

UNITE for the Environment

Solid Waste Management Training

2017



## Training summary

**Definition of waste:** Any material for which no use or reuse is intended.(Page 2)

### Categories of waste (Page 3)

- Bio-degradable
  - Compostable
  - Non-compostable
- Non-biodegradable
  - Burnable
  - Non-burnable

### Why are we generating waste? Page 4

- The demand for new things all the time
- Not knowing that waste in one place/sector could be a resource/raw material somewhere else
- Thinking that natural resources will be there forever.
- Thinking that “someone else” will take care of waste generated by yourself.
- Improvements in technology and the invention of materials
- High population growth rate (the bigger the number of people the more waste generated)
- Not realizing that wastes generated if not properly handled affect us all

### Causes of poor waste management (Page 6)

- Poor infrastructure
- Poor technology
- Lack of awareness
- Inadequate storage
- Poverty
- Poor law enforcement

### Effects of poor waste management (Page 6)

- Bad odor and toxic fumes
- Poor hygiene
- Attracts vermins
- Increases the risk of flooding
- Pollutes water
- Limits tourism
- Diseases
- Loss of wetland
- Reduces soil fertility
- Change in ecological balance

### Benefits of good waste management (Page 7)

- Improves soil productivity
- Improves tourism
- Better hygiene
- Reduces diseases
- Decreased pollution
- Protection of water resources
- Reduces costs
- Increased safety for people and animals
- Reduces flooding

### Role of teachers and local communities in managing waste (Page 8)

- Clean up campaigns and Awareness
- Reducing (Source reduction)
- Waste sorting
- Reusing
- Refusing (Saying no)
- Recycling,
- Composting,
- Use of incinerators,
- Buying in bulk

## OBJECTIVES OF THE TRAINING

- To define waste, types of wastes and understand how they are generated.
- To understand the benefits of proper waste management and dangers of poor waste management.
- To explore the different mechanisms to manage waste in our schools and communities.
- To create work plans on what each school will do within the year to manage waste in their communities.

## WHAT IS WASTE?

Waste refers to any material, substance, or byproduct that is no longer useful or required after a process. It can also be defined as material for which no use or reuse is intended. Waste can either be solid, liquid or gaseous.

## CATEGORIES OF SOLID WASTE

**Biodegradable:** This waste can be easily broken down by natural processes and turn into carbon dioxide, water, methane or simple organic molecules. This breakdown is done by micro-organisms and other living things through composting, aerobic digestion, anaerobic digestion or similar processes. Biodegradable waste can be split into two categories;

- Compost/organic waste - includes food wastes, agricultural wastes and yard wastes.
- Non compost - includes paper and soft wood.

**Non-Biodegradable:** This waste cannot be broken down by microorganisms in a reasonable amount of time; therefore it is an environmental concern. Non-biodegradable waste can further be sub categorized into;

- Burnable waste - includes plastics, metals and synthetic materials .
- Non burnable waste - includes glass and metal.

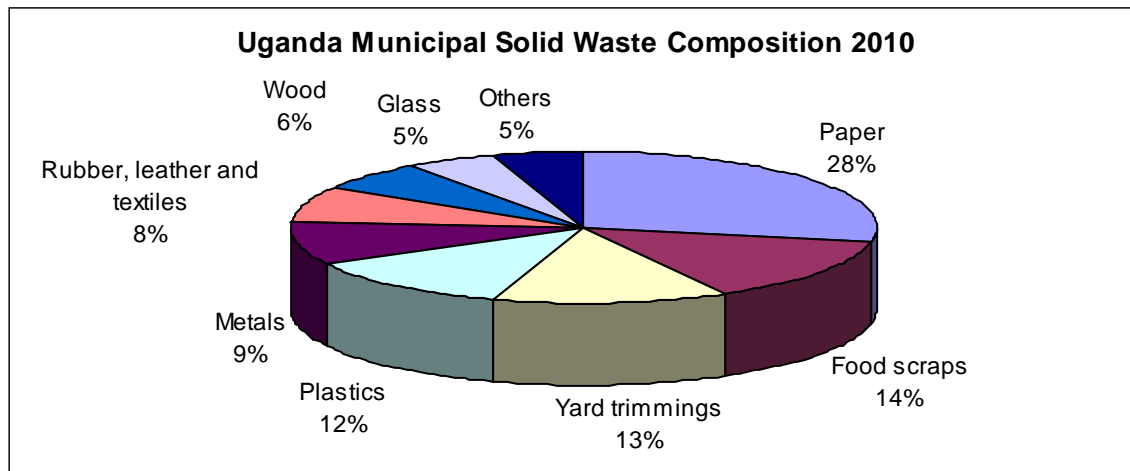
Wastes can also be categorized by how they are generated.

- Domestic waste - generated daily in our homes.
- Municipal waste - produced mostly in trading centers, towns and cities.
- Medical waste - generated in hospitals and clinics such as cotton wool, needles and syringes.
- Industrial waste - generated in factories/industries.

### Percentage composition of wastes in most areas in Uganda.

In 2010, it was found that food and yard/domestic wastes constituted **92.7%** of the waste generated in Uganda. Recyclables and other special wastes constituted only **7.3%** of the total waste, mainly because of the increased level of reuse and recycling activities (*UNEP 2010 waste management journal volume 2*).

In the same year, municipal solid waste was dominantly biodegradable waste as illustrated in the chart below



Sources: [muele.mak.ac.ug/mod/resource/view.php?id=3837](http://muele.mak.ac.ug/mod/resource/view.php?id=3837)

In both rural and municipal settings this waste is not properly sorted and this makes its management more difficult.

Waste can be regarded as a “human concept” as there appears to be no such thing as waste in nature. The waste products created by a natural process or organisms quickly becomes raw products used by other processes and organisms. This is the so-called **circle of life** and is a strategy clearly related to ensuring stability and sustainability in natural systems.

### WASTE MANAGEMENT

Waste management is the processes of dealing with the waste through minimization, handling, processing, storage, recycling, transport, and final disposal. In most of our communities a lot of waste is generated without mechanisms to properly dispose it.

## Causes of increased waste and its poor management in our communities.

1. Lack of awareness: Most people are not aware that indiscriminate solid waste disposal has negative impacts and therefore they are not bothered to devise means on how they can do it better. Most people also do not know that waste generated in one place or sector could be a resource or raw material somewhere else. They are also not aware of simple practices such as waste sorting, waste recycling and reduction, which they can potentially do.
2. Inadequate storage, collection and disposal facilities: Most people in our communities do not have proper waste collection facilities such as trucks and bins. There is also a challenge of inadequate storage and disposal facilities such as incinerators and land-fills which would otherwise help to manage waste.
3. Poverty: People do not have enough resources to practice some of the waste management practices such as paying a fee for waste collection and purchase of waste bins. They therefore end up dumping waste wherever possible.
4. Poor structural development: This is especially common in slum areas and some trading centers where structures are congested. This limits chances of proper waste management since people may not have enough land. This is worsened by poor urban planning.
5. Technology: Global improvements in technology and the invention of artificial materials such as synthetics and plastics yet in Uganda we have limited technology such as such as waste recycling plants. For example plastic waste recycling plants are only available in Kampala and these serve areas of Kampala, Wakiso and Mukono.
6. Poor law enforcement: Uganda has good laws on waste management but most times these laws are not enforced. For example a ban on plastic bags was first instituted by the government of Uganda in 2007, it was re-emphasized in 2013 and up to now factories are still producing and marketing kavera. Since the ban, it is only a few big stores/supermarkets that have complied but overall the kavera is still being used.
7. Demand for new things: Many people demand new things i.e. new clothes, new shoes, new cups, plates etc and they throw away the old ones. This increases the amount of waste in our communities.
8. High population growth rate: The bigger the number of people the more waste generated.

## **IMPACTS OF POOR WASTE MANAGEMENT**

Poor waste management affects our community in many ways.

### **a) Water and Air Quality**

- Leads to contamination of groundwater and surface water.
- May result in high level of odors/smell, dust.
- Leads to high levels of toxic fumes and particles from burning waste.

### **b) Health and Safety**

- Increases risks from water-borne diseases.
- Potential for the spread of communicable diseases (i.e. Rabies, Malaria etc.) via pests (such as dogs, rats, mosquitoes).
- Can cause injury and accidents.

### **c) Aesthetic and Socio-Economic**

- Loss in property values as areas that are surrounded by waste may not attract a good price in terms of sale price and rent fares.
- Reduction in flood storage capacity of wetlands and flood detention basins through use of these areas for disposal.
- Increased risk of flooding upstream of the dumpsite where improper disposal, blocks the drainage ways.
- Limits potential of tourism as tourists do not enjoy to visit and stay in areas which are not clean. This in turn reduces revenue from tourism.

### **d) Ecology**

- Loss of wetland habitats.
- Change in ecological balance of the area through the attraction of scavengers and pests, which are attracted to fresh and exposed waste.

## **BENEFITS OF PROPER WASTE MANAGEMENT**

- Saves natural resources: Throughout the life cycle of a product (extraction of raw materials, transportation, manufacturing and use), natural resources are used and waste is generated. Reusing items or making them with less material decreases the pressure on natural resources and waste drastically. Ultimately, fewer materials will need to be recycled or collected and sent to disposal sites or waste combustion facilities.
- 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 local community members, businesses, schools and individual consumers. 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 through reduction in prices.
- Increases animal safety: When waste is properly managed, this reduces the risk of both wild and domestic animals ingesting or manipulating waste, which can otherwise cause diseases and even death. Proper waste management also saves wildlife especially birds which sometimes use waste as nesting materials. As a result some birds get trapped and lose legs while others die as a result of ingesting some of the waste.
- Improves beauty of the place and hence adds value: This is so because areas which are free from waste are more hygienic and people can pay more for land and houses in such areas.
- Proper waste management improves soil productivity: Proper composting procedures produce good organic manure hence reducing the need for using inorganic fertilizers. Proper waste management also reduces plastics and other non biodegradable wastes in the soil that would otherwise hinder proper percolation and limit activities of microorganisms. This in turn reduces encroachment on natural habitats.
- Reduces diseases: Proper waste management reduces the risk of water borne diseases such as diarrhea and cholera. It also reduces the risk of communicable diseases such as rabies and malaria. It also reduces the risk of zoonotics (diseases that can be transmitted from humans to animals and vice versa) which would otherwise come from animals especially primates touching and using waste used by sick humans.
- Reduces flooding: Through proper waste management, wastes which would otherwise clogged waterways and drains are avoided, thus water flows freely into wetlands and rivers. It also improves flood storage capacity of wetlands.

- Improves tourism potential: When waste is properly managed, it creates a more pleasing and beautiful landscape and hence attracting tourists to an area. This increases the resource base of local community members, provides alternative sources of livelihoods and hence less pressure on natural resources.
- Protection of water resources: Proper waste management helps in reducing the amount of waste that flows into streams and wetlands. Most of these streams and wetlands are connected to national parks and the therefore addressing the issue of waste can help improve the quality of water available to wildlife as far as the National Park.

## **ROLE OF TEACHERS AND LOCAL COMMUNITIES IN WASTE MANAGEMENT**

### **Clean up campaigns and awareness**

Occasional clean up campaigns can be organized by school conservation clubs in partnership with local administration to reduce the amount of solid waste accumulated in our communities. This can be combined with awareness sessions such as community sensitization meetings about solid waste management. Most people in the communities have an "I don't care attitude" and limited knowledge about solid waste management which have led to huge accumulations of solid waste. In order to immediately reduce the amount of solid waste and improve solid waste management practices, there is a need to undertake community sensitization and capacity building. This can also be done through radio programmes and the development and distribution of waste management promotional materials such as placards and waste management messages.

### **Reducing/Source reduction**

Waste prevention, or 'source reduction', means consuming and disposing less waste. Source reduction actually prevents the generation of waste in the first place, so it is the best 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 their production and disposal. It includes purchasing durable, long-lasting goods, using products with less packaging, reduced material use in product manufacture, increased useful life of a product through durability and reparability.

### **Waste Sorting/categorizing**

This is the foundation of most waste management practices such as re-using, recycling, composting and incineration. It involves arranging waste according to the different categories such as non biodegradable and biodegradable waste. Non-biodegradable waste can further be divided into burnable and non-burnable especially if one is interested in using an incinerator. On the other



hand, biodegradable can be categorized into compost and non-compost waste. Once waste is properly sorted, then the appropriate action should be taken with the sorted waste.

### **Reusing**

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 include: reusing waragi (local gin) packets for tree potting, refilling bottles. (e.g. sodas and beers), reusing boxes for packaging, etc. Consumers should have the option of choosing reusable items instead of single serving or single-use disposables. Other reusable items include cloth napkins, tablecloths, ceramic plates, reusable cups, and rechargeable batteries. Reusing also includes using durable shopping bags that can be used every time you go shopping than packaging in polythene bags which may not last for long.

### **Refusing (Saying no)**

This involves declining to take up any packaging that one thinks may have harmful effects to the environment. For example when you go to a shop or a store to buy merchandise and the shop keeper offers to pack them in a plastic bag, you say **no** while offering alternatives or you express preference of buying commodities that are packaged in biodegradable paper bags than those packaged in plastic.

### **Recycling**

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.

In our communities, plastic bags (kaveera) can be used to make bags, mats and balls. Straws can also be used for making doormats and tablemats and paper can be used to make beads.

Recycling is one of the best environmental success stories in the world.

### **Buying in bulk**

This reduces on the waste generated in our homes. For example, instead of going to a shop everyday to buy a Kilogram of posho, if one can manage, he can buy 10kgs, which are packaged once. This however works well with dry rations than fresh/perishable items.

## Composting

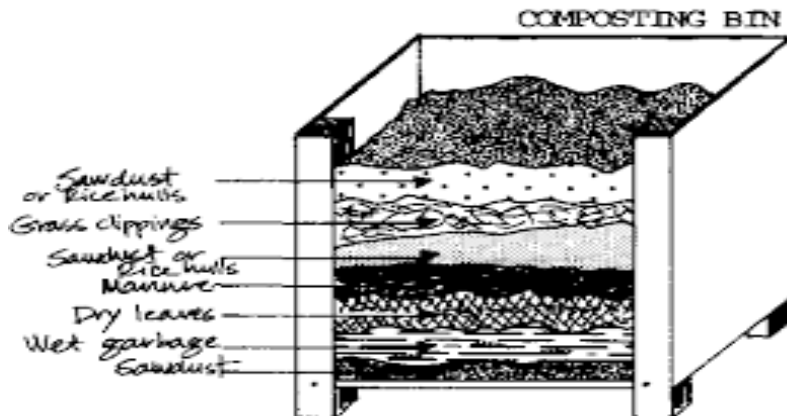
Composting is the controlled biological decomposition of organic matter, such as food and yard wastes into humus. Composting is nature's way of recycling organic waste into new soil, which can be used in vegetable and flower gardens, landscaping and many other applications.

Humus generated from composting provides minerals and nutrients needed for plants, animals and microorganisms. For composting to work properly, one must have both carbon and nitrogen.

Greens provide nitrogen and browns provide carbon. Begin with a layer of browns with a base of leaves or wood clippings to 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.

You should not leave kitchen scraps or any greens on top of the pile as it is best to keep these materials buried inside the compost heap, where they will break down quicker. Therefore 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.

By composting, households can divert large percentages of their food scraps and yard trimmings from the waste stream into something very productive.



## Use of Incinerators

These are facilities that are specially designed to aid in the burning of waste. To reduce the negative impact on the environment, waste should be sorted and dried before it is taken to the incinerator. Using incinerators reduces the mass of the waste by 95 - 96 percent. This reduction depends upon the recovery degree and composition of materials.

Incineration comes with a number of benefits in specific areas like medical wastes, plastics and polythene and other life risking waste. In this process, toxins are destroyed when waste is burned.

There are two main types of incinerators: auto-combustion incinerators and fuel-assisted incinerators. The composition of the waste to be destroyed as well as the design of the incinerator must be considered when selecting the appropriate incinerator type.

- **Auto combustion incinerators:** These can be used when types of waste have enough heat value to support their own combustion, and additional fuel such as wood or kerosene is only necessary for the initial ignition. This is the most ideal type for our communities.
- **Fuel-Assisted incinerators:** These are used when the heat value of the waste is too low and additional fuel is required to maintain combustion.

For low-income countries like Uganda it is often necessary that incinerator designs selected are those which support auto-combustion in order to reduce the operational costs.

Wastes containing halogens, phosphorus, sulphur, or nitrogen such as batteries can generate harmful by-products when burned. These wastes require a more sophisticated technology than wastes which only contain carbon, hydrogen, and oxygen such as plastics. Therefore, the choice of incinerators and their potential gas-cleaning system will depend on the waste itself. Some wastes are not suitable at all for incineration (such as highly explosive and/or radioactive materials).

### **Best practices for small-scale incineration**

- Effective waste reduction and waste segregation.
- Installation of a proper design, ensuring that combustion conditions are appropriate.
- Construction adherence to detailed dimensional plans to avoid common mistakes that cause incomplete destruction of waste, higher emissions, and premature failures of the incinerator.
- Training of incinerator operators on appropriate start-up and cool-down procedures, maintenance of optimal operating temperatures.
- Record keeping to track quantities of waste destroyed and occupational safety.
- Air inlets must be the right size and in the correct location to allow a good mixture of air (oxygen) with the waste (gasses).
- Chimney diameter and length must be carefully designed (not too short and not too long) in order to control draught.
- Incinerator itself should be located away from obstacles like buildings and trees.
- Ashes and other residues that block the free passage of air (oxygen) must be removed routinely.
- Periodic maintenance to replace or repair defective components (e.g., inspection and spare parts inventory).

- Placement of incinerators away from populated areas or where food is grown.

### Steps involved in building a simple incinerator

1. **Collection of materials:** Materials needed are 60 basins of mud, 60 basins of grass, iron bars, square mesh and water. All these should be at the venue beforehand.
2. **Building the structure:**
  - Clear the site where the incinerator is going to be built.
  - Mix the mud with grass with a ratio of 1:1.
  - The incinerator should be at least 48 Inches in diameter and 60 inches in height.
  - The incinerator should have two inlets, 1 inlet (that collects burnt material should be immediately at the base while the other (for raw waste) should be at least 30 inches off the ground.
  - The inlet at the base should be at least 20 inches high while the upper one should be 24 inches high.
  - At the top, there should be option for the chimney to allow the air to flow out
  - Since these are mud structures that will be in the open, a shade structure should be improvised

NB The incinerator should dry thoroughly before being put to use!



## ACTIVITY: TRASH AROUND ME

### Procedure

1. Participants move outside the training room.
2. They are asked to make predictions on what might be the common form of waste around the training venue (non biodegradable and biodegradable).
3. Participants then move in a radius of 50 metres in 5 minutes identifying and picking any form of waste they come across.
4. Two containers will be placed near each other, one indicating biodegradable and the other indicating non biodegradable.
5. After 5 minutes, each participant mentions the item/s they have collected as one member is writing the items
6. The participant is asked to place each item in the respective container. i.e. biodegradable or non biodegradable.

Note: Other members have to approve the waste categorizing.

7. Weigh the waste in the two containers

### Questions for discussion

- a) Between biodegradable and non biodegradable waste, which type was more collected?
- b) What item dominated the waste collected and what are the reasons for this?
- c) What is the ratio of biodegradable to non biodegradable waste?
- d) What are the most common wastes in your community?

### Requirements

1. Two packets of Gloves
2. Weighing scale.
3. Pen and paper

## SCHOOL WORK PLANS

### Procedure

1. Have each participant from each school form groups.
2. Give them 1.5hr to discuss and outline what they are going to do in their communities in regards to waste management
3. Have each school share their work plan with the rest of the participants for comments and suggestions.

### SCHOOL WASTE MANAGEMENT WORK PLAN 2017

Name of the school.....

Lead person and contact.....

Waste Management activity/project	How it is going to be implemented	Stake holders and roles	Time frame	Comments

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