.

Obtaining a characterization is important for planning reasons. Developing a characterization helps you identify, characterize and label the waste in the LA and allows you to know what types of waste you are working with and how you will eventually dispose of that waste.

Waste characterization data is collected by taking samples of waste and sorting it into material types like newspaper and aluminium cans, and weighing each type. An example would be to take a sample from individual businesses and residences, or from trucks delivering waste to disposal sites. The following are basic steps of a typical waste characterization study.

Step 1 – Determine location of sample (disposal site, transfer station, selected household area etc.)

Step 2 – Determine the number of samples to make sure that it is representative of the LA or the specific sample area.

Step 3 – Determine the size of a sample to be taken.

Step 4 – Determine whether the waste is hazardous or non-hazardous (organic, paper, plastic, glass, metal etc.) and weigh each category.

Step 5 – Determine the percentage of each type of weight in the total stream based on weight.

The Solid Waste Quantification and Analysis Worksheet is given in Appendix I. This worksheet can be used for carrying out a waste characterization exercise.

Your FIRST job is to identify the waste.

Is it a piece of equipment? Is it paper waste or organic material? A half-spent can of oil? A part from a piece of equipment?

Who should use this Information?

Waste characterization information is designed for solid waste planning. However, anyone interested in the characteristics of the solid waste stream may find it useful. Local government planners, haulers, and recyclers may estimate the amount of certain materials in their waste stream through waste characterization and establishing a database. This waste characterization information helps the LA or business understand what's in their waste stream, a first step in devising ways to reduce waste and reduce SWM costs.

Impacts

In Sri Lanka the waste statistics vary greatly with approximately 0.4 kg to 1.0 kg per person generated daily. All this waste must go somewhere and unfortunately our environment often suffers from this ever-increasing waste stream we generate. By choosing to prevent waste and to recycle, everyone can help curb environmental degradation. Waste prevention and recycling have a much greater impact than just simply making less garbage.

2. Task Force/Team

Many LAs have found that forming a waste reduction team helps to ensure a successful programme. Together with the Recycling Coordinator, this group will plan, implement and manage the programme. The waste reduction team should represent elected officials, LA staff and citizen groups. The LA task force could comprise of the Chairperson, Opposition Party Representative, Commissioner/Secretary, Engineer/Technical Officer, Officer Responsible for SWM, Environmental Officer and at least two citizen group representatives. The LA could assign an existing Standing Committee to function as recycling task force. The team will plan and implement recycling programmes for the LA. An enthusiastic Recycling Coordinator should be appointed in order to coordinate activities within and outside the LA.

3. Available Markets

Recyclable materials are marketed by collectors through brokers, intermediate processors or end users. Brokers link customers with businesses that accept recyclables. Intermediate processors accept recyclables and prepare them for end use; some pick up materials, others require delivery. End users are manufacturers who use recyclables in their processes; sufficient volumes of a material may justify direct contact with an end user.

It is frequently said that the ultimate success of recycling depends on stable, reliable markets for recyclables. Unless a LA has markets for the materials it collects, it may end up temporarily storing some materials and later disposing of some or all of them. If citizens are asked to separate materials for recycling and some are subsequently disposed of with the general waste because markets are depressed or nonexistent, a negative political backlash may result; community support for recycling could fall and the programme may be jeopardized. Research local markets to discover:

- Recycling marketers in the area and what materials each accept.
- Details of recycling marketers for materials that are collected within the LA, other than the material marketed in the area.
- How to prepare the materials.
- If the recycling marketers will pick up the materials (and the charge), or if they must be delivered (and the rate of payment).

4. Collection

In developing a collection system, the main points to consider are containers, a central storage area, personnel and materials preparation.

Containers for recyclables can range from corrugated boxes to those made of a variety of materials designed specifically for recycling. Consider where containers should be placed, the quantity needed, size and shape, and a design that conveys the intended purpose.

The central storage area should be clean, dry and free of fire hazards. If located outside, covered storage bins are necessary to prevent wind blown litter, scattering by animals and to protect product quality.

Collection personnel are needed to collect recyclables from various areas of the building and deliver them to the central storage area. If the entity must deliver recyclables, delivery personnel must also be designated. A collection schedule is desirable, so recyclables are picked up on a regular basis.

If marketing requirements include materials preparation such as crushing or bundling, consider further staffing requirements. Remember, maintaining good quality is essential for ensuring that the materials are marketable and for obtaining the highest price possible.

5. Cost Estimation

The next step is to estimate costs for the programme. Depending on the target group of the recycling programme, the cost to be involved in each of the steps described here could be estimated. Also, it is important to estimate the expected revenue from marketing the recyclable materials. The LA has to seek financial assistance if the revenue is not enough to cover the programme cost.

6. Policies and Regulations

LAs need to develop policies and regulations to encourage and streamline recycling activities. LAs can make policy decisions and prepare by-laws for this purpose. For example, the recycling team/task force may decide to substitute

products that are recyclable and/or made of recycled content and to revise existing procurement policies. (Policies and Regulations are discussed further in Session 7).

7. Educational Programme

The recycling team/task force should design an ongoing educational programme to inform staff about the programme, programme goals, and the value of waste reduction and recycling. This should include an initial assembly; signs, posters and fliers, possibly designed by staff as contest submissions; and waste reduction and recycling activities. This information can be used as an exercise to determine the amount of waste diverted from the disposal site.

8. Start-Up and Expansion

If a programme gets off to a poor start because collection is inconvenient or inefficient for local citizens, the long-term programme may never achieve the success desired. Therefore, even with a well-designed programme, a careful start-up plan should be devised. A better approach may be to use a pilot programme that allows the LA to try a number of ideas prior to making a full-scale, expensive, and perhaps irreversible decision. In a pilot programme, recyclables are collected using prescribed methods for a certain period of time. The efficiency of the approach is then evaluated. Often, pilots are run using different methods in different neighbourhoods so that results can be compared. A pilot programme serves a variety of needs.

- First, it allows the community to try different approaches, such as clear bag collection or bin collection, without the expense of going community-wide.
- Second, if coupled with a strong education and publicity programme, the pilot programme can begin public discussion/understanding of the recycling programme and generate community support for source separation.
- Third, the pilot can provide a good estimate of the quantity of recyclables that can be expected. This information can be used to refine estimates made earlier as part of waste characterization.

In some cases, LAs have conducted pilot studies in place of waste characterization, feeling that an actual recycling programme will yield better estimates of expected volumes than statistical studies.

9. Monitoring and Evaluation

Even managers of successful programmes must constantly review their programmes' progress and make necessary adjustments. Recycling is a fast-moving field with new technology, fluctuating market conditions, changing consumer waste generation patterns, and changing regulations, as local and state environmental legislation is enacted. An effective programme must be flexible enough to adapt as conditions change.

SESSION 5: SOLID WASTE REDUCTION FOR SPECIAL WASTES

Summary

This session will discuss what is referred to as 'special wastes' and several issues relating to this type of waste. These special wastes include, but are not limited to, **Household Hazardous Waste, Medical Waste and Construction/Demolition Waste**. We will discuss what makes this type of waste different and hazardous to people and the environment, and how to reduce these special wastes.

Definition – Household Hazardous Waste

Common household items such as paints, cleaners, oils, batteries and pesticides all contain hazardous components. One way to help determine if your household waste has hazardous components is to read the labels on products. Labels that read 'danger', 'warning', 'caution', 'toxic', 'corrosive', 'flammable' or 'poison' identify products that might contain hazardous materials. Leftover portions of these products are called household hazardous waste (HHW). These products, if mishandled, can be dangerous to your health and the environment.

Although we cannot completely stop using hazardous products, we can make sure that leftovers are managed properly. The best way to handle HHW is to reduce the amount initially generated by giving leftover products to someone else to use. Most often the household hazardous waste goes to local disposal facilities, enters septic systems, storm drains, or is dumped onto the ground. These disposal methods pose environmental and public health problems.

Until recently, most people did not pay much attention to HHW. Few realized the dangerous properties of many of the products we use or we thought the amount was so small it wouldn't matter. A 1989 US EPA study concluded that nickel-cadmium batteries, the kind found in small household appliances were the largest source of cadmium (a heavy metal that can cause lung damage) in the municipal waste stream. In addition, home storage of wastes, poses health and safety hazards to residents. Many common household products have hazardous properties. Products that exist in high concentration, such as aerosols and polishes are highly volatile. They can contaminate indoor air and linger for days after use. The health effects of these substances range from headache, dizziness and nausea, to cancer.

Definition – Medical Waste

Medical waste is often described as any solid waste that is generated in the diagnosis, treatment, or immunization of human beings or animals, in research pertaining thereto, or in the production or testing of biological materials, including but not limited to:

- Blood-soaked bandages.
- Culture dishes and other glassware.
- Discarded surgical gloves - after surgery.
- Discarded surgical instruments – scalpels.
- Needles - used to give shots or draw blood.
- Cultures, stocks, swabs used to inoculate cultures.
- Removed body organs - tonsils, appendices, limbs, etc.
- Lancets - the little blades the doctor pricks your finger with to get a drop of blood.
- Syringes and needles.

Definition – Construction/Demolition Waste

Construction and demolition (C&D) waste is generated from construction, renovation, repair, and demolition of houses, large building structures, roads, bridges, piers and dams. C&D waste is made up of wood, steel, concrete, masonry, plaster, metal and asphalt. C&D waste is notable because it can contain hazardous materials such as asbestos and lead.

Household Hazardous Waste

What makes a substance hazardous?

A material is hazardous if it has one or more of the following characteristics:

- **Corrosive/caustic** burns/destroys living tissue and includes drain cleaners, toilet bowl cleaners, chlorine bleach, rug cleaners.
- **Toxic/poisonous** causes injury/death, and includes furniture polishes, pet sprays and shampoos, insect sprays, silver polish.
- **Flammable/ignitable** easily catches fire and includes oil-based paints, lacquers, paint strippers and thinners.
- **Explosive** explodes through exposure to flame and includes aerosols and metal polishes, fuels and other substances.
- **Reactive** generates excessive heat, and includes ammonia/bleach noxious fumes and other substances.

Practices for Reduction in Household Waste

What is the best way to dispose of HHW?

- HHW could contaminate groundwater and should not be disposed of at home.
- Do not dump products on the ground, down sewers, drains or toilets. They should not be disposed of with household trash either. Hazardous products could pose health problems for sanitation workers and could contribute to groundwater contamination if dumped in a disposal site.
- HHW is best disposed of through professional collection programmes.

What can I do to reduce HHW?

- Audit your house to see what hazardous materials you already have. Buy only what you need.
- Use it up before discarding the container.
- Buy smaller amounts to prevent deterioration of the product. Do not use the product too often or in excessive amounts.
- Avoid splashing, skin contact and breathing of fumes. Use in well-ventilated areas. Use personal protection such as gloves or masks.
- Give leftovers to a friend or neighbour to use up.
- Read labels carefully; look for words that indicate hazardous products, such as: CAUTION, WARNING, DANGER, TOXIC, CORROSIVE, FLAMMABLE, CONTENTS UNDER PRESSURE and avoid these products.
- Store materials separately, in their original containers, clearly labelled. Store the product safely away from children. DO NOT MIX SUBSTANCES.
- Know what you're buying and decide if it is the safest product for the job. Always use non-hazardous alternatives when possible.

Are any HHW recyclable?

In some cases, batteries, waste oil and old paint can be recycled. Button batteries, such as mercury-oxide, silver-oxide and lithium, can be recycled and may even produce revenues. Waste oil can be re-refined into lubrication or motor oils or reprocessed into industrial heating fuels. Latex or water-based paints can be reused or recycled through paint exchanges or LA-based collection programmes. Solvent-based paints are not recyclable and should be disposed through proper hazardous waste programmes.

Medical Waste

Issues with Medical Waste

Medical waste is an ongoing concern for hospitals, dental offices, physician offices, clinics, veterinarian offices and other places where medical assistance is provided. There are two types of medical waste: the infectious variety, which can carry the bacteria or viruses that cause illnesses and the non-infectious variety. Infectious wastes include blood products, bandages with blood, animal and human flesh, and sharps, such as hypodermic needles, pipettes and scalpel blades. Non-infectious wastes include packaging and food waste. Infectious waste must be destroyed or sterilized if it is being taken to a disposal site.

How to Reduce Medical Waste

Infectious waste is often burned in incinerators. Incinerators are either located on-site or at an off-site facility that specializes in handling medical waste. There are advantages to choosing incineration over other methods of waste disposal. First, because the waste is burned, there is a resulting reduction in disposed waste. This can be ecologically friendly, as well as save the facility disposal costs. Second, incineration produces energy that the facility can use, reducing overall energy costs. Sharps can also be disposed of through incineration. Incineration does have disadvantages. They are a large expense. Some of this expense can be offset by savings from the energy that incinerators generate, and by the reduction in disposal site costs; but an incinerator can still be a large capital expense for a hospital. Incineration also produces pollution. The main culprit in this is plastic waste, which releases dioxins and furans into the atmosphere when it is burned.

Alternatives to Incineration

Autoclaves use steam to sterilize medical waste. Some equipment has additional features to aid in disposal, such as drying and compacting. Autoclaves are available in many sizes, from small models that can only be used in one small facility, to industrial sizes, which can be used by one or more hospitals.

Construction/Demolition Waste

C&D materials can be recovered through reuse and recycling. In order for materials to be reusable, builders generally must remove them intact (windows and frames, plumbing fixtures, floor and ceiling tiles) or in large pieces (drywall, lumber). Some materials may require additional labour before they can be reused. For example, lumber may need to be de-nailed and window frames may need some new panes. In order to be recycled, materials must be separated from contaminants (e.g. trash, nails and broken glass). This can be accomplished if builders require workers to sort materials as they remove items from buildings or as debris is produced.

Strategies for Recovering C&D Materials

- Include C&D recovery plans in the project design.

  Some recovery options may be lost if not considered at the project design stage.

- Include recovery requirements and goals in project specifications and contracts.

  By including recovery requirements and goals in project specifications and contracts, project planners can signal their commitment to recovery and make subcontractors aware of their responsibilities from the project outset.

- Educate builders and crews on materials recovery techniques.

  Educating builders and crews on materials recovery techniques and procedures such as sorting and storage methods, recoverable materials and removal techniques, can eliminate contamination problems and increase recovery rates.

- Hold subcontractors accountable for materials recovery.

  Incorporating a mechanism to enforce contract provisions requiring materials recovery, gives project managers leverage to ensure efforts are a success.

- Provide incentives for recovery.

  Providing incentives to builders and crews can create project buy-in.

- Follow-up with builders and crews during the project.

  Without feedback, builders and crews may forget correct recovery procedures or grow lax about implementing them.

- Think outside the box.

  Recovery of C&D materials is a growing field and offers opportunities for creative thinking.

SESSION 6: HOUSEHOLD WASTE COMPOSTING

Summary

This session will discuss composting as a means of source reduction. The methods of home composting are discussed and what is meant by 'Master Composter'.

Definition - Composting

Another form of Solid Waste Reduction (recycling) is composting. Composting is the controlled biological decomposition of organic matter, such as food and yard wastes, into humus, a soil-like material. Composting is nature's way of recycling organic waste into new soil, which can be used in vegetable and flower gardens, landscaping and many other applications.

Natural composting, or biological decomposition, began with the first plants on earth and has been going on ever since. As vegetation falls to the ground, it slowly decays, providing minerals and nutrients needed for plants, animals and microorganisms. Mature compost, however, includes the production of high temperatures to destroy pathogens and weed seeds that natural decomposition does not destroy.

Home Composting - Food Scraps

Home composting programmes are an increasingly popular residential source reduction programme option. By composting, households can divert large percentages of their food scraps and yard trimmings from the waste stream. Home composting programmes are typically organized at the municipal level and involve educating users about proper composting practices and encouraging the diversion of all organic materials. Many LAs with home composting programmes implement public education and outreach programmes to encourage residents to compost. These entail distributing flyers and brochures, producing videos and radio advertisements, and displaying home composting bins with instructions and information at public events, gardens and gardening stores. In addition, many LAs develop 'Master Composter Programmes'. In these programmes, a compost specialist trains a group of volunteers, who become 'Master Composters'. They in turn train others in the LA on proper composting techniques.

Benefits of Composting

- Keeps organic waste out of disposal sites.
- Provides nutrients to the soil.
- Increases beneficial soil organisms (e.g. worms and centipedes).
- Suppresses certain plant diseases and pests.
- Reduces the need for fertilizers and pesticides.
- Protects soil from erosion.
- Assists pollution remediation.
- Promotes higher yields of agricultural crops.
- Facilitates reforestation, wetlands restoration, and habitat revitalization efforts by amending contaminated, compacted and marginal soils.

Pollution Solution

Compost can:

- Cost-effectively remediate soil contaminated by hazardous waste.
- Remove solids, oil, grease and heavy metals from stormwater runoff.
- Capture and destroys 99.6 percent of industrial volatile organic compounds (VOCs) in contaminated air.

Alternatives to Commercial Composting Bins

1. **Compost Pile**

   No construction necessary. Find a sheltered spot in your garden to begin your pile. That's all you need. Just keep in mind that items such as paper towels and napkins can blow around without some sort of shelter or protection around the pile.

2. **Wire-Mesh**

   Tie a length of wire or plastic mesh into a circle and attach the ends with wire ties using pliers. Use an old carpet or other material to cover, which will prevent the compost from becoming too wet.

3. **Single Wooden Unit**

   Choose a 3' x 3' square for your compost bin. Use a sledgehammer to pound the four posts (2' x 4's) into the ground, three feet apart. Nail wooden boards horizontally on three sides. One side can be left open to allow for easy access. A second unit would allow the compost to mature in one box while you add materials to the other box.

4. **Wooden Pallet Unit**

   One easy way to build a simple and effective compost bin is to use four ordinary wooden pallets and tie them together. After placing the four pallets upright to form your square bin, tie the four corners with rope or wire. You can use a fifth pallet for flooring to allow greater airflow. Again, cover with an old carpet or some other material to keep it dry. A second unit would also be helpful with this type of composting.

5. **Cement Block Bin**

   Cement blocks or bricks may be used to build a composter. It is easy to set up and can be constructed with two sections to facilitate the turning of the pile, from one section to another.

How do you Compost?

All organic material can be divided into **GREENS** and **BROWNS**. This is an easy way to remember them, although things do not have to be green to be called **GREEN**. **GREENS** are things like, kitchen waste, fruit and vegetable peelings, bread, pasta, rice, ground coffee, cooked and uncooked food scraps (except meat, fish and chicken), fresh leaves, dried grass cuttings and garden weeds. **BROWNS** are things like, tea bags, paper including egg cartons, toilet paper rolls and cereal boxes, dried leaves, straw, sawdust and other woody materials (these would have to be broken into small pieces).

AN EASY WAY TO REMEMBER IS THAT BROWNS ARE DRY, HARD MATERIALS. GREENS ARE FRESH, SOFT, MOIST MATERIALS.

GREENS provide nitrogen. **BROWNS** provide carbon. For composting to work properly, you must have both carbon and nitrogen in equal quantities. Begin with a layer of **BROWNS** - a base of leaves or wood clippings will help air circulate

in your pile, and then add a layer of **GREENS**. Finish by covering with a layer of **BROWNS**. As you add to your pile in the weeks and months to come, continue alternating layers of **GREENS** and **BROWNS**, always finishing with a layer of **BROWNS**.

Don't worry if you don't have many materials at the beginning. Although a compost pile needs a certain amount of bulk to get working, you will soon be adding lots more material to your pile.

You should not leave kitchen scraps **GREENS**, on top of the pile. It is best to keep these materials buried inside the compost heap, where they will break down quicker. That is why you finish with **BROWNS** on top of the pile. Just remember that each time you add some greens and kitchen scraps, cover them with a layer of **BROWNS**. The easiest way to do this is to keep a bag of leaves or shredded paper near your composter, or compost heap, and then throw in a few handfuls each time to cover your **GREENS**.

Developing a Master Composter Programme

Master Composters are a group of volunteers trained to educate the public about, and instil enthusiasm for composting. Volunteers achieve these goals in a number of ways. They conduct workshops at demonstration sites throughout the LA. Through exhibits and demonstrations, they provide information at LA events held during the year at various locations. Volunteers also offer troubleshooting and technical assistance to composters in the LA. Anyone who has an interest in or basic knowledge of composting can become a Master Composter. The only requirements are enthusiasm for acquiring and sharing knowledge about composting and the interest and time to participate.

Reasons to Become a Master Composter

- Acquire new knowledge and skills shared by composting experts.
- Reduce waste and produce some wonderful humus for gardening.
- Improve your teaching and leadership skills through LA education.
- Gain a sense of satisfaction by initiating LA composting efforts.
- Make new friends and work as a team with others who share your interests.

LA Benefits

A Master Composter programme benefits the whole LA by furthering the goals of reducing the amount of compostable materials going into disposal sites. In addition to reducing waste, educating people about compost has additional benefits in terms of helping households reduce costs of disposal, reduce expenses for gardening soil amendments, and improve soil and water quality.

Biogas

Biogas is generated when bacteria degrade biological material in the absence of oxygen, in a process known as anaerobic digestion. Anaerobic digestion is basically a simple process carried out in a number of steps that can be used with almost any organic material as a substrate - it occurs in digestive systems, marshes, rubbish dump and septic tanks. Biogas can be used directly for cooking/heating and lighting.

The technology is particularly valuable in agricultural, waste treatment or animal processing units where there is excess manure (e.g. pig, cattle, chicken and human) or farm waste.

Biogas Digesters

With biogas technology, waste (called slurry) is stored in specially constructed containers while being digested. There are a number of technologies used to accomplish this:

- **Batch type digesters** treat a large amount of material at once. They are used for large-scale application.
- **Continuous flow units** add and remove waste material on a daily or regular basis. They are best suited for small-scale domestic applications.

Gas production is dependent upon digester temperature, fermentation or retention time and the feedstock material.

It is possible to have biogas units at the household level. However, a biogas unit will only yield good results if it is properly planned, constructed, operated and maintained. Regular supply of water is essential for operation of biogas plants.

Information required to design and install a biogas digester include:

- Size of family and daily cooking (and lighting) requirements.
- Availability and amount of feedstock (water, number of members in the family, cows, pigs etc).
- Materials available on site (bricks, etc) for construction of digester.

Using this information, the type of digester, the required digester volume and retention time can be determined.

Biogas can be used directly for cooking/heating and lighting. Besides producing the fuel gas, biogas digesters have the added benefit of producing a high nutrient slurry fertilizer and encouraging better sanitation on farms.

SESSION 7: DEVELOPING POLICY ON SOLID WASTE REDUCTION

Summary

This session will discuss policies and programmes by which a LA may encourage participation in Solid Waste Reduction by citizens and businesses.

As part of a recycling programme, a variety of policy directions and regulations may be required. In many parts of the world, regulations governing source reduction programmes are increasing due to the fact that without this regulation the participation levels would remain minimal. LAs can develop relevant policies and regulations in two ways:

- Preparation and enactment of by-laws.
- Development of policy statements/directives.

By-Laws

The Minister-in-charge of Local Government can frame rules and by-laws under the power of the Principal Ordinances and Act by: Municipal Councils (MCs), Urban Councils (UCs) and Pradeshiya Sabhas (PSs). LAs too can frame their own by-laws, subject to the approval of the Minister, as specified under the relevant sections of the Principal Ordinance and Act.

The following are standard by-laws available for LAs:

- MCs - Parts 1-57 published in gazette (extra) 54 1/17 of 20/1/1989
- UCs - Parts 1-27 published in gazette 10609 of 6/11/1953
- PSs - Parts 1- 41 published in gazette 520/17 of 23/8/1988

In respect to by-laws framed and published after the establishment of Provincial Councils (PCs), it must have the acceptance and proclamation of the PC. Once a LA resolves to accept the by-laws, and after publication of such adoptions or acceptance in the gazette, they became legally valid by-laws from the date specified in it or from the date of publication. A proposal to accept the approved by-laws, wholly or in part, must be adopted as a resolution at a meeting of the Council/Sabha. It must include the following:

- The Minister's power under Section 2 of Local Authorities (Standard By-Law) Act No 6 of 1952 giving reference to the gazette number and date of publication.
- The number and date of the gazette notice which proclaimed the acceptance of that Standard By-Law by the PC.
- The relevant section of the Ordinance/Act which express the Council desire to frame by-laws.
- The relevant section of the Standard By-Law Act under which the by-law is accepted or adopted – by section 2 (3) of the Local Authorities (Standard By-Law) Act No 6 of 1952.
- Resolution of the Council/Sabha stating its validity area with the name of the LA and its acceptance.
- Effective date to be stipulated, if not, it is effective from the date of publication of gazette.

Once the council approves the decision, the LA should gazette it.

The following procedure must be followed for a new or amendment to a Standard By-Law:

- Draft prepared and submitted to council for its acceptance by resolution. (Draft prepared with the participation of community affected or involved, with wide publicity).
- Obtain the approval of the Provincial Minister-in-charge of the subject of Local Government.

- Publication of the by-law in all three languages along with the approval of the Minister.
- Submit the by-law after publication for the concurrence of the PC. (As per Municipal Council Ordinance section 268(1), a by-law is not in effect until it is approved by the Minister and confirmed by Parliament and such confirmation is published in the gazette).
- If the PC acts for deletion or to alter a by-law, then that too must be published in the gazette.

Policy Statements / Directives

Policy Statements should be specific, actionable items that will be carried out under certain circumstances. Policy Statements should be agreed by a majority of the LA – Council Members and Mayor/Chairman. It is appropriate to obtain input from the Secretary/Commissioner, Technical Officers and other relevant local staff. Policy Directives are not mandatory but helps LAs to implement new initiatives for the betterment of the community. The LAs could develop such statements in order to reduce waste and encourage recycling within the organization and bodies that come under their purview. The following are some of the components LAs could include when preparing a Policy Statement:

Statement of purpose: reasons recycling is being imposed, such as saving disposal site space or protecting the environment or reducing costs.

Items that must be separated: not all communities want to recycle the same items. A definition section in the policy may be advisable to clarify which items must be recycled. Also, state which items such as grass clippings or leaves will not be accepted.

Material processing: processing requirements, such as crushing, cleaning, cap removal, bundling, or stacking in bins, should be clearly stated.

Collection procedure: some LAs have separate pick-up days for recyclables and non-recyclables. Others require drop-off at recycling centres. The local situation will dictate how this is handled. For a recycling centre, the hours of operation should normally be included in the policy.

Procurement and purchasing guidelines: LAs can decide terms and conditions for purchases.

Tenders and contracts: For market and slaughterhouse tenders, LAs can impose fines for violating segregation rules. This can be added into their lease/rental agreement.

APPENDICES

APPENDIX I: SOLID WASTE QUANTIFICATION AND ANALYSIS WORKSHEET

SOLID WASTE QUANTIFICATION AND COMPOSITION ANALYSIS SORT DATA SHEET		
SITE INFORMATION: households / schools / industries / markets / shopping area / transfer station / disposal site / any other site ----------(use one sheet for one site)		
NAME OF LA:		
LOCATION:		
TIME:		
SAMPLE INFORMATION:		
SORT DATA:		
WASTE COMPONENTS*	**NET WEIGHTS**	**COMMENTS**
PAPER:		
White Ledger		
Coloured Ledger		
Computer		
Newspaper		
Cardboard		
Magazine		
Telephone Books		
PLASTIC:		
Polythene Bags		
Plastic Bottles		
Plastic Cans		
Multi Layer Packaging		
GLASS:		
Clear Containers		
Green Containers		
Brown Containers		
Plate Glass		

METAL:		
Aluminium Cans		
Tin/Steel Cans		
Copper		
Major Appliances		
Remainder/Composite Metal		
GREEN WASTE:		
Leaves		
Grass		
Other Garden Waste		
KITCHEN WASTE:		
Food Waste		
Coconut Shells		
TYRES		
USED OIL		
WOOD		
CLOTHING		
FURNITURE		
OTHER		
HAZARDOUS WASTE:		
Batteries		
Paint		
Solvents		
Other Hazardous		
COMMENTS / OBSERVATIONS:		
* Use blank cells to write any other items		

APPENDIX II: SOLID WASTE REDUCTION ASSESSMENT WORKSHEET

WASTE COMPONENTS*	TARGET SECTORS**	WASTE REDUCTION ASSESSMENT WORKSHEET					
		Waste Composition		Current Recycling Activity		Waste Reduction Preliminary Planning	
						Material Targeted For	
		Present in Waste	Quantity wt., vol., %	Material Recycled	Quantity wt., vol., %	Recycling	Waste Prevention
PAPER:							
White Ledger		☐		☐		☐	☐
Coloured Ledger		☐		☐		☐	☐
Computer		☐		☐		☐	☐
Newspaper		☐		☐		☐	☐
Cardboard		☐		☐		☐	☐
Magazine		☐		☐		☐	☐
Telephone Books		☐		☐		☐	☐
Other Paper		☐		☐		☐	☐
		☐		☐		☐	☐
		☐		☐		☐	☐
PLASTIC:							
Polythene Bags		☐		☐		☐	☐
Plastic Bottles		☐		☐		☐	☐
Plastic Cans		☐		☐		☐	☐
Multi Layer Packaging		☐		☐		☐	☐
		☐		☐		☐	☐
		☐		☐		☐	☐
GLASS:							
Clear Containers		☐		☐		☐	☐
Green Containers		☐		☐		☐	☐
Brown Containers		☐		☐		☐	☐
Plate Glass		☐		☐		☐	☐
		☐		☐		☐	☐
		☐		☐		☐	☐
METAL:							
Aluminium Cans		☐		☐		☐	☐
Tin/Steel Cans		☐		☐		☐	☐
Copper		☐		☐		☐	☐
Major Appliances		☐		☐		☐	☐
Remainder/Composite Metal		☐		☐		☐	☐
		☐		☐		☐	☐
		☐		☐		☐	☐
GREEN WASTE:							
Leaves		☐		☐		☐	☐
Grass		☐		☐		☐	☐
Other Garden Waste		☐		☐		☐	☐

		☐		☐		☐	☐
		☐		☐		☐	☐
KITCHEN WASTE:							
Food Waste		☐		☐		☐	☐
Coconut Shells		☐		☐		☐	☐
		☐		☐		☐	☐
		☐		☐		☐	☐
TYRES		☐		☐		☐	☐
USED OIL		☐		☐		☐	☐
WOOD		☐		☐		☐	☐
CLOTHING		☐		☐		☐	☐
FURNITURE		☐		☐		☐	☐
OTHER		☐		☐		☐	☐
HAZARDOUS WASTE:							
Batteries		☐		☐		☐	☐
Paint		☐		☐		☐	☐
Solvents		☐		☐		☐	☐
Other		☐		☐		☐	☐
		☐		☐		☐	☐

** Use blank cells to write any other items*

**Please use the following to indicate targeted sectors: R=Residential; C=Commercial; I=Industrial; G=Governmental; S=School; A=All sectors, M=Markets, Any Others, please mention

APPENDIX III: SOLID WASTE MANAGEMENT WORKSHEET

Solid Waste Management Worksheet				
MATERIAL	**AMOUNT DISPOSED**	**AMOUNT RECYCLED**	**RECYCLER Name and Location**	**DISPOSAL Facility Name**
PAPER:				
White Ledger				
Coloured Ledger				
Computer				
Newspaper				
Cardboard				
Magazine				
Telephone Books				
Other Paper				
PLASTIC:				
GLASS:				
Clear Containers				
Green Containers				
Brown Containers				
Plate Glass				
Other Glass				
ALUMINUM:				
OTHER METAL:				
Steel				
Copper				
WOOD:				
GREEN WASTE:				
Leaves				
Grass				
Other Yard Waste				
FOOD WASTE:				
TYRES:				
USED OIL:				
HAZARDOUS WASTE:				
Paint				
Batteries				
Solvents				
Other				
CLOTHING:				
FURNITURE:				
OTHER:				
TOTALS				

APPENDIX IV: SOLID WASTE AUDIT AND GENERAL INFORMATION WORKSHEET

Name of Business..... Date.....

Mailing Address..... Postal Code.....

Key Contact Person / Title..... Phone.....

Source of Referral.....

Property Management Company.....

Description of Building

Number of Employees..... Number of Floors.....

Number of Computer Printers..... Number of Photocopiers.....

Are Elevators Available?.....Yes .....No

Does the building have a Loading Dock for freight deliveries? .....Yes .....No
Special needs that may affect recycling: (Shredding for confidentiality, cpace limitations)

Current Waste Management Services

Name of Janitorial Service.....

Janitorial service participation in recycling programme?.....Yes .....No

Waste collection service..... Phone.....
Quantity and equipment used for waste collection and disposal

Type/No. of Containers	% Full	Frequency of Pickup
Dumpsters _____	_____	____Daily ____ Weekly _____Other (_____)
Cans _____	_____	____Daily ____ Weekly _____Other (_____)
Compactor _____	_____	____Daily ____ Weekly _____Other (_____)
Shredder _____	_____	____Daily ____ Weekly _____Other (_____)

Current Recycling Activity

Currently recycling?.....Yes .....No Materials.....

Vendor(s).....

Has programme been successful?.....Yes .....No Why?.....

Waste Currently Generated

PAPER	*% of Total Waste*
White Ledger Paper	_____
Coloured Ledger Paper	_____
Computer Paper	_____
Newspaper	_____
Corrugated cardboard	_____
Multi-Copy Forms (pressure sensitive)	_____
Mixed Waste Paper	_____
Magazines	_____
Telephone Books	_____

METAL	
Aluminium Cans	_____
Aluminium/Other	_____
Brass	_____
Copper	_____
Iron	_____
Lead	_____
Steel	_____
Tin Cans	_____
Other	_____

OTHER MATERIALS	*TYPE*	
Glass	_____	_____
Plastic	_____	_____
Textiles	_____	_____
Wood Waste	_____	_____
Motor Oil	_____	_____
Combustible Waste	_____	_____
Other	_____	_____

THE VOLUMES ABOVE ARE ESTIMATES PER _____ DAY _____WEEK _____ MONTH

APPENDIX V : RECYCLING ACTION PLAN

Use the following worksheets to begin planning a recycling programme for an identified bulk waste generator. Prepare individual plans for each bulk generator if you have more than one.

GENERAL PROFILE

Name of institution:.....

Type of institution: Collective Houses / School / Industry / Market / Shopping Complexes / Hospital / _____

Address/Telephone:.....

TARGET MATERIALS (Mark X all that apply)

Mark the materials that can be potentially collected from the institution

Paper		Plastic		Organic Matters		Glass		
White Ledger		Polythene Bags		Kitchen Waste		Clear Containers		
Coloured Ledger		Plastic Bottles		Garden Waste		Green Containers		
Computer		Plastic Cans				Brown Containers		
Newspaper						Plate Glass		
Cardboard						Other Glass		
Magazine								
Telephone Books								
Other Paper								
Metals		**Others**		**Others**		**Others**		
Aluminium		Tyres						
Steel		Used Oil						
Copper								

STORAGE FOR RECYCLABLE MATERIALS (Mark X all that apply)

Existing Condition

Methods	X	Comments
Number separate collection		
Specific area for collection		
Separate collection bins at the site		
Only one collection bin for recyclable		
Write down if there is any other way		

Action to be taken

Methods	X	Comments
Purchase new containers		
Modify existing containers		
Place a common bin for recycleables		
Place separate bins for recycleables		

METHODS FOR RECYCLABLE COLLECTION (Mark X all that apply)

Existing Condition

Methods	X	Comments
Number collection of recycleables		
Directly sent to contractors		
Contractors periodically come and collect		
No specific procedure		

Action to be taken

Methods	X	Comments
Identify recycling contractors		
Direct to a central collection place		

RECYCLING WASTE QUANTITY

Type of Waste	% Weight	Amount of generation, kg / month	Amount of collection for recycling kg / month
Paper			
Plastic			
Organic matter			
Glass			
Metals			
Others			

HAULING / PICKUP DATA

Details on recyclers in the region

Name	Contact Details	Collection Materials	Remarks

EDUCATION AND PROMOTION (Mark X all that apply)

Existing Condition

Methods	X	Comments
Brochures		
Posters		
Mini presentations/workshops		
Meetings/discussions		
Video		
Radio		
Number programme on education and promotion		

Action to be taken

Methods	X	Comments
Gather materials from relevant sources		
Distribution of materials		
Conduct group meetings		

SUMMARY OF RESPONSIBILITIES

Team Leader of Recycling Action Plan Team of the LA

Recycling Coordinator at the bulk waste generation site

Other members in the Recycling Action Plan Team

COST-BENEFIT WORKSHEET

Item	Price per Unit	Revenue by selling recyclables for the month, Rs / month	Item	Price per Unit	Revenue by selling recyclables for the month, Rs / month
Paper			**Plastic**		
White Ledger			Polythene Bags		
Coloured Ledger			Plastic Bottles		
Computer			Plastic Cans		
Newspaper					
Cardboard					
Magazine					
Telephone Books					
Other Paper					
Metals			**Others**		
Aluminium			Tyres		
Steel			Used Oil		
Copper					
Organic Matter			**Glass**		
Kitchen Waste			Clear Containers		
Garden Waste			Green Containers		
			Brown Containers		
			Plate Glass		
			Other Glass		
Others			**Others**		
TOTAL					

APPENDIX VI: SAFER ALTERNATIVES TO HOUSEHOLD HAZARDOUS PRODUCTS

Aerosols

- Use non-aerosol products.
- Deodorants - roll-ons, creams and sticks.
- Hair sprays - setting lotions, gels, pump sprays.
- Shaving cream - brush and shaving soaps.
- Cooking sprays - cooking oils.
- Cleaners - pump sprays.

Air Freshener

- Leave open box of baking soda in room.
- Set out a dish of vinegar.
- Add cloves, cinnamon to boiling water and simmer.

All Purpose Cleaner

- Mix 1 qt. warm water, 1 tsp. liquid soap, boric acid (borax), lemon juice and/or vinegar. Make stronger according to the job.

Ant Control

- Pour a line of cream of tartar at place/s where ants enter the house.
- Sprinkle red chilli, paprika or dried peppermint where ants enter.

Chlorine Bleach

- Use safer and less destructive dry bleach or borax to whiten.

Disinfectant

- 1/2 cup borax in 1 gallon water.

Drain Opener

- Plunger or mechanical snake.
- Handful of baking soda and 1/2 cup vinegar, followed by boiling water to prevent clogging. Flush drain weekly with boiling water.
- Use enzymatic biological drain cleaner.

Fabric Softener

- Rinse cotton and wool blankets with 2 cups white vinegar added to washer.

Furniture Polish

- Wipe with mixture of 1 tsp. lemon oil in 1 pint mineral or vegetable oil.
- 3 parts olive oil, 1 part vinegar.
- 1 part lemon juice, 2 parts vegetable oil.

Floor Cleaner

- Mop with 1 cup white vinegar with 2 gallons water.
- Polish with club soda.

Glue or Decal Remover

- Soak in white vinegar.

Hair Colours

- Plant-derived rinses.

Insecticides

- Select pest resistant plants.
- Plant garlic cloves at 1 foot intervals in garden.
- Use traps or spray soaps.
- Blend 6 cloves crushed garlic, 1 minced onion, 1 Tbls. dried hot pepper, and 1tsp. pure soap in 1 gallon hot water; let sit 1-2 days; strain; spray on plants.

Laundry Spot Remover

- Make paste of washing soap and water.
- Club soda, lemon juice and hot water.
- Borax and cold water.
- Deodorant stains - rub lightly with white vinegar and launder as usual.

Metal Polish

- Brass - Worcestershire sauce.
- Copper - vinegar and salt; or lemon and salt.
- Silver - soak in 1 qt. warm water with 1 tsp. baking soda, 1 tsp. salt, and piece of aluminium foil; or rub with ammonia and soft cloth.
- Stainless steel - wash with 1 qt. warm water and 3 Tbls. baking soda; rinse with hot water.
- Chrome - apple cider vinegar or baking soda and soft cloth.
- Pewter - rub with fine steel wool dipped in olive oil, wash in soapy water and dry; or polish with cabbage leaves.

Mildew or Soap Scum

- 1/4 cup baking soda, 1/2 cup vinegar and warm water.

Mothballs

- Cedar chips, lavender flowers, rosemary, mint, white peppercorns.

Oven Cleaner

- Sprinkle salt and baking soda on spill while still warm.
- Scour with steel wool and baking soda.
- For baked on grease, wipe with ammonia, let sit overnight; then scrub with baking soda.

Stain Remover

- Clean stains immediately with club soda.
- Wine or coffee stains - put stained materials in glass, enamel, or stainless steel pot; Cover with mixture of milk and water; bring to boil and simmer 2-4 minutes until stain has disappeared.
- Coffee and tea - equal parts moist salt and vinegar; or baking soda solution of 3 Tbls. baking soda and 1 qt. water.

Starch

- 1 Tbls. cornstarch, 1 pint cold water.
- Non-aerosol sprays.

Window Cleaner

- Use 1/2 cup. vinegar in 1 gallon warm water.
- Use newspaper to dry glass.

APPENDIX VII: GENERAL TIPS ON WASTE REDUCTION FOR LARGE ENTITIES

Hotels/Lodging

Practice waste reduction, reuse and recycling:

- Use reusable items vs. disposable items.
- Practice double-sided photocopying.
- Set up in-house recycling programme (e.g. office paper and corrugated cardboard).
- Purchase supplies in bulk where possible.
- Use glasses rather then disposable cups.
- Reuse scrap paper (e.g. make into note pads).
- Use liquid soap containers rather then individually wrapped bars of soap.
- Recycle toner or cartridges for copy machine or printer.
- Minimize use and seek out alternatives to toxins (such as cleaners).

Use products made from recycled content:

- Purchase office paper and administrative products made with recycled content (e.g. paper, letterhead, paper towels, tissue paper, note pads, business cards, credit card slips, etc.; indicate on letterhead, 'printed on recycled paper').
- Purchase and use at least two other items made with recycled content (e.g. desk organizers, recycling bins, desk top trays).

Promote waste reduction and recycling:

- Encourage guests not to open or use items unless needed.
- Provide guests with drop-off points to recycle newspaper, glass and aluminium containers (and/or other items consistent with LA recycling programmes); or post signs at trash disposal areas promoting separation of recyclable and locations of recyclable drop-off points.
- Promote and support LA recycling efforts by using LA boards or posting local flyers.
- Donate to human service agencies, soaps, shampoo, lotions and bathroom tissue that are usually discarded by guests when checked out.
- Request that suppliers/manufacturers use as much recycled content material in packaging as possible.
- Request suppliers/manufacturers provide a system to take back non-recyclable packaging.
- Encourage employees to share magazines and newspaper subscriptions.

Restaurants

Practice waste reduction, reuse and recycle:

- Use reusable dishes, glasses and utensils instead of single use disposable.
- Use cloth tablecloth and hand wipes vs. paper (or serviettes with recycled content for take out).
- Serve drinks from bulk containers.

- Request that suppliers package food in reusable and/or returnable containers.
- Purchase supplies in bulk where possible.
- Use cloth towel dispenser in rest room or paper towels with recycled content.
- Reuse scrap paper (e.g. make into note pads).
- Request that suppliers/manufacturers use as much recycled content material in packaging as possible.
- Request suppliers/manufacturers to provide system to take back non-recyclable packaging.
- Serve sugar, cream, butter and other condiments in bulk (non-individual).
- Compost all non-meat product waste.
- Use compact florescent light bulbs where lights are on three hours or more.
- Donate surplus edible foods to charities, soup kitchens, homeless shelters, local families, if possible.
- Encourage employees to share magazines and newspaper subscriptions.
- Minimize use and seek out alternatives to toxins (such as cleaners).
- Eliminate use of Styrofoam products (e.g. cups and packaging).

Recycle as much of remaining waste as possible:

- Set up in-house recycling programme (e.g. office paper and corrugated cardboard).
- Return deposit containers.
- Designate an employee to oversee recycling/separation programme.

Purchase products made from recycled material:

- Purchase office paper and administrative products made with recycled content (e.g. paper, letterhead, paper towels, tissue paper, note pads, etc.).
- Purchase and use at least two other items made with recycled content (e.g. desk organizers, recycling bins, desk top trays).

Schools

Practice waste reduction, reuse and recycling:

- Use reusable items vs. disposable items.
- Purchase supplies in bulk where possible.
- Set up school recycling programme (e.g. office paper and corrugated cardboard).
- Set up in-house recycling programme for metal cans (especially from food service area).
- Practice double-sided photocopying.
- Reuse scrap paper (e.g. make into note pads).
- Increase use of reusable items in cafeteria area (e.g. reusable lunch trays vs. disposable ones, silverware vs. plastic utensils).
- Request that suppliers/manufacturers use as much recycled content material in packaging as possible.
- Request suppliers/manufacturers to provide system to take back non-recyclable packaging.

- Recycle toner or cartridges for copy machine or printer.
- Minimize use and seek out alternatives to toxins (such as cleaners).
- Encourage employees and customers to share magazines and newspaper subscriptions.

Teach the necessity for waste reduction, composting and recycling:

- Conduct internal waste audit to help identify areas of greatest need in waste reduction.
- Work with teachers to develop curriculum for students.
- Encourage speakers at assembly programmes on topics of waste reduction/recycling.
- Develop programme to promote donation of non-recyclable materials such as bottle caps, Styrofoam peanuts, etc. for use in art projects.

Use products made from recycled content:

- Promote and support LA recycling efforts with LA boards or space to display swap items and LA recycling projects.
- Purchase and use at least two other items made with recycled content (e.g. desk organizers, recycling bins, desk top trays).

Financial Institutions

Practice waste reduction, reuse and recycling:

- Use reusable items vs. disposable items.
- Practice double-sided photocopying.
- Set up in-house recycling programme (e.g. office paper and corrugated cardboard).
- Purchase supplies in bulk where possible.
- Reuse scrap paper (e.g. make into note pads).
- Promote reduced use of envelopes for customer transactions; perhaps post sign, 'envelopes on request only'.
- Explore use of truncated cheque system for customers; (cancelled cheque records are kept on microfilm and not sent back to customer; perhaps an incentive is offered for customers using this system).

Use products made from recycled content:

- Purchase office paper and administrative products made with recycled content (e.g. paper, letterhead, paper towels, tissue paper, note pads, business cards, credit card slips, etc.; indicate on letterhead, 'printed on recycled paper').
- Request that suppliers/manufacturers use as much recycled content material in packaging as possible.
- Purchase and use at least two other items made with recycled content (e.g. desk organizers, recycling bins, desk top trays).
- Offer bank cheques with recycled content paper.
- Explore use of savings book covers made of material that can be recycled or made of recycled content.

Promote waste reduction and recycling:

- Request suppliers/manufacturers to provide system to take back non-recyclable packaging.
- Encourage employees to share magazines and newspaper subscriptions.

Government Institutions

Practice waste reduction and recycling in all government facilities:

- Set up in-house recycling programme (e.g. office paper and corrugated cardboard).
- Educate employees about waste reduction, recycling programmes.
- Use reusable items vs. disposable items.
- Practice double-sided photocopying.
- Purchase supplies in bulk where possible.
- Recycle toner or cartridges for copy machine or printer.
- Encourage employees to share magazines and newspaper subscriptions.

Do at least one of the following:

- Store public records on computer disks or microfilm (if available).
- Minimize use and seek out alternatives to toxins (such as cleaners).
- Adopt feasible measures to promote 'post-consumer' recycled contents in procurement specifications.

Promote waste reduction, composting and recycling by offering:

A. Financial Incentives such as:

- Reduced disposal fees for those who recycle or charge a fee for each bag of trash disposed (recyclable would be exempt).
- Offer free pickup for recyclables.

B. Educate the LA on ways to cut waste generation for all local residencies and businesses:

- Distribute information on waste reduction.
- Form a solid waste recycling committee to promote waste reduction and recycling.
- Sponsor events to raise public awareness about waste reduction.
- Encourage backyard composting.
- Request that suppliers/manufacturers use as much recycled content material in packaging as possible.
- Request suppliers/manufacturers to provide system to take back non-recyclable packaging.
- Pass an ordinance that would require LA-wide recycling.

Provide and promote waste exchange and recycling opportunities:

- Initiate and promote a LA recycling programme.
- Provide a collection programme for or provide information on collection sites for waste oil.
- Set up a waste exchange at the town dump/transfer station/recycling centre.
- Work with resale shops to provide pickup of clothing.

Use products made from recycled materials:

- Purchase office paper and administrative products made with recycled content (e.g. paper, letterhead, paper towels, tissue paper, note pads, business cards, credit card slips, etc.; indicate on letterhead, 'printed on recycled paper').
- Use compost material for town landscaping.
- Purchase and use at least two other items made from recycled content (e.g. desk organizers, recycling bins, desk top trays).

Ensure bid specifications call for recycling or use of recycled material:

- Use recycled asphalt for road/highway projects

Retail Establishments

Practice waste reduction, reuse and recycling:

- Use reusable items vs. disposable items.
- Purchase supplies in bulk where possible.
- Reuse scrap paper (e.g. make into note pads).
- Use cloth towels in rest rooms or paper ones with recycled content.
- Use compact florescent lights wherever possible.
- Donate excess stock to charities whenever possible.

Use products made from recycled content:

- Purchase office paper and administrative products made with recycled content (e.g. paper, letterhead, paper towels, tissue paper, note pads, business cards, credit card slips, etc.; indicate on letterhead, 'printed on recycled paper').
- Request that suppliers/manufacturers use as much recycled content material in packaging as possible.
- Recycle toner or cartridges for copy machine or printer.
- Purchase and use at least two other items made with recycled content (e.g. desk organizers, recycling bins, desk top trays).

Promote waste reduction and recycling:

- Offer incentives to customers for bringing in their own bag or containers for purchases.
- Set up in-house recycling programme (e.g. office paper and corrugated cardboard).
- Promote and/or purchase items with recycled content such as letterhead, brochures, business cards, etc. (indicate on letterhead, 'printed on recycled paper').
- Request suppliers/manufacturers to provide system to take back non-recyclable packaging.
- Offer employees educational material on recycling and waste reduction.
- Minimize use and seek out alternatives to toxins (such as cleaners).
- Encourage employees to share magazines and newspaper subscriptions.

Markets

Reduce and recycle in-store waste:

- Set up in-house recycling programme (e.g. office paper and corrugated cardboard).
- Request that suppliers/manufacturers use as much recycled content material in packaging as possible.
- Request suppliers/manufacturers to provide system to take back non-recyclable packaging.
- Purchase office paper and administrative products made with recycled content (e.g. paper, letterhead, paper towels, tissue paper, note pads, business cards, credit card slips, etc.; indicate on letterhead, 'printed on recycled paper').
- Purchase supplies in bulk where possible.
- Practice double-sided photocopying.
- Use reusable items vs. disposable items.
- Reuse scrap paper (e.g. make into note pads).
- Purchase and use at least two other items made with recycled content (e.g. desk organizers, recycling bins, desk top trays).
- Return wooden pallets for repair/reuse.
- Encourage suppliers to use reusable containers.
- Compost non-meat product waste.
- Recycle toner or cartridges for copy machine or printer.

Provide and promote recycling opportunities for customers:

- Set up drop-off recycling containers on site for paper bags, plastic bags.
- Encourage support for municipal recycling efforts.
- Offer incentives to customers for bringing in their own bag or containers.
- Educate on over-bagging and check people to minimize over-bagging.
- Initiate a self-labelling programme to educate customers on recycling.
- Offer 'environmental shopping tours' and other educational tours for civic organizations and school groups.
- Display educational information in shopping carts and/or set up a recycling information area.

Promote waste and toxicity reduction:

- Promote items using recycled or reduced content packaging.
- Promote bulk items.
- Use recycled goods in store brand products (e.g. recycled paper in grocery bags, recycled plastic in food containers).
- Encourage conservation of in-store supplies.
- Encourage recyclability of packaging and products.
- Minimize use and seek out alternatives to toxins (such as cleaners).
- Encourage employees to share magazines and newspaper subscriptions.

Promote and practice energy conservation:

- Use energy efficient lights (that dim at night).
- Install doors on dairy cases and freezers.
- Use heat from refrigerators to heat water.

APPENDIX VIII: GENERAL TIPS ON WASTE REDUCTION FOR INDIVIDUALS

Don't Pay More for Less - Choose Items With Minimal or No Packaging

Packaging can make up to 1/3 of the average household's garbage and accounts for approximately 10% of the price you pay for food.

- Avoid buying products that have excessive, multi-layer packaging.
- Buy products in bulk or in the largest size available. This way you will minimize the amount of packaging per unit of product and save money!
- Buy products in packages that are recyclable in your local programme (i.e. glass, metal, rigid plastic, aluminium).
- Buy concentrates - why pay more for a big package when you can just add water yourself?
- Buy recycled! By choosing products and packaging made from recycled materials, you are supporting recycling markets.

Reuse Packaging and Other Items

- Use glass jars for storing food, such as flour, nuts and dried fruit, or for other items such as screws, nails, buttons, etc.
- Reuse paper and plastic bags; better yet, invest in canvas shopping bags.
- Wash and reuse plastic dinnerware for parties, picnics and potlucks.
- Use plastic margarine and yogurt containers for freezing foods or storing leftovers in the fridge.
- Wash and reuse aluminium pie plates.
- Give magazines to friends, office waiting rooms, hospitals, school home economics classes, etc.
- Save polystyrene packing peanuts and use them again; better yet, ask mail order companies to ship in paper, not polystyrene.

Buy Durable, Long-Lasting Products

- Think about the purchases you make. Durable, long-lasting products are often better quality products that require fewer repairs and create less waste than disposables. They may cost more at first, but they save money in the long run.
- Invest in cloth napkins for everyday use and use reusable wiping cloths and towels rather than paper towels for home cleaning projects.
- Avoid buying disposable dishes for picnics and parties, invest in reusable, durable plastic plates and cups that can be washed and used again.
- Buy refillable and reusable containers. Instead of using disposable razors, lighters, pens and cameras, invest in a good razor with replaceable blades, a refillable lighter, pens with refills and a camera that lets you change the film.
- Use cloth rather than disposable diapers. Even if you can't wash diapers at home, diaper services are generally less expensive than buying disposable diapers.
- Buy rechargeable batteries.

Maintain and Repair

- Maintain and repair items such as tools, appliances, shoes and clothing to ensure long productive life.
- If you are unsure how to do your own repairs, repair manuals are available in bookstores, libraries and the Internet.

Borrow or Rent

- Borrow or rent items you use infrequently, such as audiovisual equipment, tools, appliances and baby or office furniture.

Donate Things you No Longer Need

- Pass along clothes, books, appliances, furniture and other items to friends, neighbours, libraries, schools, nursing homes or other charities.

Backyard Composting

Up to 70-90% of municipal solid waste in Sri Lanka is composed of organic, kitchen and garden waste.

- Compost your kitchen scraps, grass/tree clippings, leaves, weeds and woody wastes to grow healthier plants.
- Garden composting turns organic waste into a valuable soil amendment.
- Simple compost bins can be constructed for most homes and gardens. Construction information for building your own compost bin is typically available in libraries, public agencies and the Internet.

Vermiculture

Vermicomposting or worm composting is, without question, one of the most exciting and educational forms of recycling known to modern humans. Here is a partial list of some of the benefits of worm composting:

- Dispose of your food scraps without burdening disposal sites.
- Provide your houseplants with free worm 'tea' (natural liquid fertilizer) and nutritious 'castings' (a great soil conditioner for gardens and indoor plants).
- Ideal for apartment dwellers or people with little or no garden space.
- Re-establish natural worm populations in your garden that were decimated by poisoning from synthetic fertilizer applications.
- Highly educational (and entertaining) for kids - teaches them about the carbon cycle and responsible waste disposal.
- Grow your own free worms for use as pet food or fishing bait.

Reuse Materials to Make the Things you Need

- Remove nails and other hardware from used timber. It can then be made into birdhouses, mailboxes or other small carpentry projects or it can be used as firewood if it is unpainted and not chemically treated.
- Use broken concrete and brick to make retaining walls, walkways and patios or use for fill.

APPENDIX IX: SEVEN EASY STEPS TO COMPOSTING

1. Gather green and brown garden waste.
2. In a heap or bin, mix two parts brown garden waste with one part green garden waste.
3. Add a small amount of garden soil and chopped up leaves and mix them into the pile. This will speed up the composting process.
4. Add water so the waste is kept as moist as a rung-out sponge.
5. Turn the pile every week. (not necessary, but will speed up the process).
6. When the ingredients are black and no longer recognizable you have the final product, compost. This will take between 4 weeks to one year depending on the frequency of turning and how well you maintain the moisture of the pile.
7. Fruit and vegetable scraps can be added to your compost pile.

APPENDIX X: GUIDE TO HOME COMPOSTING

Why Should We Compost?

Compost contains valuable nutrients that could replace or supplement use of commercial fertilizers by homeowners. Proper home composting of organic garden waste can reduce air pollution, reduce the volumes at the landfill sites or incinerators.

Home composting is the most cost effective method of dealing with the garden and compostable kitchen waste. Many organic materials that would normally be burnt or thrown in the garbage, is recyclable by composting. Composting is the most efficient way to divert organic wastes from our county's solid waste stream.

What Materials May be Composted?

- grass clippings
- leaves
- farm manure
- hedge clippings
- sods
- hay
- weeds
- straw
- sawdust
- kitchen vegetable and fruit scraps

Do Not Compost

- pig and pet manure
- meat scraps
- vegetation treated with fungicides
- fats and oils
- diseased plants
- perennial weeds, such as: morning glory, quack grass, other hard to kill weeds

Location

Locate the compost pile or bin in an inconspicuous location. A shaded area is preferred. Place it close to water since the decomposition needs moisture. Don't locate compost piles under trees, because tree roots will invade a compost pile rapidly in the lower layers.

Size of the Compost Pile

The size of a pile may vary greatly with the amount of material available. A good size is 4 x 4 feet and 5 feet high. A minimum of 3 x 3 feet and 4 feet high is necessary to reach the high temperature of 150 degrees Fahrenheit. This high temperature is a requirement for the composting process, and is needed for killing weed seeds and disease bacteria. Although it is possible to stack the compost in a loose pile, decomposition is more efficient in a contained bin or enclosure.

The sides should be open enough to provide some air movement through them. One side should open for turning and removal of the compost.

Many types of materials can be used for building enclosures. Scrap timber, woven wire fencing, chicken wire and cement blocks are all possibilities. Some wire fencing is too loose to contain smaller materials. Line the inside with some plastic (containing some aeration holes). Pile bricks or concrete blocks without mortar. Leave space between some of them to allow adequate air movement through the sides.

Starting a Compost Pile

Starting the compost pile is usually described in terms of layers. Layering provides the quickest and most complete decomposition. The pile may be started directly on the ground. However, you need to provide aeration and drainage to the bottom of the pile. Dig a trench across the base of the area and cover with a stiff wire mesh before starting the layers. Begin the pile by spreading a layer of coarse organic material over the area. First pile a layer of 6-8" of organic materials, then add a layer of 1-2" nitrogen rich material, such as farm manure, (no pig manure) or 10-6-4 fertilizer. Then add good soil or old humus. Repeat the process until the bin is full. You don't need special compost activators or starters when soil, old compost or fertilizers are used.

Shredding or Grinding

Shredded or chopped materials decompose the fastest. If a shredder is available, then shred coarse organic matter. Some materials such as leaves and grass clippings tend to mat. Place these in layers only 2" to 3" thick. Better to shred or chop this material in small pieces. Moisten, but do not soak the layer of organic material. Over the layer of plant material, sprinkle a high nitrogen source. Some sources are: blood meal, cottonseed meal, kelp meal or parts of leguminous plants like clover, vetch or alfalfa. Substitute a 1-2" layer of fresh farm animal or poultry manure if it is available. A complete garden fertilizer, such as 10-10-10 may also be used to supply the nitrogen. One cup for each 25 square feet of top surface area should be adequate. Next add a layer of soil or sod 1-2" thick. The soil contains micro organisms that help to start the decomposition process. Use a layer of finished compost if there is not an adequate source of topsoil. Continue to alternate the layers of organic materials, fertilizer or farm manure, and soil. The maximum height is about 5 feet. Air is needed, so do not compact the layers. Water each layer as it is added.

Moisture

The compost pile must be kept moist for proper heating and decomposition. Too much moisture will bring the composting process to an anaerobic condition, which has an offensive smell. A moisture content from 50% to 75% is recommended for composting in the open air. It may be necessary to sprinkle the compost if the material is getting too dry. Covering the compost pile with black plastic keeps the moisture loss to a minimum and helps the decomposition during extremely dry periods. The plastic covering also protects the pile from becoming too wet during periods of heavy rainfall.

Temperature

Proper temperature is a very important factor. Much heat energy is released by micro organisms as decay occurs. Check the temperature with a thermometer, if available. The experienced composter usually checks the temperature by putting his hand 8 inches deep in the pile. The compost should feel too warm to hold your hand for more than a few seconds in the pile. The temperature of 150°F is needed for killing many of the pathogenic diseases and weed seeds. Failure to reach this temperature might be caused by too much water, improper aeration, too little nitrogen or too small a pile.

Composting Time

Hasten the decomposition by turning the pile regularly. This will help aeration of the pile and reverse any undesirable reactions. Complete composting can be achieved in about 1 month if the materials are finely shredded and turned at 2 days intervals. Turning the pile monthly will produce compost in about 6 months. The pile should be turned immediately if at any time a strong ammonia or other offensive odour is released. During the decomposition the pile will shrink to about half of its original height. The time needed for decomposition will also vary with the size of the pile and the season of the year.

Climate

Because the winter climate in Sri Lanka is tropical, the process of decomposition will continue all year round.

Turning

To maintain the temperature, turn the pile regularly. The wetter the pile, the more frequent the turning should be. If the moisture content seems dry, add water. If adequate space is available, it may be easier to have two bins. Turning can then be done by shifting the entire pile into another bin, and later moved back again. The main objective of turning is to shift materials from the outer parts of the pile closer to the centre, where they are better able to heat to 150°F. This temperature is needed for killing many of the pathogenic diseases and weed seeds. A 150°F temperature will be reached in the centre of the pile by the about the third day after starting the pile.

When to Use Compost

Compost is ready for use when the temperature in the compost pile drops to the temperature of the surrounding air. The developed compost should be a fine crumbly, dark mixture. The pH is usually around 7.5. It should have an earthly smell. You can use compost as soon as it becomes ready. Compost stacked in a pile for later use may loose some of the nutrients through leaching. Old compost is still a good soil conditioner even if some leaching out of the nutrients occurred.