Tsunami Waste Livelihoods Management Activities – Round III

Terre des hommes Italia

ACEH CLEAN

Promoting the 3Rs in Aceh, Indonesia

Recycling Guidelines

UNDP Indonesia

Multi Donor Fund
for Aceh and Nias - Bersama Membangun

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Terre des Hommes Italia is an Italian NGO based in Milan, Italy. It operates in Aceh since 2005.
www.terredeshommes.it

For further information about the project, you can visit the project's website: http://wml4aceh.xoom.it

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Promoting the 3Rs in Aceh, Indonesia

Recycling Guidelines

SPECIAL MESSAGE FROM TDH - I

In Indonesia, boosting the recycling sector and educating people to a new culture of waste has become a necessity. With a population of more than 245 million people and a growth rate of 1.2%, waste generation is on the rise. Despite the government's efforts, numerous communities around the country are left with mounting waste problems that can have deadly consequences.

Estimates talk about a production of 55,000 tons of solid wastes in urban areas every day, of which only 50 to 60 per cent are collected, mostly in higher income areas.

Among the answers to this challenging problem, one is about putting a clear emphasis on avoiding waste generation and minimizing the waste stream wherever possible. In Aceh, turning trash into cash is the kind of sport many *"recyclists"* have started to practice with successful results. They are able to earn money to support their family and at the same time help to keep the environment clean.

This manual complements Tdh-I intervention in the field of public awareness and can help people of Aceh to incorporate an important element of environmental stewardship **— the 3 Rs of waste management: reduce, reuse & recycle** — into their daily lives.

For that reason, this manual has been specially prepared to give very practical, easy-to-follow steps.

We are grateful to **Mr. Eric E. Van Monckhoven** who coordinated the present version of the manual, **Mr. Moreno Tomasetig** who created the drawings for it, and **Ms Dian Gucci** who translated the manual in Bahasa.

We shall be failing in our duty if we do not adequately thank **Tdh-I staff in Aceh** for their invaluable in helping with the production of the manual and ensuring the success of the whole UNDP's Tsunami Waste Management Project – Round III: **Mr. Adriano Scaravetti, Ms Nona Maisyarah, Ms Syaika Putri, Ms Irma Suryani, Ms Siska Ridwan, Mr. Hamdani** and **Mr. Dimyati Thoyyib.**

Aron Cristellotti
Program Manager
Fondazione Terre des Hommes Italia

MESSAGE FROM UNDP

After the **Earthquake and Tsunami of 26 December 2004**, many local district governments in Aceh were facing the enormous challenge of cleaning up large parts of their territory and removing debris and associated waste materials from a wide coastal stretch.

During 2005-2007 a substantial amount of earthquake and tsunami debris had been recovered and either recycled or safely disposed of in engineered landfill cells. In parallel, programmes such as **UNDP's Tsunami Recovery Waste Management Programme** (TRMWP) have worked to reactivate and develop municipal solid waste management services.

Concerted Indonesian and international support was organised to strengthen the service delivery capability of the dinas kebersihans, district sanitation departments.

TRWMP played a major role in this recovery process. Phase I of the programme began with US $14.4 million from the Multi Donor Fund for Aceh and Nias (MDF), marked for disaster recovery activities, including creating immediate employment, restarting essential services, clearing debris and recovering recyclable materials for use during the rehabilitation and recovery process, as well as resuming municipal waste collection across eight districts in Aceh and Nias to reduce potential environmental and health-related risks. During Phase II (effective September 2007), the programme aimed to safeguard investments by building sustainability into programme interventions with an additional US $9.98 million grant to extend activities to the end of 2009 and expand from eight districts to 13 districts. With an additional US $15 million grant, Phase III extends the project to the end of June 2012 enabling the construction of up to ten priority permanent landfills together with limited essential rehabilitation works elsewhere.

In 2009-2010, the programme is still going strong, delivering on its development objectives.

Through the **Tsunami Waste Management Livelihoods Project** launched in May 2007, UNDP's TRWMP has aimed to create waste management related sustainable livelihoods by targeting the collection and processing of recyclable waste through community and private sector interventions. Giving support to SMEs, NGOs and CBOs through the distribution of working equipment and the delivery of small grants, the programme contributes to boost the **recycling sector in Aceh**. Recycling has proved to be a great opportunity for income generation for many individuals and families. It also plays a key role in reducing waste going into landfills.

In support of this valuable project, we welcome this manual prepared by **Terre des Hommes Italy – Indonesia**, which will help to spread the concept of recycling among a wider audience.

Nigel Landon
WM Advisor
UNDP Indonesia

CONTENTS

Chapter 1

Caring for the Earth

SUSTAINABILITY

There are **various** debates to the **definition of sustainability** among leaders in the field. However in general, they all have to do with:

- The concept of living within our **limits**;
- Understanding the **interconnections** among economies, society, and the environment;
- Providing **equitable distribution** of resources and opportunities.

In short, sustainability refers to the idea that human activity should be guided by the principle that **the welfare of the environment and of future generations should be always considered.**

The original term was **sustainable development**, a term adopted by the **Agenda 21** program of the **United Nations** at the **Earth Summit** of 1992.

> *"Sustainable development is development that meets the needs of the present without compromising the needs of future generations to meet their own needs."*
> Brundtland (1987)

Children's definitions

"Something that lasts for a long time- maybe forever "

"Like a circle- it goes around and all is re-used"

"Loving and caring for our planet and others"

"Thinking about what you need rather than taking what you want"

"Making the world a better place for the future."

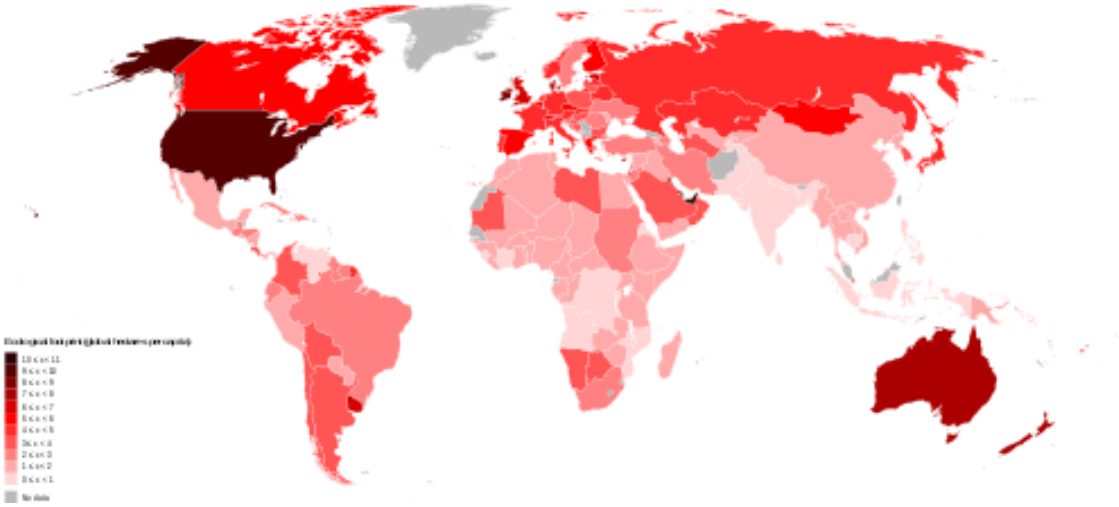
http://www.un.org/esa/dsd/agenda21/res_agenda21_00.shtml

The Ecological Footprint

How much land area does it take to support our lifestyle?

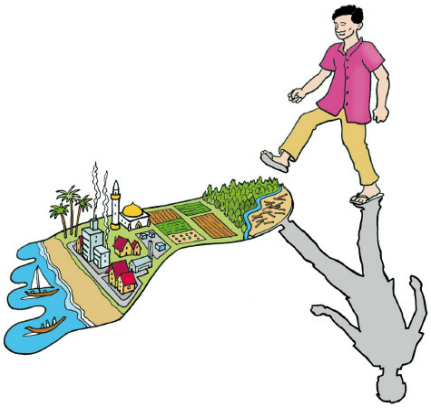
The **Ecological Footprint** is a unit of measurement aimed at helping us to **calculate human pressure on the planet.**

By measuring the Footprint of a population—an individual, city, business, nation, or all of humanity - we can assess our pressure on the planet, which **helps us manage our ecological assets more wisely** and take personal and collective action in support of **a world where humanity lives within the Earth's bounds.**



Living Planet Report 2008 outlines scenarios for humanity's future. Global Footprint Network. Retrieved: 2009-02-15

A country's **Ecological Footprint** is the **total area of productive land or sea** required to produce all the crops, meat, seafood, wood and fibers it consumes, to sustain its energy consumption, to give space for its infrastructures, to absorb its wastes.

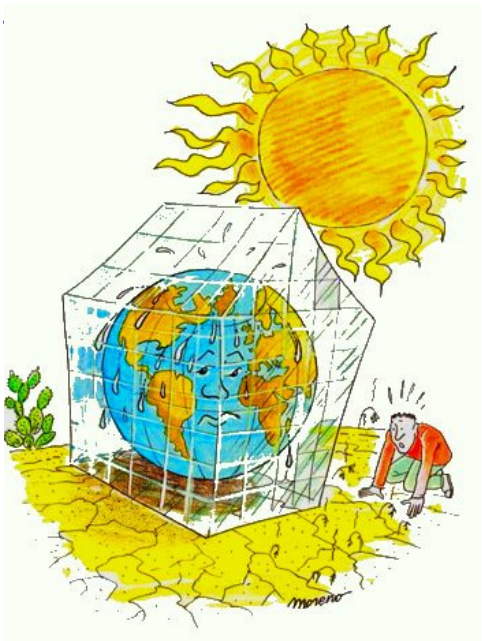


Today humanity uses the equivalent of 1.4 planets both to provide the resources we use and to absorb our wastes. This means it now takes the Earth one year and five months to regenerate what we use in a year.

If everyone lived the lifestyle of the average American we would need five planets.

Turning resources into wastes faster than wastes can be turned back into resources puts us in global ecological overshoot, depleting the very resources on which human life and biodiversity depend.

The result is **collapsing fisheries, diminishing forest cover, depletion of fresh water systems, and the build-up of pollution and waste,** which creates problems like **global climate change**.



FOOTPRINT CALCULATION

In 2006, the **average Ecological Footprint per person** worldwide was approximately **1.8** hectares of biologically productive land and water (gha) per capita. The **U.S.** footprint per capita was **9.5**gha, and that of **Austria 7,7**gha, while **China**'s was **1.5**gha and Indonesia's **1,2**gha.

TO CALCULATE YOUR OWN FOOTPRINT, VISIT:
http://www.footprintnetwork.org/en/index.php/GFN/page/calculators/

My Notes

Chapter 2

Waste Management

WHAT ARE WASTES?

Everyone produces waste. Wastes are products for which we **no longer have a use.** They can either be **solid, liquid or gaseous.**

WASTES = RESOURCES

Wastes are **made up of natural resources** that can often be used repeatedly before being disposed of.

Old products can be broken down, reprocessed, and used to replace virgin materials in the manufacturing process. This is called the **recycling** or **material recovery** process.

There are many **waste types** defined by modern systems of waste management, notably including:

Domestic waste
Commercial waste
Construction and demolition waste
Industrial waste
Medical waste
Agriculture waste
Hazardous waste

MUNICIPAL SOLID WASTE MANAGEMENT

Municipal solid wastes are generated by households, commercial activities and offices. It does not include other kinds of wastes like industrial, agricultural, mining, hazardous, or construction and demolition wastes.

Each municipality or community should have a **Solid Waste Management Program** in order to both **avoid environmental nuisances** and **reduce public health risks**.

Waste management typically involves 5 stages which are:

- **Generation**
- **Storage**
- **Collection**
- **Transportation**
- **Disposal**

Most municipalities bring wastes to **landfills** and **dumpsites**.

Good Practice in Solid Waste Management is the collection and proper disposal of solid waste in a systematic manner, regularly and in time.

New options include:

- **Recycling of inorganic wastes**
- **Composting of organic wastes**
- **Waste to energy**

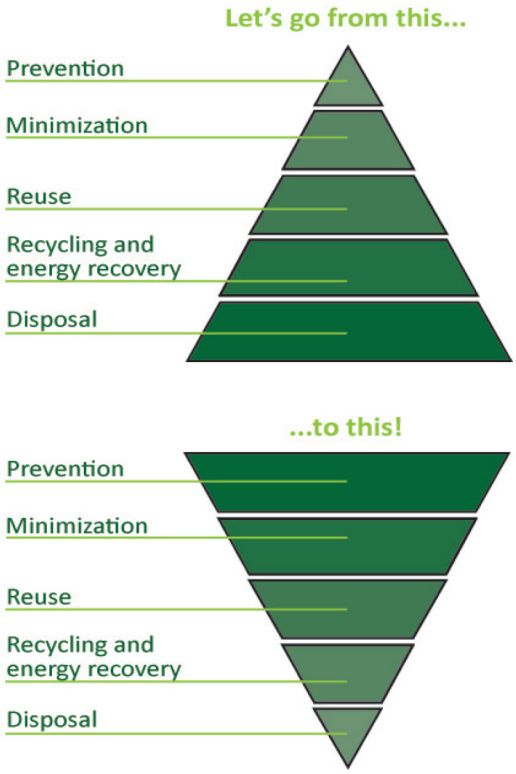
On the other hand, **Mismanagement of Solid Waste** is the case when waste is not disposed off in a proper way, not collected regularly, or not collected at all. In this case the waste can cause risks to people's health and the environment you live in. **Uncontrolled burning** of waste, **burying of waste**, and **uncollected piles of garbage** are all examples of waste mismanagement.

Avoid burning wastes!
Don't throw wastes into the environment!
Reduce – Reuse – Recycle!

Elements of Waste Management

INVERTING THE WASTE PYRAMID

The following illustration represents two models of waste management:



The first one belongs to a vision known as "**end-of-pipe**". Most of the garbage goes to the dumpsite/waste disposal.

The second illustration shows a waste management model based on a "**life-cycle approach**". A special focus is put on **waste prevention and minimization, recycling and energy recovery.** As a result, the volume of wastes sent to final disposal is reduced. Managing a final disposal requires a lot of money to the collectivity and tax payers.

INTEGRATED SOLID WASTE MANAGEMENT

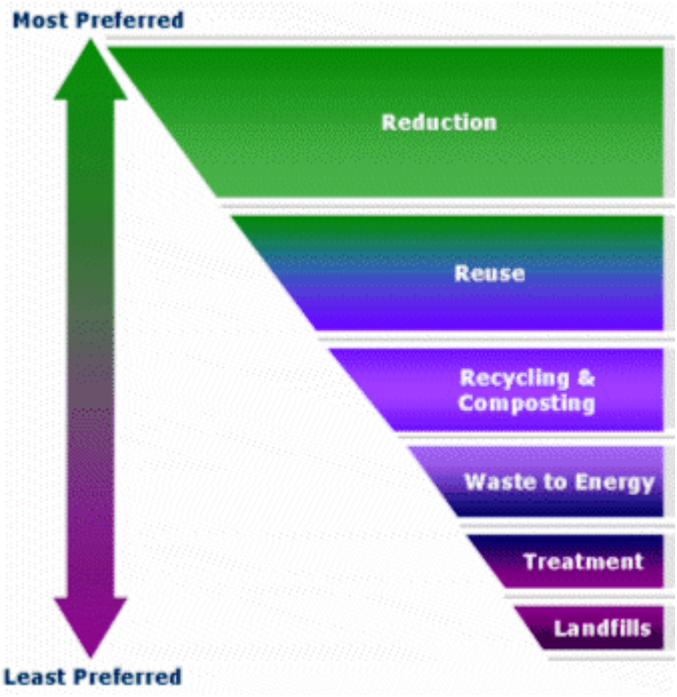
Integrated Solid Waste Management (ISWM) is a comprehensive waste prevention, recycling, composting, and disposal program. An effective ISWM system considers how to prevent, recycle, and manage solid waste in ways that most effectively **protect human health and the environment**. ISWM involves evaluating local needs and conditions, and then selecting and combining the most appropriate waste management activities for those conditions. The major ISWM activities are **waste prevention, recycling and composting**, **combustion and disposal** in **properly designed, constructed, and managed landfills.**

WASTE PREVENTION + RECYCLING & COMPOSTING + LANDFILLING

=

INTEGRATED SOLID WASTE MANAGEMENT

Each of these activities requires **careful planning, financing, collection**, and **transport**.



Note: While many industrial countries have adopted incineration of waste with energy production, this solution is little appropriate to tropical or equatorial countries, including Indonesia.

THE 3 RS

The principle of **reducing** waste**, reusing** and **recycling** resources and products is often called the **3Rs.**

The **3Rs** are meant to be a **hierarchy.** In order of importance:

- **Reducing** means choosing to use things with care to reduce the amount of waste generated.
- **Reusing** involves the repeated use of items or parts of items which still have usable aspects.
- **Recycling** means the use of waste itself as resources.

Waste minimization can be achieved in an efficient way by focusing primarily on **reducing** consumption patterns and choosing products that can be easily recycled. Once a product has been used, the following step is to consider if it can either be **reused** (by ourselves or by others) or **recycled** before throwing it away.

The 3R initiative

The 3R Initiative aims to promote the "3Rs" (reduce, reuse and recycle) globally so as to build a sound-material-cycle society through the effective use of resources and materials. It was agreed upon at the G8 Sea Island Summit in June 2004 as a new G8 initiative.

http://www.env.go.jp/recycle/3r/en/index.html

My Notes

Chapter 3

Recycling

THE RECYCLING PROCESS

Recycling, in its literal meaning, is the procedure of **transforming used or unwanted products into new remanufactured products.**

It helps extend the life and usefulness of something that has already served its initial purpose by producing something that is useable**,** and it has a lot of **benefits** for both **humans** and the **environment**

The **recycling process** is a cycle and is composed of various stages:

- **Segregation**
- **Collection**
- **Manufacturing**

You begin the recycling process when you set **segregated waste materials** (glass bottles, old newspapers, aluminum cans, etc.) apart from your **household** garbage and give them to itinerant buyers or bring them to a **junk shop**.

The **collector** will generally further sort your materials, clean them, compress and bail them, and send them to end users who are actually the **recycling factory** that are using them and processing them into new reusable products.

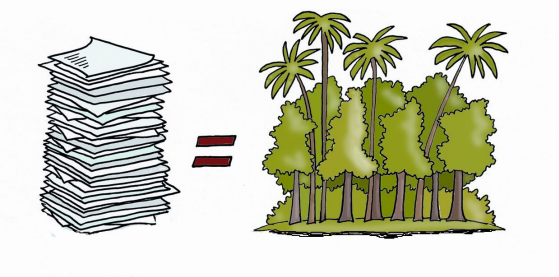
Finally, after **new products are manufactured**, the next stage follows which is the **selling of the recycled products to consumers**.

The recycling process will then again continue as these products will be used, discarded and collected again for a new cycle of recycling.

Benefits of Recycling

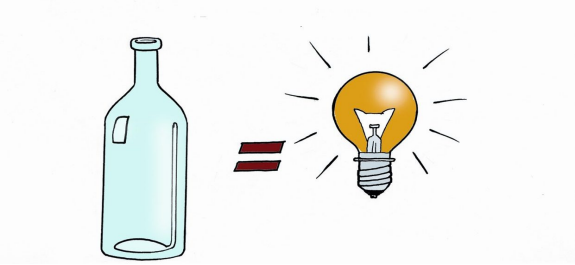
Recycling Saves the Earth

Recycling different products will **help the environment**. For example, we know that paper comes from trees and many trees are being cut down just to produce paper. By recycling it, we can help lessen the number of trees that are cut down. Products made from raw materials that came from our natural resources should be recycled so that we can help preserve the environment.



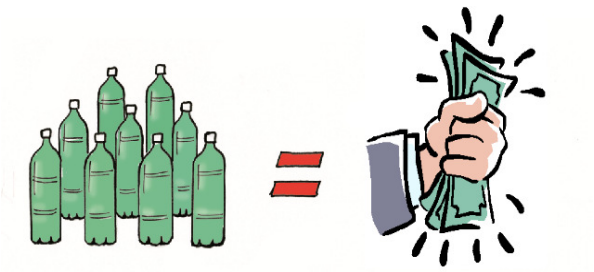
Recycling Saves Energy

It takes **less energy** to process recycled materials than to process virgin materials. For example, it takes a lot less energy to recycle paper than to create new paper from trees. The energy from transporting virgin materials from the source is also saved. Saving energy also has its own benefits like decreasing pollution. This creates less stress on own health and our economy.



Recycling Helps Save/Earn Money

Recycling provides **ways to save/earn money**. You can sell recyclable materials to organizations and companies that are willing to buy it. When consumers seek out recycling companies, they win by not only helping the environment but also by saving/earning money.



WHAT CAN BE RECYCLED?

Almost **everything** can be recycled: paper, cardboard, metals, glass, plastic, rubber, textiles, electronic devices, old cars, construction material, etc.

However, **different materials require different techniques** when recycled.

To be efficient, the recycling industry needs **clean and uncontaminated materials**. This means that separation at source (at home for instance) is a key to success. Materials collected at TPS or TPA are generally contaminated, need to be separated and cleaned. It means a lot of work and energy.

More a product has been transformed, more complex it is to recycle it.

- **Organic wastes** can be **easily processed** and transformed in a high quality product called **compost**. Compost is a natural fertilizer.
- **Inorganic wastes** are wastes composed of material other than plant or animal matter, such as sand, dust, glass and many synthetics .They are important materials for the recycling industry, but require **higher technology** and processing to be recovered.

TO FIND OUT WHAT CAN BE RECYCLED. VISIT:

http://www.recyclenow.com/what_can_i_do_today/can_it_be_recycled/index.html

Paper

Where does paper come from?

Paper is produced from wood. It takes approximately **17 trees to make 1 ton of paper**. Fortunately, trees are a renewable resource; however, we are currently harvesting our trees faster than we are replacing them. Without proper management or sufficient natural regeneration, some species of trees are threatened.

How is paper made?

Paper is made in **paper mills**. Once the trees are cut down, they are debarked and chipped. These smaller pieces of wood are mixed with chemicals and processed in a large pressure cooker called a digester. This process helps to break the wood down into cellulose fibers. These fibers are rinsed to remove chemicals, unwanted wood contaminants, and dirt. The remaining wood-water mixture is called slurry and is fed onto screens that catch the fibers. The material on the screens is shaken to intermesh the fibers and drain any excess water. The resulting sheets of paper are passed through a series of rollers where they are pressed and dried.

An increasing number of paper mills are using **recycled paper** as a feed stock to make new paper. Recycled paper contains cellulose fiber that can be reused (alone or combined with new fiber) to make many kinds of paper products including newsprint, stationery, towels, tissues, napkins, insulation, roofing paper, packaging, and paperboard.

As paper recycling programs have become more common, the **supply of recycled paper has increased** and become more reliable.

How does paper production affect our environment?

In addition to **consuming resources** and contributing to the **destruction of forested areas**, paper production is **polluting our environment**, especially air and water.

While the use of recycled paper to make more paper should be encouraged, the recycling process does create its own environmental hazards too. The paper de-inking process, in which ink is removed from recycled paper, produces wastes that may contain lead. These wastes require **careful management and disposal.**

Of major concern in the production of paper, either from trees or recycled paper, is the use of chemicals that produce cancer-causing wastes.

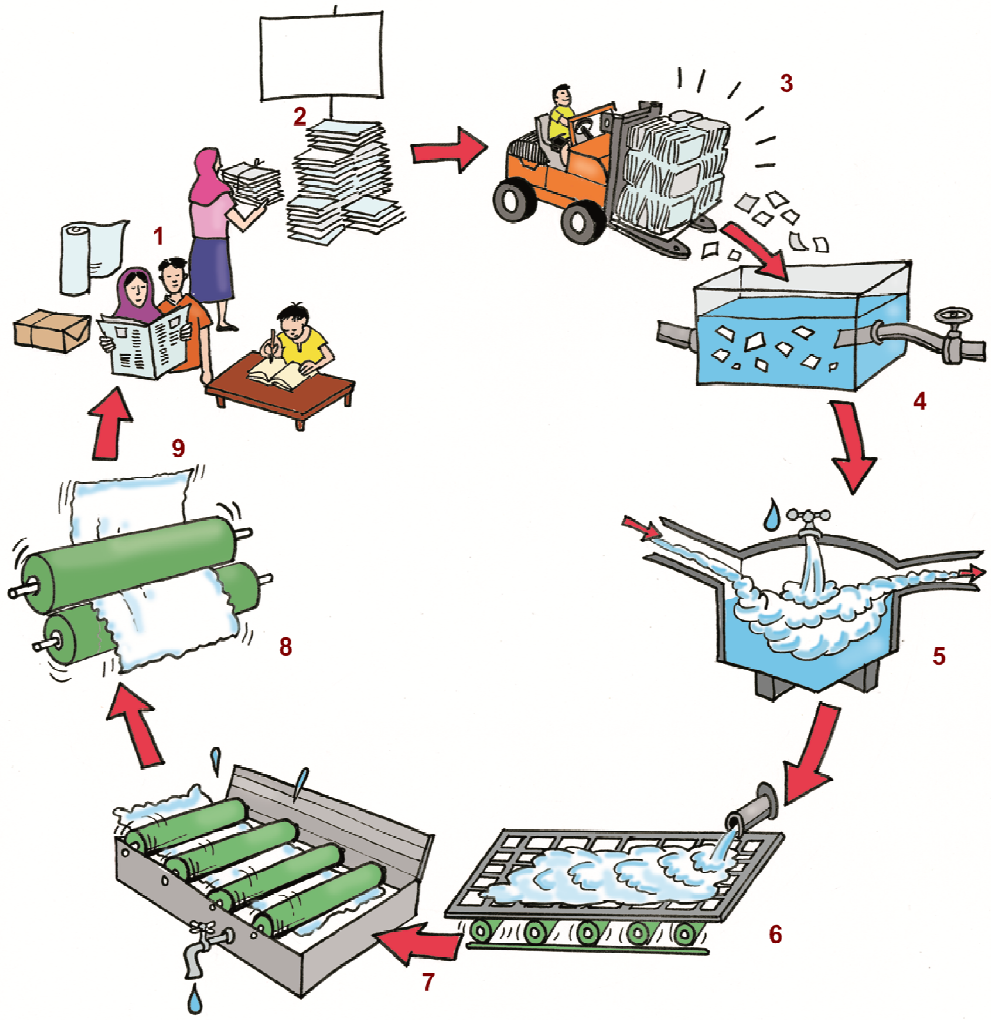
What are the benefits of recycling paper?

If we recycled half of the paper used in the world today, we would meet almost three-quarters of the demand for new paper and **save millions of acres of forest** at the same time. When left standing, forests help purify the air, provide essential wildlife habitat, and offer recreational opportunities to humans.

Using waste paper instead of trees to manufacture new paper products also reduces water consumption by 60 percent and the generation of environmental pollutants by 70 percent.

Recycling **1 ton of waste paper** saves an average of **3 cubic yards of landfill space.**

How paper is recycled?



1. Paper products – 2. Collecting used paper products – 3. Bringing used paper products to factory – 4. Shred & Digest old paper products - 5. Pulp washing & de-inking – 6. Drying new pulp – 7. Squeeze out liquid – 8. New paper sheets - 9. New paper products

GLASS

Where does glass come from?

Glass is produced from minerals like **silica, limestone, feldspar and so**da. Silica, more commonly known as sand, is the primary ingredient used in its production. Different colors of glass are produced by adding small amounts of other substances such as iron, copper, and cobalt. Green glass, for example, is made by adding iron.

How is glass made?

Glass is produced in **factories** where the raw materials are melted together and transformed into bottles, jars, and other products. The mixture of silica, soda ash, limestone, and feldspar is called a batch of glass. The batch is mechanically fed into large furnaces and heated to **very high temperatures**. When it is completely melted, the material is transferred to a glass forming machine where molten glass is dropped into molds for shaping. Compressed air is then forced into the center of the mold blowing the glass out against its walls, forming the desired shape. Finally, the containers are placed on conveyor belts and are slowly passed through cooling tunnels to prevent shattering. Slow cooling, in addition to a protective coating, strengthens the glass and increases its durability.

How are glass, energy, and the environment related?

The raw materials used to produce glass are plentiful and fairly accessible, but the process of transforming them into glass requires **a lot of energy**. Glass production generates **air pollutants** and **mining wastes**.

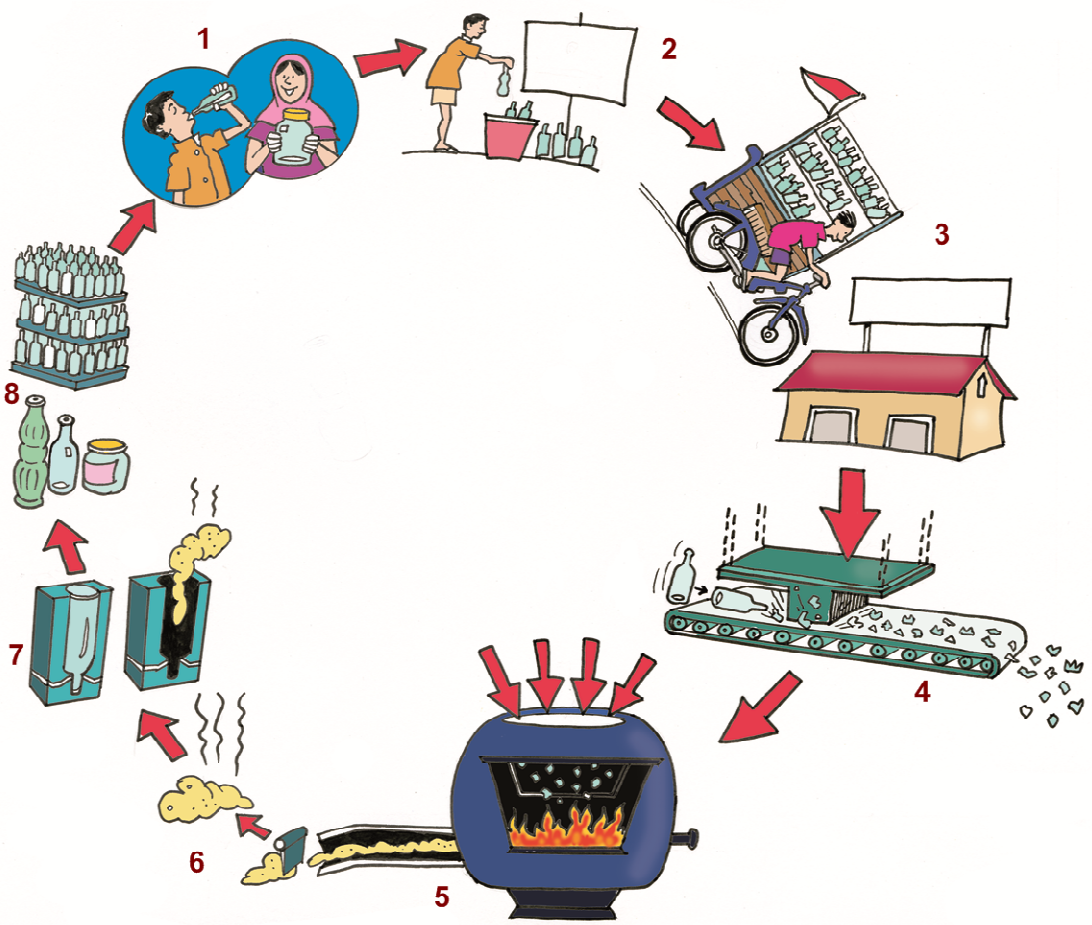
What are the benefits from reusing and recycling glass?

Reusing glass at home **conserves resources and energy**, and can **reduce the amount of waste and pollution** generated by glass production. Using 1 ton of recycled glass will also save 1.2 tons of raw materials. It has been estimated that using 50 percent recycled glass in the manufacturing of new glass can reduce mining wastes by 79 percent, water consumption by 50 percent, and air emissions by 14 percent. Finally, recycling glass saves landfill space. Instead of becoming trash and lying in landfills for thousands of years, bottles and jars can be used over and over again, and recycled indefinitely.

Industries also **reuse glass by cleaning and refilling glass containers** that are returned for the bottle deposit. The energy savings from this activity, though, are partially offset by the energy expended in the cleaning and transport of the used bottles.

To be fully useful to manufacturers, recycled glass must be **separated by color—green, brown and clear.** Ceramics and window glass, which have an entirely different composition from container glass, are considered contaminants to recycled container glass.

How glass is recycled?



1. Glass products – 2. Collecting used glass products – 3. Bringing glass products to factory – 4. Breaking up glass - 5. Melting glass in furnace – 6. Producing molten glass – 7. Moulding molten glass into new products – 8. New products including glass bottles

METALS

Where does metal come from?

Metals are elements or mixtures of elements that occur **naturally in the earth**. Abundance, accessibility, and the processing required to transform these natural substances into a usable form vary with the type of metal.

Aluminum

Aluminum is the third most common element and constitutes **8 percent of the earth's crust**. Although it is quite common and can be found dispersed throughout most rocks and clays, it is never found naturally in its metallic state. The greatest concentration of aluminum is found in **bauxite ore**, which contains large amounts of alumina. Most of the world's bauxite reserves are in **the subtropics** where heat and water weather away other elements, leaving a high concentration of alumina.

Surface mining of bauxite requires a **large energy input** and generates **solid, waterborne, and hazardous wastes**, as well as **air pollution**. After the bauxite ore is extracted from the ground, it is transported to refineries where the alumina is chemically separated from the ore. The aluminum is then extracted from the alumina through an energy-intensive process called electrolysis. Small amounts of other metals or alloys may be added to the aluminum to strengthen it. The melted aluminum is then cast into ingots and sent to manufacturing plants where it is re-melted and formed into a variety of items. Aluminum is often used when a strong, durable, yet light-weight, material is needed.

Iron, Steel, and Tin

Iron is also a naturally occurring element. Steel is produced by adding carbon to iron. Different grades of steel are produced by adding various elements to this basic mixture. Tin is another metallic element. "Tin" cans are really steel cans with a thin coating of tin, which prevents the steel from rusting or corroding.

Steel is very strong and is the most widely used metal today. The **mining** and **processing** of iron is quite **costly,** and **energy intensive**.

How can I tell the difference between the types of metals?

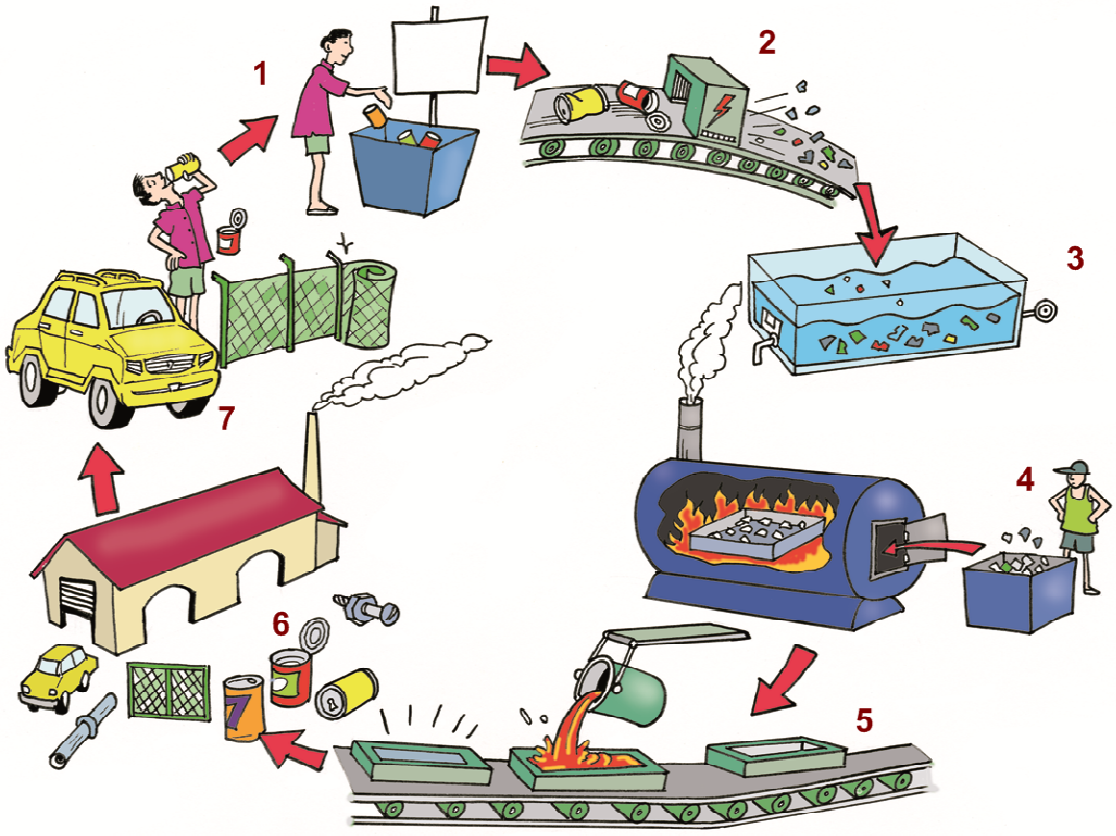
You can tell the difference between steel cans and aluminum cans with a **magnet**. Magnets will attract steel, but not aluminum. Bimetal cans are steel cans with an aluminum top and bottom. A magnet will attract these cans if pointed at the steel portion, but not if placed near one of the aluminum ends.

What are the benefits of recycling metal products?

Metal products are used extensively throughout the world. Unfortunately, **metals are non renewable resources** and their extraction from the earth is **expensive**, **energy intensive**, and **detrimental to the environment.**

Pure aluminum cans are 100 percent recyclable. Using them to produce new aluminum products can reduce energy consumption and air and water pollution by approximately 95 percent. Compared with manufacturing steel from virgin materials, recycling steel can reduce energy consumption by 74 percent, air pollution by 86 percent, water use by 40 percent, water pollutants by 76 percent, and mining wastes by 97 percent. Recycled steel is generally shredded or compacted, cleaned, and re-melted.

How metals are recycled?



1. Collecting scrap metal & cans – 2. Bringing meta s to factory and shredding – 3. Washing metal shreds – 4. Smelting - 5. Pouring ingots – 6. Making new products – 7. Using new products

PLASTICS

What are plastics made from?

Plastics are **synthetic materials** derived from **petroleum** and **natural gas**. Availability and cost of these scarce, **non renewable resources** is a critical issue underlying the continued use and disposal of plastics.

How are plastics made?

Plastics consist of **carbon** combined variously with **hydrogen, oxygen, nitrogen, chlorine, or fluorine**. They are made by linking together small molecule groups called monomers into long-chain molecules called polymers. When this chemical rearranging occurs, a plastic resin is formed. **Plastic resins** are used to produce hundreds of different types of plastic and categories.

Thermoplastics make up 80% of the plastics produced today. Most of them have a recycling code imprinted on their bottom panel. The code consists of a number, 1 through 7, inside of a recycling symbol (the chasing arrows). The thermoplastic resin types most commonly and most frequently seen in the waste stream are listed below, next to their SPI code:

- **high density polyethylene (HDPE)** used in piping, fuel tanks, bottles, toys,
- **low density polyethylene (LDPE)** used in plastic bags, cling film, flexible containers;
- **polyethylene terephthalate (PET)** used in bottles, carpets and food packaging;
- **polypropylene (PP)** used in food containers, battery cases, automotive parts;
- **polystyrene (PS)** used in dairy product containers, tape cassettes, cups and plates;
- **polyvinyl chloride (PVC)** used in window frames, flooring, bottles, packaging film;
- insulation, credit cards and medical products.

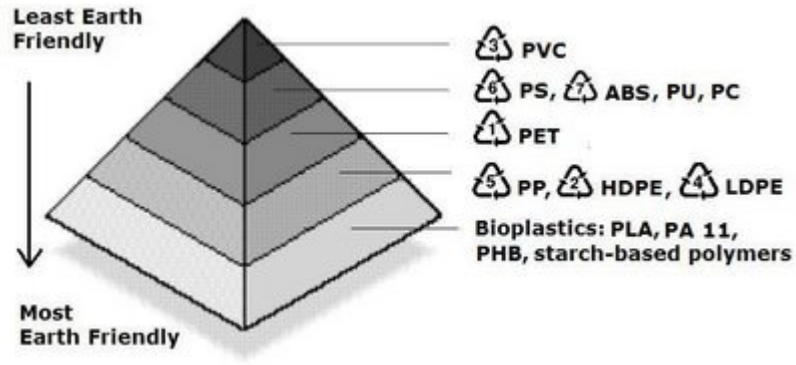
Thermosets make up the remaining 20% of plastics produced. They are hardened by curing and cannot be re-melted or re-molded and are therefore difficult to recycle. They are sometimes ground and used as a filler material. They include:

- **polyurethane** (PU) – coatings, finishes, gears, cushions, mattresses and car seats;
- **epoxy** – adhesives, sports equipment, electrical and automotive equipment;
- **phenolics** – ovens, handles for cutlery, automotive parts and circuit boards.

Nowadays, the raw materials for plastics come mainly from **petrochemicals,** although originally plastics were derived from cellulose, the basic material of all plant life.

What are the disadvantages to using plastics?

The production of plastics requires **large quantities of crude oil and natural gas**, and generates a **significant amount of solid wastes**, as well as **air and water pollutants**. Each day, millions of plastic products are discarded, and the potential energy embodied in them is wasted. Disposal of plastics can generate air pollution when burned in combustion facilities. For example, burning PVC releases chlorine gas into the atmosphere, which can threaten human health. In addition to the problems associated with the production and subsequent disposal of plastic waste, many plastic items are disposed of improperly and end up in oceans, waterways, and along roadways. This plastic litter threatens the health of many species of wildlife and often compromises the natural beauty of these areas.



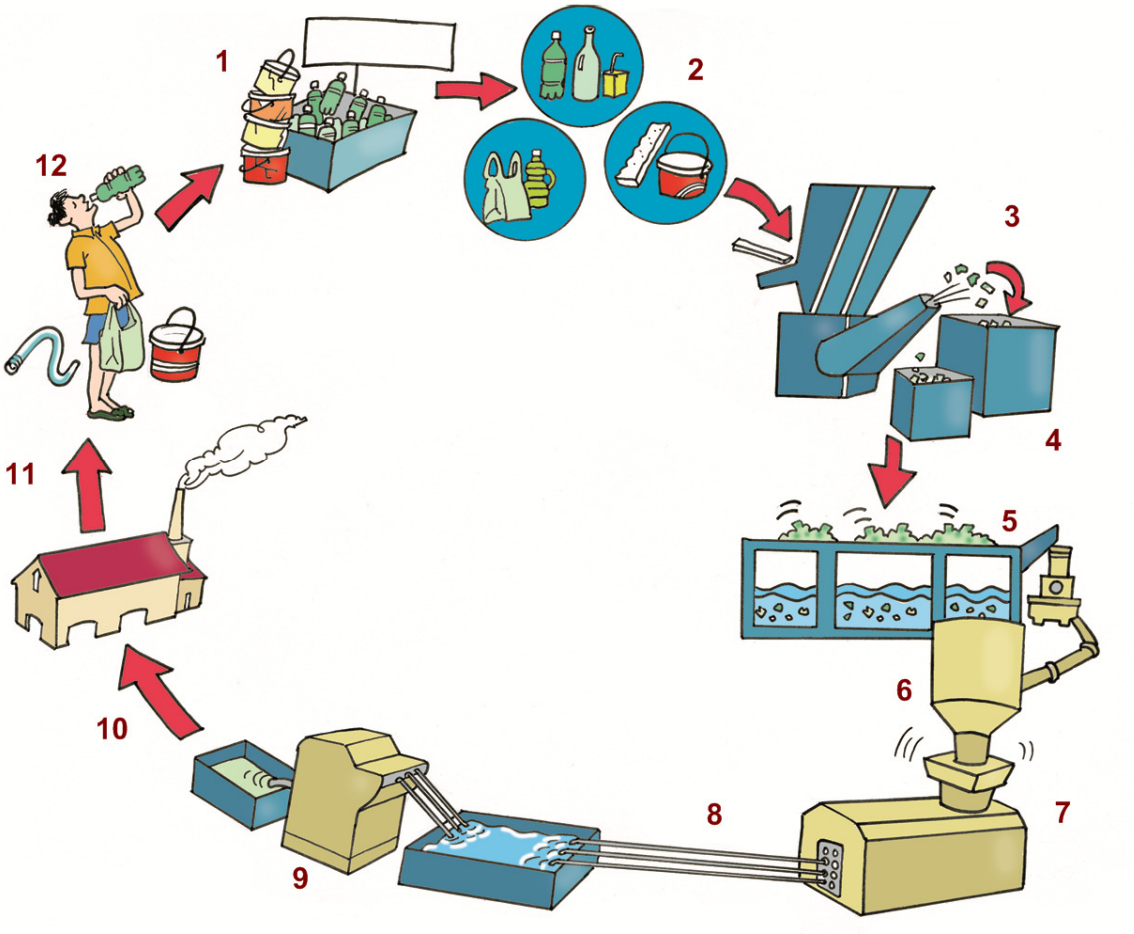
PVC = Polyvinyl chloride
PS = Polystyrene
ABS = Other resins, like acrylonitrile butadine styrene
PU = Polyurethane
PC = Polycarbonate
PET = Polyethylene terephthalate
PP = Polypropylene
HDPE = High-density polyethylene
LDPE = Low-density polyethylene
PLA = Polylactide acid
PA 11 = Polyamide 11
PHB = Poly 3 hydroxybutyrate

How plastics are recycled?

The ideal type of plastics recycling is a **primary recycling process** that creates a closed-loop system. An example of a primary process is the conversion of an old laundry detergent container into a new detergent container, again and again, indefinitely. There are some factors that limit the use of the primary recycling process for plastics like the cost for transportation and health protection regulation.

A **secondary recycling process** is one that converts a plastic product into a different product that is also recyclable. While this process does not eliminate the need to use virgin materials to make more of the first product, it does displace some virgin materials in the production of the second product.

A **tertiary recycling process** converts the recyclable plastic into an item that cannot be recycled again. The ideal goal in this process is to take items with short life spans, such as ketchup bottles, and convert them into an item with a long life span, such as plastic lumber.



1. Collecting plastics – 2. Segregating plastics by types and colors – 3.Shredding plastics – 4. Each type of plastic is treated separately - 5. Washing shreds – 6. Drying – 7. Melting – 8. Extruding – 9. Cooling – 10. Chopping into pellets – 11. Making new products -12. Using new plastic products

ORGANIC WASTES

What are organic wastes?

Organic wastes are produced by **humans, animals and plants**.

In towns and cities, they are generated by households, businesses, industries and local authorities. It consists of **kitchen waste** (e.g. potato peelings), **waste food** (e.g. leftovers in restaurants, spoiled fruit and vegetables from markets), **garden waste** (e.g. grass clippings and hedge trimmings) and **industrial waste** (e.g. from agricultural and food processing factories).

Organic waste often forms as much as **75% of household waste** in Aceh.

How to deal with organic wastes?

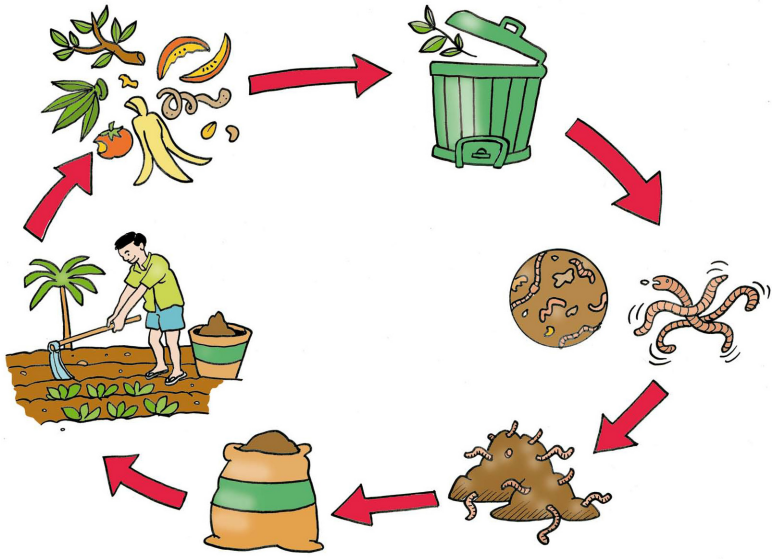
The organic portion of solid municipal wastes can be transformed in:

- **Compost** (natural fertilizer)
- **Food for animals**
- **Biogas** (natural fuel)

What is Compost?

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.

Compost is a product of **controlled aerobic decomposition** of organic matter made using aerobic **microorganisms, insects and worms**. It is a stable, dark brown, soil-like material which can hold moisture, air and nutrients. It is created by: combining organic wastes (e.g., yard trimmings, food wastes, manures) in proper ratios into piles, rows, or vessels; adding bulking agents (e.g., wood chips) as necessary to accelerate the breakdown of organic materials; and allowing the finished material to fully stabilize and mature through a curing process.



Contrary to popular belief **compost does not smell rotten**: often it will smell as fresh as a forest floor (which is, of course, naturally-made compost).

Compost contains some **plant nutrients** including nitrogen, phosphorus and potassium, and a range of minerals and microorganisms beneficial to plant growth.

Its main benefit is as a **soil conditioner**. Adding compost to soil can lessen the need for chemical fertilizers because it holds nutrients in the soil, it can also help reduce soil erosion, and improve the structure of the soil thus benefiting drainage and plant roots.

My Notes

Chapter 4

SWM & Recycling Directory

SANITATION DEPARTMENTS

LHOKSEUMAWE
Badan Lingkungan Hidup dan Kebersihan
(BLHK)
Jln. Listrik No. 2, Lhokseumawe
Tlp(0645)-47015

Dinas Pasar, Kebersihan dan Pertamanan
(DPKP)
Jl. Listrik No.2 - Pasar Inpres –Lhokseumawe
Tlp/Fax(0645)-42312

ACEH UTARA
Dinas Lingkungan Hidup, Kebersihan dan Pertamanan
(DLHKP)
Jln. Mayjen. Hamzah Bandahara, Lhokseumawe
Tlp (0645) 48747 - Fax.(0645)-43636

BIREUEN
Dinas Lingkungan Hidup, Kebersihan dan Pertamanan
(DLHKP)
Jln. Bakti No. 1 A, Bireuen,
Tlp. 0644-323111

PIDIE JAYA
Dinas Lingkungan Hidup, Kebersihan dan Pertamanan
(DLHKP)
Jl. Simpang Tiga, Meureudu

PIDIE
Dinas Kebersihan, Pertamanan, dan Pemadam Kebakaran
(DKPPK)
Jl. Teuku Umar. No. 2. Sigli
Tlp. (0653) – 21350

NAGAN RAYA
Kantor Lingkungan Hidup Dan Kebersihan (KLHK)
Jl. Poros Suak Makmue, Nagan Raya

ACEH BARAT
Kantor BAPEDALKP
Jl. Imam Bonjol, Seunebok, Johan Pahlawan, Aceh Barat

ACEH JAYA
Kantor Lingkungan Hidup, Pertamanan, Kebersihan & Pemadam Kebakaran (KLHKP2K)
Komplek Perkantoran Aceh, Jaya krueng Sabee, Aceh Jaya

BANDA ACEH
Dinas Kebersihan dan Pertamanan (DKP)
Jln.Pocut Baren No.30 Kampung Laksana-Banda Aceh
Tlp.(0651)-31217, 7410780

JUNK SHOPS & RECYCLING COLLECTING POINTS
(SUPPORTED BY UNDP WASTE MANAGEMENT LIVELIHOODS PROJECT)

LHOKSEUMAWE
UD. Mitra Besi
Muara Dua
085260100121

UD. Saputra
Muara Dua
081362950003

UD. Sumber Rezeki
Muara Dua
085260601002

ACEH UTARA
UD. Abadi Logam
Tanah Pasir
081360855505

Rusli Teknik
Syamtalira
085288476041

UD. Barona Jaya
Dewantara
08116703951

UD. Rahmat
Dewantara
081361515953

UD. Keunekna Jaya
Muara Batu
081360038853

BIREUEN
UD. Indo Jaya Logam
Kuta Blang
085260355120

UD. Serba Bisa
Kota Juang
081263251738

UD. Delima Logam
Juli
085260661940

PIDIE JAYA
UD. Joni Logam
Bandar Baru
081377201260

PIDIE
UD. Usaha Giat
Mutiara Barat
085277780471

Bang Nyong / UD. Audy
Kota Sigli
081377305409

UD.Usha
Pidie
085277654773

CV. Foenna
Pidie
81360882973

NAGAN RAYA
UD Nabila
Kuala
081370062111

ACEH BARAT
UD Rahmat
Johan Pahlawan
085260576707

UD Bersama
Johan Pahlawan
081360490829

UD Keularga
Johan Pahlawan
081360418169

UD Rahmad
Meurebo
085277892757

PWR
Johan Pahlawan
081360936454

ACEH JAYA
UD. Iswa
Calang
081360157555

UD Besi Tua
Teunom
081263276671

BANDA ACEH
UD Hana Abe Habeh
Banda Raya
081360973938

NGOs (Waste Management & Recycling Education)

LHOKSEUMAWE
Palapa Plastic Recycle (PPR) Lhokseumawe
Muara Dua
081385754607

Sepakat
Banda Sakti
081360024719

Community Youth Development (CYD)
Mon Geudong
085260128151

PIDIE
Lembaga Perlindungan Perempuan dan Anak (LP2A)
Keunire
081360533237

Nagata Foundation
Simpang Tiga
085277333452

ACEH BARAT
Yayasan An-Nisa'Wal Athfal
Johan Pahlawan
081377207456 / 085260474228

Yapintar Meulaboh
Drien Rampak
081360282915

YPK Meulaboh
Johan Pahlawan
081534043793

Yayasan Paramadina Semesta (YPS)
Johan Pahlawan
081360914668

ACEH BESAR
Yayasan Lamjabat
Peukan Bada
081360238982

BANDA ACEH
Palapa Plastic Recycle (PPR) Banda Aceh
Kuta Alam
081377166546

PILOT SCHOOL GARBAGE BANKS

LHOKSEUMAWE

SDN 14 Banda Sakti
SDN 16 Banda Sakti

MEULABOH

SDN 3 Meulaboh
Min Meulaboh

BANDA ACEH

SDN 24 Banda Aceh
SDN 67 Banda Aceh

UNDP - TRWMP

Tsunami Recovery Waste Management Programme (TRWMP)
UNDP Banda Aceh
Gedung Biro Organisasi 3rd Floor
Kantor Gubernur
Jln. T. Nyak Arief No. 219
Banda Aceh - NAD
Indonesia
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TRWMP WM Adviser
Nigel Landon
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Appendix

Taking Action

Examples of Individual and Community Initiatives

From "Waste Management" to "Resource Management"

Many initiatives can be taken at individual or community level to help the environment. **More we are and more it becomes fun and useful**.

Rapid urbanization has made **solid waste management a serious problem today**.

Low collection coverage, unavailable transport services, and lack of suitable treatment, recycling and disposal facilities are responsible for unsatisfactory waste management, leading to **water, land and air pollution**, and for putting people and the environment at risk.

A shift in thinking about the definition of waste is essential for a transition to more resource-efficient societies. Waste is traditionally thought of as having no value. As we have seen in the previous pages of this manual, **turning wastes into resources** is possible and has many benefits for humans and the environment.

Adopting a 3R approach

All in all, the practice of the **3R (Reduce – Reuse – Recycle**), individually or collectively, saves fresh resources exploitation, add value to the already exploited resources and very importantly minimizes the waste quantity and its ill effects.

The 3R's approach should be practiced in the following order of importance:

- **REDUCE** – The **best** way to manage solid waste.

Don't create wastes in the first place! Buy only what you need, can be reused or recycled! Refuse plastic bags at stores or reuse them several times before throwing them away.

- **REUSE** - The **better** way to manage solid waste.

Reuse items – use them over and over until they are completely worn out. Borrow or share items you don't use very often. Repair items, instead of throwing away and buying new. Donate unwanted items to charitable organizations. Organize a waste market in your neighborhood or community.

- **RECYCLE** - The **good** way to manage solid waste.

Sort items by type (organic-inorganic; organic – plastics – glass – metals – paper – mixed wastes). **Start a compost** at home, **a garbage bank** in your school, **a recycling center** in your community. Sell the recyclables to local traders or junk shops. **Turn wastes into handicrafts**. Take part in the "**Clean The World Campaign**". These are just some ideas.

MAKE YOUR OWN COMPOST

Approximately **half of all household waste is organic**. Most of this waste can be recycled through **composting** – turning waste materials into a **rich soil supplement** for use in your garden.

By composting, not only can you help **reduce the amount of wastes that go into landfills** but you can also help **reduce contamination and greenhouse gasses.**

In **Surabaya City**, household organic waste composting has been widely practiced in communities. The city government, through the support of several private companies and local NGOs, have adopted the **Takakura method** that uses baskets for **household composting**. Hygienic condition of streets and communities improved and **income opportunities** were generated by selling produced compost and plants grown by using the compost.

In the Takakura composting method, **organic waste is broken down by micro-organisms**. The method involves making a **seed compost** from fermented solutions and a fermenting bed. **Organic waste is then mixed with the seed compost** and left to degrade in a ventilated container or basket.

Home Composting: A Step by Step Guide to Takakura Composting:
http://thestar.com.my/archives/2010/1/5/lifefocus/home_composting.pdf

http://www.yudhakaryadi.com/keranjang-takakura/
http://olahsampah.multiply.com/journal/item/11
http://blogsampah.blogsome.com/

TURN WASTES INTO HANDICRAFTS

Did you know that you can extend the life of wastes by turning them into handicrafts, **producing textile based products, soft toys, other utility items and clothes?**

This process is called "**upcycling**". It springs from a desire to make the best use of limited resources and to add quality to waste materials. Upcycling is the opposite of "downcycling" which involves converting materials and products into new materials of lesser quality.

Trashion (trash & fashion) is a term that was coined in 2004 in New Zealand for art, jewelry, fashion and objects for the home created from recyclable materials like old papers, plastics, tin and aluminum cans.

In Indonesia, **Trashion** is a project implemented by **Unilever Foundation** to answer the need of tackling post consumer plastic waste while empowering women to become entrepreneurs using plastic wastes and engaging other women in their neighborhood to be involved in the process. The project has helped them turn plastic packaging wastes into useful and attractive items with economic value such as bags, umbrellas, slippers.

TRASHION was born from the *Green and Clean* program initiated by PT Unilever Indonesia, Tbk together with its partners, and fully supported by Sunlight, which has been actively supporting the program to empower Indonesian women through the community called*Komunitas Ibu Bersinar Sunlight*. To date, there are 53 TRASHION centers throughout Jakarta, Surabaya, Yogyakarta and Makassar, with 500 housewives involved in the *Komunitas Ibu Bersinar Sunlight*. In Jakarta alone, there are 10 TRASHION SME centers.

For more information about **Trashion**, visit:
http://www.stevieawards.com/pubs/iba/awards/408_2624_20221.cfm

Contact person:
Ms. Sinta Kaniawati, General Manager, Peduli Foundation PT Unilever Indonesia,
(62-21) 52996 514 sinta.kaniawati@unilever.com

START YOUR OWN RECYCLING BUSINESS

One of the easiest ways of making money is by collecting recyclables and selling them to local traders or junk shops.

Some steps to be taken:

1. **Transport and Storage**
   Your primary logistical concerns would be transportation and storage. Having a becap, a car or a pick up is a definite advantage, you can readily cover a wider area within your neighborhood, community, or city. You may have to invest in a few recycling containers and allocate some space in your garage or backyard, but that's basically the only capital outlay you'll need to be in business.

2. **Choose your material**
   Initially, you have to decide on which recyclable item you're going to focus on. Will you be collecting metals, glass bottles, aluminum beverage cans, or plastics? Are those materials available in your community and in which quantities? This will help you calculate the number of recycling bins or the amount of space to prepare. Some items, like car batteries which can leak toxic heavy metals, would need bigger space and may not be ideal for home storage.

3. **Contact local traders**
   The next step would be to get in touch with local traders to know about prices, and make the necessary arrangements once you have decided to start your business. Distance is an important factor - the closer the facility to your home, the lesser the hauling costs would be.

4. **Map out your collection points**
   One last step before you go on your collection rounds. Identify your collection points - these are the places or establishments located in different spots within your service area where people can bring their recyclable items to. Establish a calendar, cultivate contacts, make new friends as you make your rounds - this is very important to your recycling business, or to any business, for that matter. Your contacts and friends within the community are the people who would want to see you succeed and can help you identify strategic places where you can leave bins, boxes, or containers for your collection effort.

   Get to work, put everything down on paper, and fill in the numbers, according to your particular situation. Turning trash into cash is a good idea. Get trained and learn about recyclable types, qualities, prices.

To know more, download the manual of ILO on how to **Start Your Waste Recycling Business**:
http://www.ilo.org/public/english/employment/recon/eiip/download/waste_recycle/business_manual.pdf

ESTABLISH A RECYCLING COLLECTING POINT IN YOUR COMMUNITY

Establishing a recycling depots can be a great option for a **local community**. The success will depend on several factors, including public awareness of the local community and capacity building of personnel and staff.

As it might be difficult to create enough incentive for waste generators to bring recyclables to the depots, it is highly recommended that the creation of such facilities is coupled with the organization of a **waste-type collection scheme** encouraging **separation at source** (households, businesses, etc.). In practice, a special focus should be put on **items having a market**, like plastics, plastic bottles, cardboard, etc.

Recycling depots are places that **receive, separate and prepare recyclable materials for marketing** to waste traders or end-user manufacturers. These facilities accept **recyclable materials that have already been separated at the source** into different waste streams (such as glass, paper/cardboard, cans, scrap metal - ferrous and non-ferrous - plastics, garden waste and oil). **A fixed price is paid per unit** for materials brought to the depot. **Alternatively, only some items are redeemed** (plastics, cans, bottles for instance) while others are donated (paper, newspapers, scrap metals for instance). Materials are sorted to specifications, clean and reduced in size. Then, they are baled, shredded, crushed, or otherwise prepared for shipment to market. Each depot can chose which material they want to collect. Some focus only on one material, like plastics.

BALIFOKUS

In 2003, Yuyun Ismawati, 44, and **Bali Fokus**, in cooperation with a local Rotary Club, initiated a solid waste management program with Temesi Village in Gianyar, Bali consisting of a **waste management facility owned and operated by the village itself**. Ismawati and the organizations recruited and trained local residents to operate the facility. Workers now separate waste into recyclables, compostable and residuals to transport to the dumpsite. Income from the sale of recyclable materials and compost benefits the community. The plant now employs 40 local residents.

More information: **http://www.balifokus.asia**

To support the scheme, members of the community will be asked to segregate wastes at home. Community based contractors, using cycle carts or pick-ups (and provided with uniforms and safety equipment such as masks, boots and gloves) will then perform **door-to-door collection** and transport the recyclable material to the depot.

ECOBALI

EcoBali was established in 2005 in response to the urgency of waste management problems in the island of Bali. The company offers **waste segregation at source** and disposal services; trainings on green practices for individual and businesses; awareness and environmental education programs.

More information: **http://www.eco-bali.com/**

MOBILIZE YOUR SCHOOL TO START A GARBAGE BANK

Garbage banks are different from other banks. Members do not bring money to the bank but **recyclables** the value of which is exchanged for credit points recorded on a passbook. A transaction price for each type of items (paper, glass, aluminum, etc.) is then calculated according to the current market.

Once sufficient **credits** are achieved, members can be redeemed for **money, goods or coupons** which can be used at participating businesses.

The bank stores recyclables which are deposited by the school participating students/pupils and bought by itinerant waste pickers affiliated to a **local trader** ("Junk Shop"). **The garbage bank acts as the coordinating body for collection and trading**. Recyclables are collected from the neighborhood and from households.

In **Thailand**, school garbage banks were initiated in the 90s in order to promote separation-at-source activities in both schools and communities. These activities – undertaken by students with teacher supervision –raised the awareness of youths and their parents about their roles in reducing waste generation. School garbage banks are generally operated by a committee made up of pupils and including one or more adult advisers. The committee is responsible for administration management, accountancy, public relations, and contracting activities with buyers (waste pickers, junk shops). The "bank" is open one or more days per week. Knowledge of recycling and source separation are integrated into the school curriculum. In 2001, school garbage banks were launched in more than 30 provinces and numbering 500. It was estimated that each of them collected from **3 to 5 tons of recyclables per month** for a total amounting 18,000 to 30,000 tons of recyclables. As a result, government saved millions of baths that year.

In Indonesia, **Bogor Nature School** (West Java), which was established in 2002, is already running a School Garbage Bank program with successful results.

Read more:
http://bataviase.co.id/node/185633

Pilot projects of **School Garbage Banks** are implemented in **Aceh** by **Terre des homes – Italy** within the framework of UNDP's Tsunami Waste Management Livelihoods Program - Round III.

More information:

http://wml4aceh.xomm.it
http://wml4aceh.wordpress.com

TAKE PART IN "CLEAN-UP DAYS"

In March 2010, more than 600 000 people in Australia have collected 15 000 of wastes during the National Clean-up Day.

Clean Up the World partners with the **United Nations Environment Programme** (UNEP) inspire and empower communities to "clean up, fix up and conserve their local environment" by carrying out initiatives ranging from waste removal and tree planting to water and energy conservation projects.

In 2010 the campaign's flagship event; Clean Up the World Weekend will be held from **the 17-19 of September.**

http://www.cleanuptheworld.org

Getting involved is easy!

To **register for the campaign** and put your group's activity on the global environmental map, visit the **Clean Up the World website**.

Membership is free and needs to be renewed annually.

WASTE MANAGEMENT ACT AND PRACTICES IN INDONESIA

Waste Management Act of 18/2008

http://www.menlh.go.id/dokumen_sampah/Waste%20Management%20Act%20Number%2018%20Year%202008.pdf

Waste Management Practices in Indonesia

http://www.eurojournals.com/ejsr_40_2_04.pdf

USEFUL LINKS

SOLID WASTE MANAGEMENT

http://www.waste.nl/

http://www.wastekeysheets.net/

http://www.wasteconcern.org/

http://www.cwgnet.net

http://www.wasteonline.org.uk/

http://scp.eionet.europa.eu/themes/waste

http://www.unep.or.jp/ietc/publications/spc/State_of_waste_Management/index.asp

http://www.iwmsa.co.za/index.php?option=com_content&task=view&id=29&Itemid=47

3R REDUCE -REUSE - RECYCLE

http://www.3rkh.net/

http://www.uncrd.or.jp/env/spc/docs/Tokyo-3R-Statement-12Nov2009.pdf

http://www.env.go.jp/recycle/3r/en/asia.html

http://www.iges.or.jp/en/ltp/activity08.html

http://www.unescap.org/esd/environment/mced/tggap/documents/RPD/8_MoriSan_3RInitiative.pdf

http://www.3rasia.org/

http://www.recycling-guide.org.uk/rrr.html

http://www.recyclenow.com/

http://www.grrn.org/

ZERO WASTE

http://en.wikipedia.org/wiki/Zero_waste

http://zerowasteinstitute.org/

http://www.zerowaste.co.nz/default,255.sm

http://www.grrn.org/zerowaste/articles/waste_not_asia.html

http://www.zerowarming.org/

http://www.ecocycle.org/zerowastevideo/index.cfm

http://www.stoptrashingtheclimate.org/

http://no-burn.org/

CASES OF GOOD PRACTICE

http://www.apfed.net/ki/database/rstgp.php

http://kitakyushu.iges.or.jp/successful_practices/solid_waste_management.html

SCHOOL GARBAGE BANKS

http://www.amchamthailand.com/asp/view_doc.asp?DocCID=2035

http://www.iges.or.jp/APEIS/RISPO/inventory/db/pdf/0109.pdf

HANDICRAFT FROM PLASTICS

http://www.conserveindia.org/main.php

WASTE PICKERS

http://en.wikipedia.org/wiki/Waste_picker

http://www.wiego.org/occupational_groups/waste_collectors/index.php

http://www.chintan-india.org/

http://www.no-burn.org/section.php?id=95

INDONESIA

http://www.undp.or.id/press/view.asp?FileID=20090610-1&lang=en

http://www.goldmanprize.org/2009/islands

http://www.pusdakota.org/

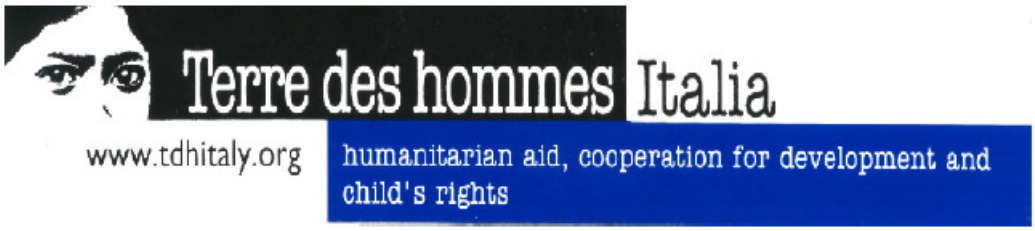
http://www.keranjangtakakura.blogspot.com/

http://www.idepfoundation.org/idep_waste.html

http://www.esp.or.id/wp-content/uploads/pdf/devtools/modul-cbswm-low.pdf


Multi Donor Fund
for Aceh and Nias - Bersama Membangun
ADB


UNDP
Indonesia


Terre des hommes Italia
www.tdhitaly.org
humanitarian aid, cooperation for development and child's rights