



SOLID WASTE MANAGEMENT

TECHNOLOGY CHALLENGING POVERTY



Solid Waste Management (SWM) has become a serious environmental and a social problem with the population increase. Some intellectuals define the problem of solid waste management as an off spring of development and it is obvious that there are many points to support that argument.

Why the Solid Waste has become a problem nowadays?

In history most of the waste material produced by the mankind is almost 100% biodegradable. The natural degradation of biodegradable waste material took place without causing much problems to mankind and environment. With the new innovations and changing consumption behaviours the non-biodegradable portion of the waste increased gradually making it a problem. Plastics, polythene, glass, etc are responsible for this condition in great deal. However, the problem was not acute when there were plenty of bear lands to dump the collected waste. With the ever increasing population and pressure on land the problem of waste has become acute and one of the top problems in development arena. The complexity of waste management has increased with high variation in types of waste. Some of such waste types have been listed below.

Municipal Solid Waste (domestic and market waste)

Industrial Waste

Biomedical Waste

Construction and demolition waste

Agricultural waste

E(lectronic) waste

Paradigm shift in waste management

The direct waste disposal was the first evident way of waste handling in human history. With the population increase the system gradually changed to collection and disposal as the non-biodegradable components of the waste increased. This system was in use and still in use in many parts of the world for a prolonged era. It was prolonged to such a long period making the mindset of the majority of people to assume that the waste collection and disposal is the only way to tackle this problem and the responsibility is lying with local government authorities. The concept of “waste management” came in to play when it is realized that the sustainability of the “collection and disposal” approach is problematic and there are valuable natural resources within disposed waste. The idea of “don’t waste waste” came with this concept.

The objective of “waste management” is to minimize the waste diverted to final disposal. 3R concept (Reduction/Avoidance, Reuse and Recycle) was developed with this approach. Pressure on land for final disposal and natural resources has paved the way to develop this modern paradigm in waste.

What is waste



Waste, garbage, trash, junk, debris, and refuse are all names given to that “stuff” that are no longer useful in its current form. Waste is defined in many ways by many institutions and individuals. The number of definitions shows that the term WASTE is a relative term.

- "Any substance or object the holder discards, intends to discard or is required to discard."
The European Union
- "Refuse from places of human or animal habitation." *US Environmental Protection Agency*
- "Waste is unwanted or undesired material left over after the completion of a process. "Waste" is a human concept: in natural processes there is no waste, only inert end products." <http://en.wikipedia.org/wiki/Waste>
- "Material that has been discarded because it has worn out, is used up, or is no longer needed."
- "When the relative value of a good is different from that goods marginal cost of production, waste occurs. Goods or resources are wasted when they are allocated to uses which are not the most valuable." http://ilrdss.sws.uiuc.edu/glossary/glossary_allresults.asp

In nutshell Solid Waste can be defined as *all solid materials or substances* discarded or *rejected* as being *spent, useless, worthless*, or in *excess to the owner's needs* at the time of *disposal* or rejection.

Waste can be comprised of any substance or material. It includes food, cloths, soil, human or animal dead bodies, electronics, vehicles, medicine, building components, furniture, simply anything.



What is waste



Anything does not become a waste until it is discarded or rejected. Any material or substance from rotting vegetables to old computers is not become a waste until it is discarded by the user or the generator or the owner.

Composting of market / kitchens waste



The decision to discard material as waste is taken by an individual or an organisation when they feel that particular material has no utility anymore or the resource requirement (time, money, etc) for further utility is too high. It totally depends on individual perception.



What is waste



When some material is in excess of the need people discard those as waste.

Any valuable material can become a waste with time. For any person one time valuable material can become a useless or worthless material at a certain moment. This can be due to many reasons such as,

Improved living standards - clothes, furniture, equipment, etc.

Technological development - computers, vehicles, mobile phones, etc

Out of fashion

Types of wastes

- Municipal solid waste (MSW)
- Household waste
- Commercial waste
- Market waste
- Institutional waste
- Agricultural waste
- Construction & Demolition waste
- Hazardous waste

Composition of Waste

- Organic
- Inorganic

Need of waste management

- About 6400 tonnes of waste are generated in Sri Lanka each day.
- Only 40% (2600 tonnes) of this waste is collected.
- Western province alone accounts for 57% (1500 tonnes) of the total waste collected in the country.
- Composition of MSW includes
 - 80-85% organic waste, (mainly kitchen and garden waste)
 - The balance, 15%-20% consists of paper, plastics, glass, metals and other inorganic materials.
- Municipalities spend almost 20 - 50% from their total budget, on solid waste management.

Solid waste generation per capita per day

- Colombo Municipal Council :0.85-1.00kg
- Other Municipal Councils : 0.75-0.85kg
- Urban Councils :0.60-0.75 kg
- Pradeshiya Sabhas : 0.40-0.5kg

(Highly variable on demographic conditions)

Problems due to poor SWM practices

- Use of wetlands as disposal sites,
- Ground water contamination,
- Air pollution,
- Decrease of property value,
- Loss of amenity,
- Some epidemics such as Dhengi Fever, Phylaria etc. (spread in urban areas)

Recent trends

- Separation of waste at the source
- Community based home composting systems (composting bins, Jeewa Kotu etc.)
- Low rate composting systems (windrow and static piles) for local authorities
- Plastic and polythene recycling



Integration

- Integration of different stakeholders
- Integration of different options
- Integration of different factors - social, economic, cultural, environmental, technological
- Integration of different systems - livelihoods development, poverty alleviation, tourism, organic agriculture

Definitions of solid waste management

- A systematic approach to the management of solid waste that combines and integrates source reduction, reuse, recycling, composting, energy recovery and land filling in order to conserve and recover resources and dispose of solid waste in a manner that protects human health and the environment.

www.nema.org/lamprecycle/support_files/glossary1.html

- The complementary use of a variety of practices to handle municipal solid waste safely and effectively. Integrated waste management techniques include source reduction, recycling, composting, combustion and land filling.

www.fpi.org/jahia/Jahia/cache/offonce/pid/134

- the management of municipal solid waste using all available means - disposal in a landfill, incineration, recycling, composting or mulching and a hazardous waste disposal program.

www.clearwater-fl.com/gov/depts/solid_waste/docs_pub/glossary.asp

- Incorporates several different approaches for handling the entire MSW stream. Using a combination of approaches allows each type of waste to be managed according to environmental and economic considerations, with priority going to source reduction, reuse, and recycling, while reserving landfills as the least desirable waste management method. See also Waste management hierarchy.

www.mfe.govt.nz/publications/waste/landfill-full-cost-accounting-guide-mar04/html/page12.html



ISWM strives for an integrated approach, on many levels.

It aims at the integration of:

- Various stakeholders, governmental or non-governmental, formal or informal, profit- or non-profit oriented (cooperation, relationships)
- A variety of aspects (technical, environmental/public health, financial)
- Various collection and treatment options adapted to a specific habitat scale, i.e. household, neighbourhood and city level
- The waste management system and other urban systems (such as drainage, energy, urban agriculture)



Earlier options

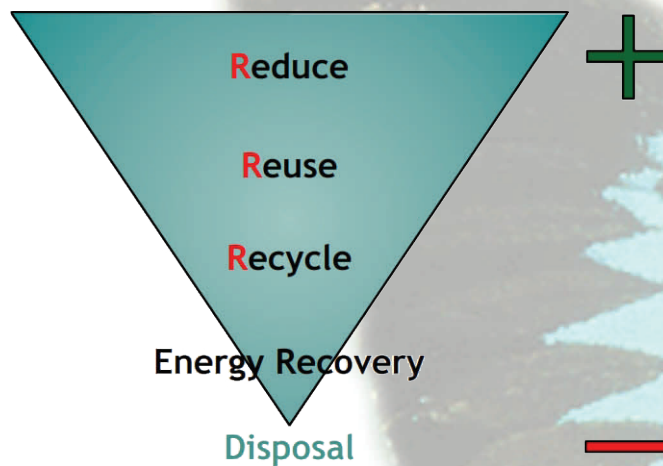
Collection - incineration - disposal (open dumping, semi engineered or sanitary land filling)

Idea behind is waste is a problem as far as waste is seen by people.

Current options

Reduction - reusing - recycling - energy recovery - collection and disposal

Idea behind is minimizing the amount of waste to be collected and disposed.



Reduce and Reuse

Waste management should start from the point of waste is originated. Source reduction of waste is the best way to initiate waste management. It can be started at your home, office, school or institution. We hope that you will consider some of the following suggestions to reduce the waste stream generated. Your efforts may provide the additional benefit of saving money as well. Remember, even small changes can make a big difference!





Tips for Waste Reduction

1. 'Shop Smart', and buy products with less packaging. For example you can go to the supermarket and buy vegetables and fruit loose which is often cheaper. Buy a refill for things like washing powder, liquid softener and beauty products.
2. Avoid disposable items such as nappies and carrier bags. Buy and use new generation washable nappies, and use the heavy duty reusable carrier bags issued by most supermarkets.
3. Try to buy products in reusable packaging, e.g. yoghurt cartons make ideal seed pots.
4. Where possible buy products made from recycled materials, such as writing paper and facial tissues.
5. Keep equipment and tools well serviced to give them a longer life and repair what you can instead of throwing it out.
6. Compost your kitchen and garden waste.
7. Donate old clothes, books and shoes to a charity.
8. Reuse paper that is printed only on one side as a scrap pad.
9. Use old T-shirts or sheets as rags or polishing cloths.
10. Make double-sided copies whenever possible. This can dramatically reduce your paper usage.
11. Instead of making individual copies for everyone, use a routing slip when circulating information to staff, or post notices on a bulletin board.
12. Use reusable envelopes for interoffice mail.
13. If applicable, use electronic mail instead of making hard copies of all communications.
14. Request the removal of your name from junk mail lists by writing to the Direct Mail Marketing Association, P.O. Box 9008, Farmingdale, N.Y. 11735-9008.
15. If possible, limit the number of subscriptions to periodicals and have classrooms share them. This will reduce both trash and subscription costs.
16. Do not purchase envelopes with cellophane windows or self-adhering note pads. If the windows are necessary, purchase the ones which have no covering over the window.
17. Use scrap paper for messages. If you have access to a wax binder, you can make your own scrap pads.
18. Take notes on the back of scrap paper.
19. Print assignments on scrap paper. (Double-check with your prof if you're worried about the consequences)
20. Photocopy file copies on scrap paper.



21. Don't print out email unless you absolutely need to.
22. Don't use a cover page for minor assignments - put a textbox with your name and ID in the upper right corner.
23. Require suppliers who deliver products on pallets or in metal drums to take them back.
24. Encourage students who bring their lunch to use a reusable lunch box and thermos instead of brown paper bags and disposable drink containers.
25. Replace single-strike film typewriter ribbons with ink impregnated nylon multi strike ribbons. The multi strike ribbons last 6-10 times as long as the single strike variety. Do the same for printers that can utilize multi strike ribbons.
26. Arrange to have a vendor collect and recharge empty laser printer toner cartridges. Such cartridges can be recharged several times, saving money and reducing waste generation.
27. Replace ball-point or felt tip pens with ones that take refills.
28. Purchase reusable and washable cleaning cloths, aprons, tablecloths, etc., rather than single-use disposable products.
29. Buy institutional sizes of cleaning supplies, food products, beverages, etc. and repackage into smaller, reusable dispensers.
30. Have you cafeteria switch to reusable utensils and crockery instead of throwaways whenever possible. Investigate the possibility of switching to refillable containers for milk and juice.
31. Encourage employees and students to reuse paper clips, rubber bands and brass fasteners. These should be removed before recycling white office paper anyway.
32. Use a reusable mug instead of disposable coffee cups, and receive a discount!
33. Use reusable dishware and cutlery on campus and receive a discount!
34. Use a reusable menstrual cup instead of tampons.
35. Use washable cloth pads instead of disposable menstrual pads.
36. Use handkerchiefs instead of paper tissues.
37. Use reusable cloth gift-bags instead of wrapping paper.
38. Keep garbage out of the recycling - contaminating it wastes other people's efforts!
39. Carry a reusable container with you to takeout leftovers to avoid polystyrene.
40. Avoid single-serve juice and pop bottles.
41. Eat at cafeterias that provide reusable dishes.
42. Carry a cloth napkin with you to use instead of disposables.
43. Use automatic hand-dryers not paper towels.



44. Bring cloth bags to the grocery store for shopping.
45. Buy local produce to prevent long-distance transportation.

Recycle

Organic Waste Management:

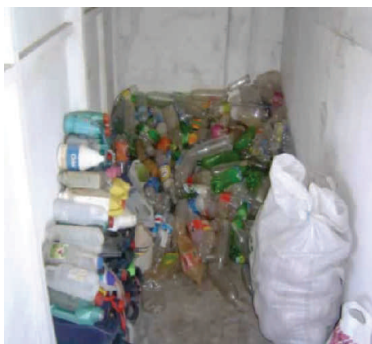
- Composting - leaflets and technical briefs
- Biogas - technical briefs

Inorganic waste recycling

- Paper recycling

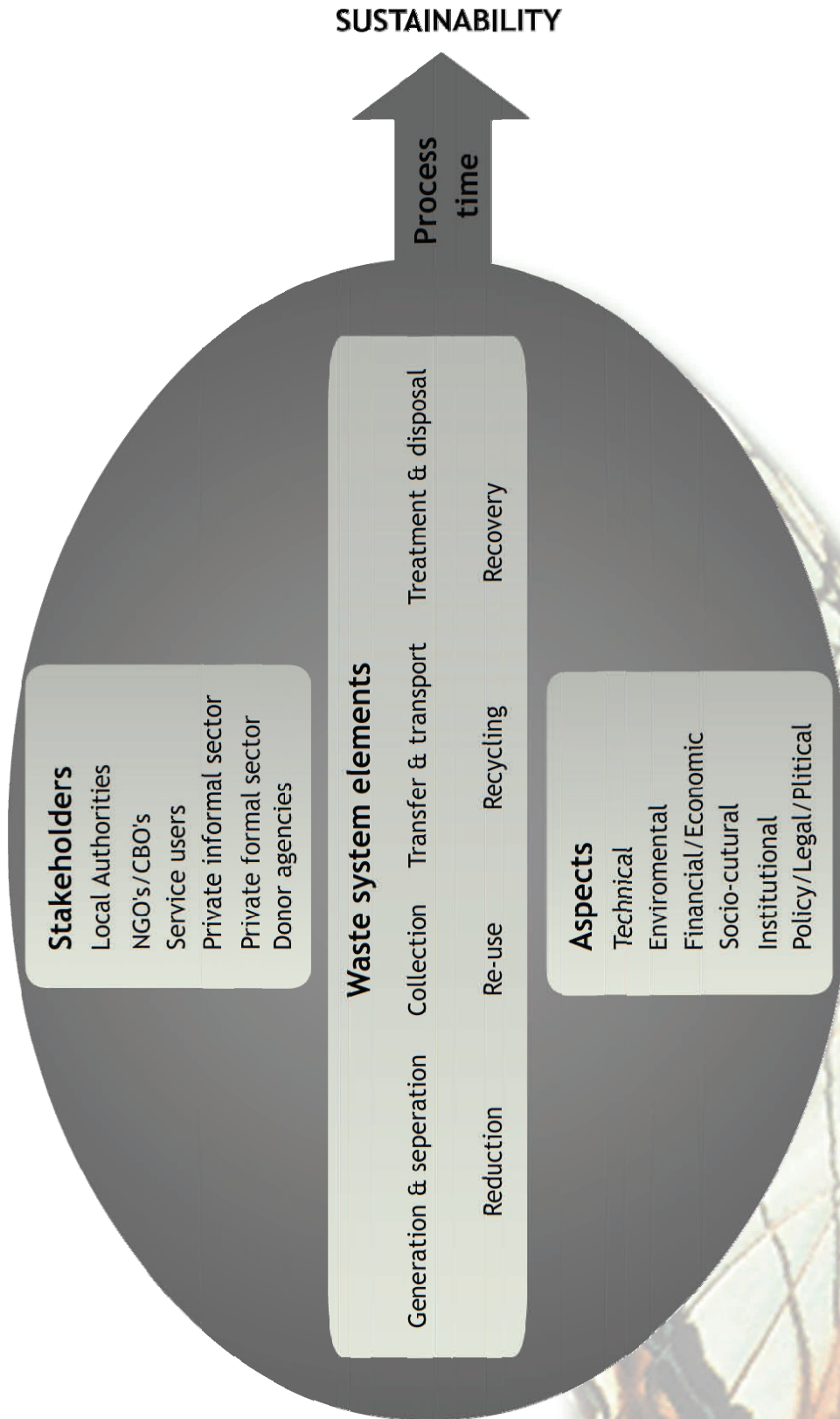


- Plastic Recycling



- Glass recycling
- Metal recycling

Solid waste & Poverty reduction





Videos

- Video on solid waste management
- Video on bin composting

Knowledge products

- Case Studies
 - ◆ Change of life
 - ◆ Earning of recognition
- Solid Waste Management
 - ◆ *Introduction*
 - ⇒ The need for waste management in post disaster rebuilding
 - ◆ *Process Guidelines*
 - ⇒ Guidelines for waste reduction in post disaster temporary shelters
 - ◆ *Technical Brief*
 - ⇒ Home composting bins
 - ⇒ Home composting systems
 - ⇒ Mechanical waste plastic recycling
 - ◆ *Worked Example*
 - ⇒ Technical guide - Composting bin manufacturing

Photo gallery

- Compost bin fabrication
- Compost bin using in Tsunami housing schemes
- Training workshops
 - ◆ Awareness programs on compost bin using
 - ◆ Paper recycling workshops
 - ⇒ WS on paper recycling 07, 08, 09.04.2006
 - ⇒ WS on value-added recycled paper products
 - ◆ Training of trainees (TOT) workshops on solid waste management
 - ◆ Workshops on compost bin fabrication

Reports

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