



CIWM



2017 CIWM Presidential Report – VOLUME I

Making Waste Work: A Toolkit

Community Waste Management
in Low and Middle Income Countries



Zoë Lenkiewicz and Mike Webster

Illustrations by Susan Hatfield

October 2017

wasteaid.org.uk/toolkit

This toolkit has been produced by WasteAid UK
with funding from the Chartered Institution of Wastes Management



WasteAid UK is a charity working to make an impact on the global waste emergency by:

- Partnering with local organisations to improve the health, environment and livelihoods of people without waste services.
- Building the skills of local people to deliver practical solutions to the waste management crisis in their own communities.
- Raising awareness of the benefits of proper waste management and campaigning for greater change.

www.wasteaid.org.uk



CIWM (Chartered Institution of Wastes Management) is the leading professional body for the resource and waste management sector, representing around 6,000 individuals in the UK, Ireland and overseas. It awards the title of Chartered Waste Manager to qualifying members.

The objectives of the CIWM are to advance the scientific, technical and practical aspects of wastes and resource management worldwide for the safeguarding of the natural environment, to promote education, training, and research in wastes and resource management, and the dissemination of knowledge of the topic; and to strive to achieve and maintain the highest standards of best practice, technical competence and conduct by all its members.

www.ciwm.co.uk

Creative Commons

Under this licence, our work may be shared freely. This provides the freedom to copy, distribute and transmit this work on to others, provided WasteAid UK and CIWM are credited as the authors, text and images are unaltered. This work must not be resold or used for commercial purposes. These conditions can be waived under certain circumstances with the written permission of WasteAid UK. For more information about this licence go to <http://creativecommons.org/licenses/by-nc-nd/3.0/>

Disclaimer

The information in this Toolkit and associated How-to guides is provided in good faith and is intended as an indicative guide to the processes and activities referred to only, based on information provided by currently active operators and practitioners. It should not be taken as a definitive guide to the activities referred to, and should not be used as a substitute for undertaking a full site-specific health and safety risk assessment. WasteAid and CIWM recommend always undertaking a full feasibility and environmental and health and safety risk assessment, based on the specific conditions applying to the community, waste, and site in question. WasteAid and CIWM do not accept any legal responsibility for any errors, omissions or misleading statements, or for any injury or loss resulting from the use of or reliance upon the processes outlined in this Toolkit and associated How-to guides. WasteAid and CIWM are not responsible for, and cannot guarantee the accuracy of, information on sites they do not manage, nor should the inclusion of a hyperlink be taken in itself to mean the endorsement of the site, the site owner or any specific content to which it points.

Contents

VOLUME I

1. Foreword.....	1
2. Making Waste Work: A Summary	2
3. Introduction to community waste management.....	3
3.1 What is community waste management?	3
3.2 Why this toolkit?	4
3.3 Who is this toolkit for?.....	6
3.4 How do I use this toolkit?	7
Part A: Be informed – Community waste management essentials	8
4. Waste: the challenge	9
4.1 What is waste?.....	9
4.2 Where does waste come from?.....	10
4.3 Waste: a global challenge	11
4.4 What happens where there is no waste collection service?	13
4.5 What happens when there is no controlled waste disposal site?	16
4.6 Taking care when handling waste.....	17
5. Community waste management: the opportunity	18
5.1 Waste: what are the options?.....	19
5.2 Reducing waste	20
5.3 Collecting materials to sell on.....	21
5.4 Making the most from recyclable materials in your community.....	22
5.5 Dealing with the waste that is left	23
5.6 Delivering community waste management.....	23
Part B: Be prepared – Planning a community waste project.....	24
6. Introduction to planning community waste management.....	25
6.1 Planning your community waste project: key steps	26
7. The common materials in waste.....	27
7.1 Know the availability, condition and sources of waste.....	29
7.2 A 10-step waste analysis.....	30

8.	Select the right project	31
8.1	Are there existing markets for the materials?	31
8.2	Considering different recycling technologies	32
8.3	Access the raw materials	33
8.4	Is there a potential market for your recycled product?	34
9.	Develop a business plan.....	35
9.1	Price your product	35
9.2	Perfect your product.....	38
9.3	Market your product.....	38
10.	Get help and support	39
10.1	Let's talk about waste	39
10.2	Tailor your message	41
10.3	Present your project to government	43
10.4	Informed and prepared? Let's go!	45

VOLUME II

Part C: Be inspired – How to transform waste into a resource 46

How-to guides:

- 1 How to measure your waste
- 2 How to transform woody waste into fuel briquettes
- 3 How to convert organic waste into biogas
- 4 How to transform fish waste into animal feed
- 5 How to turn organic waste into compost
- 6 How to turn organic waste into compost using worms
- 7 How to prepare plastics to sell to market
- 8 How to transform plastic waste into paving tiles
- 9 How to turn mixed plastic waste and bottles into ecobricks
- 10 How to crochet film plastic into bags and mats
- 11 How to collect waste safely and efficiently
- 12 How to design and operate a basic waste disposal site

Acknowledgements

Professor David C Wilson, Pat Jennings and Tina Benfield at CIWM for editorial support; David Leeke for technical support, online development and fieldwork; The Arkleton Trust and participants at the WasteAid seminar in The Gambia April 2017 for helpful advice, comments and additions; Isatou Ceesay and the Women's Initiative The Gambia for the charcoal briquette and crocheting technologies; Pierre Kamsouloum of Cameroon for the plastic tiles technology; Ed Cooke and Resource Futures for background research and fieldwork; Petra Röhr-Rouendaal for additional illustrations from the book *Where There Is No Artist*; Joyce Lockard for the briquetting without a press technique; USAid for waste collection and disposal advice; Brian McCarthy, Adam Read, Sophie van den Berg, Mansoor Ali, Jane Gilbert, Adam Flores, Danladi Yunana, Alexander Kumi-Larbi, Fiona Ross, David Fulford and other reviewers; and all CIWM members and WasteAid supporters.

1. Foreword

Solid waste management sits alongside electricity and gas, water supply and sewerage, transport, communications and the internet, as one of the essential utility services on which modern society depends. But it seldom gets the recognition or the political priority that it needs and deserves.

I had the privilege to lead work for the United Nations Environment Programme and the International Solid Waste Association on their inaugural *Global Waste Management Outlook* (GWMO), published in 2015. This reported that more than two billion people worldwide do not have a waste collection service and, in total, the waste of more than three billion people isn't disposed of safely. These numbers are likely to increase as populations grow and more people migrate to urban areas.

Where there are no waste management services, people and communities have no option but to burn or dump their waste. These widespread practices increase the spread of disease and the risk of floods, negatively impact local economies and contribute to climate change and marine plastic litter: major global challenges in their own right. The global waste management crisis must be addressed.

Many of the recommendations in the GWMO involve 'top down' solutions, focused around how international organisations and national governments can work with (often the larger) cities to develop integrated and sustainable waste management systems. However, it does also recognise the need for parallel work from the 'bottom up', in particular community-based waste management initiatives which both tackle the local waste crisis and create sustainable livelihoods. Such approaches are often the only hope for many smaller cities, towns and villages, as well as informal settlements around larger cities, where local authorities simply do not have the resources to provide any level of waste management service.

When I had the opportunity, therefore, to select a project to be funded by CIWM to mark my Presidency, I chose a particular GWMO recommendation on the need to prepare practical guidance on low cost 'waste to wealth' technologies, which involve minimal capital investment and make products to sell in a local market. This fits well with CIWM's objects under our Royal Charter "to advance for the public benefit the art and science of wastes management worldwide", and also with our focus on developing the skills of waste professionals.

Making Waste Work is a practical toolkit, developed for CIWM by WasteAid UK. An early draft was 'field tested' at a workshop in The Gambia for community-based organisations from 11 low and middle income countries. Specific chapters and the How-to guides have also benefitted from the input of CIWM members and global development practitioners. It is designed to be used as an online and offline resource to motivate and inspire people to tackle the waste crisis locally, wherever they are.

Now is the time for communities to act; it is often too late to wait for outside support. Where there is no municipal service for waste management, communities must be empowered to do something for their own safety and wellbeing. *Making Waste Work* has been produced to facilitate such action.



Prof David C Wilson
President CIWM
October 2017

2. Making Waste Work: A Summary

A		Be informed: Community waste management essentials	
<p style="text-align: center;">The challenge</p> <p>Some two billion people around the world, mostly in low income countries, do not have their waste collected. With no option other than to dump or burn waste, communities become unhealthy and hazardous places to live.</p> <p>Dumping and burning waste damages people’s health, and is especially harmful for children. If livestock eat waste they can become ill and even die.</p> <p>Waste blocks drains and leads to flooding, while burning waste releases smoke that is harmful to health and contributes to climate change.</p> <p>The amount of waste accumulating on land and in the oceans is now a global crisis, with waste polluting even the remotest parts of our planet.</p>	<p style="text-align: center;">The opportunity</p> <p>Fortunately, managing waste properly does not need to be expensive or complicated.</p> <p>Communities in lower-income countries where there is no waste service can still reduce the amount of waste they generate, and separate materials such as food waste and plastics.</p> <p>When waste materials are kept separate, they can be turned into new, useful products for local markets. With simple tools and the right knowledge, people can become self-employed recycling entrepreneurs, providing a very valuable service for the health and wellbeing of their community, and the whole planet.</p>		

B		Be prepared: Planning a community waste project	
<p style="text-align: center;">Know the materials</p> <p>Understand the common materials in waste, the problems they can cause, and the opportunities they present. Analyse the waste that is locally available and identify which materials to work with. Explore whether it is best to sell to an existing recycling market or convert waste materials into new products.</p>	<p style="text-align: center;">Choosing the right recycling project</p> <p>Selling materials to an existing recycling market can be the quickest and easiest approach. Markets don’t exist everywhere however, so making your own recycled products is the next best step.</p> <p>Make sure you have regular access to the materials and choose the most appropriate technology.</p>		
<p style="text-align: center;">Develop a business plan</p> <p>Test whether there will be a market for your product locally. Calculate the cost of making your product, including collection, transport, processing and marketing costs. Practise making your product until it is of a good quality. Give away some free samples and ask for feedback. Market your product to potential new customers.</p>	<p style="text-align: center;">Get help and support</p> <p>It is much easier to work as a team. Talk to the community with tailored messages about the benefits of waste management. Encourage them to get involved and become advocates. Get support from government by demonstrating the benefits of your approach. Share your work with other communities and be prepared to help them.</p>		

C			Be inspired: How to transform waste into a resource		
<p style="text-align: center;">Integrated waste management</p> <p>1 Measure your waste</p> <p>11 Waste collection</p> <p>12 Waste disposal</p>	<p style="text-align: center;">Organic wastes</p> <p>2 Woody waste into fuel briquettes</p> <p>3 Organic waste into biogas</p> <p>4 Fish waste into animal feed</p> <p>5 Organic waste into compost</p> <p>6 Organic waste into compost using worms</p>	<p style="text-align: center;">Plastics</p> <p>7 Selling plastics to the market</p> <p>8 Plastic film into building materials</p> <p>9 Plastic waste into ecobricks</p> <p>10 Plastic film into crocheted bags</p>			

3. Introduction to community waste management

3.1 What is community waste management?

Regular waste collection is taken for granted in wealthier parts of the world, but in 2017 there are still two billion people living mostly in lower and middle income countries without this basic service.

When there is no municipal waste collection people have no option but to dump or burn their waste close to where they live. These practices are harmful to public health, local economies and the environment.

A common example is plastic packaging waste. When dumped it can block drains leading to flooding and stagnant water, allowing insects to breed, and often end up in the oceans where it is a major source of marine plastic, itself a global crisis. If burned, plastic is harmful to lungs, eyes and skin, and is a major contributor to urban air pollution.

Meanwhile, food and organic waste can attract vermin that spread disease, and when rotting in a dump releases methane, a powerful climate changing gas.

These materials (and more) are usually mixed together, and it is challenging to recover any value from them. When the different materials are kept separate, however, they can be managed safely and even used to generate a small income.

This toolkit shares simple and low-cost techniques for people to address the waste problem in their own communities. Community-scale waste management empowers people to protect their own and their children's health, and tackle a shared, global challenge.



Community waste management – a definition

Waste management and recycling practised by community based organisations. These could be in provincial towns, villages, remote rural areas, small island communities or parts of cities in low and middle income countries where there is no, or inadequate, municipal waste management service.

Community waste management includes waste reduction, collection, sorting, selling materials, recycling, composting, and safe disposal. Importantly, the techniques are low-cost and do not require specialist knowledge or skills.

3.2 Why this toolkit?

A growing global population, urbanisation, and changing consumer lifestyles are leading to a global waste crisis. In 2015 the Global Waste Management Outlook (GWMO)¹ estimated there are around two billion people without access to collection and three billion without controlled waste disposal, mostly in lower income countries.

There are serious health and environmental consequences of not managing waste properly, from illness and disease to climate change. For children, the health risks posed by unmanaged waste and poor sanitation are particularly harmful².

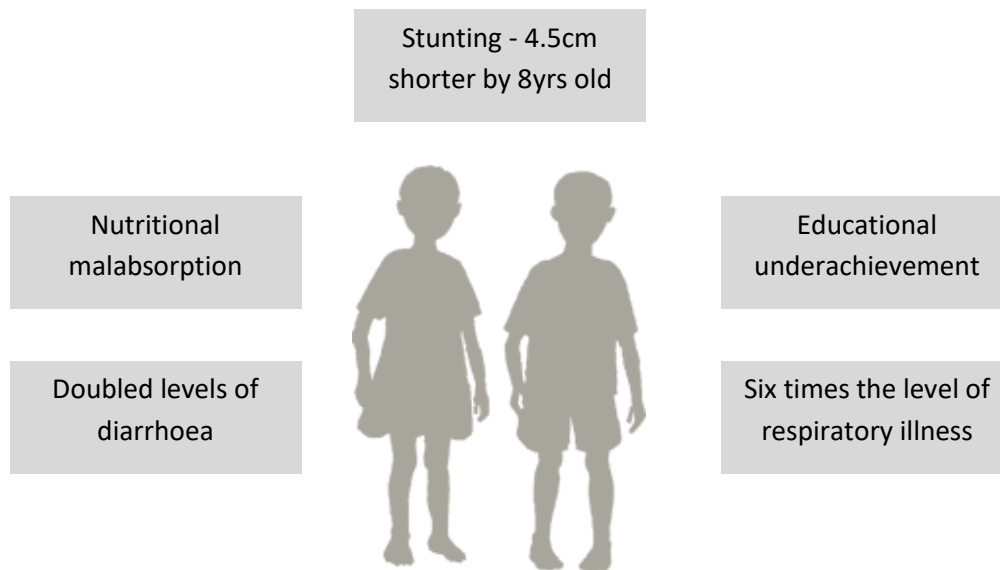


Figure 1: The health impacts on children of unmanaged waste are particularly concerning.

Alongside potable water and sanitation, shelter, food, energy, transport and communications, proper waste management is essential to society and the economy. Waste management is vital for sustainable development, and unsurprisingly has many linkages with the Global Goals (see Figure 2).



Improving waste management ties in with other major global challenges: health and wellbeing, poverty reduction, sustainable livelihoods, resource management and security, climate change, and sustainable production and consumption.

¹ United Nations Environment Programme and International Solid Waste Association (2015) Global Waste Management Outlook (referred to in this Guide as the GWMO).

² UNHABITAT (2010) Solid Waste Management in the World's Cities; UNHABITAT (2012) Recycling and disposal of municipal solid waste in low and middle-income countries; Humphrey, JH (2009) Child undernutrition, tropical enteropathy, toilets, and handwashing, *The Lancet*, 374(9694):1032-1035;

UNICEF and SHARE (2017) The impact of poor sanitation on nutrition; Boadi KO and Kuitunen M (2005) Environmental and health impacts of household solid waste handling and disposal practices in third world cities: the case of the Accra Metropolitan Area, Ghana, *Journal of Environ Health*, 68(4):32-6.

A growing problem

Humans are producing more waste now than ever before, due to increased consumption and economic growth, population growth and continued migration from rural to urban areas. Within 15-20 years, solid waste generation in urban areas in low income countries in Africa and Asia is expected to double¹.

Lower income countries are already struggling to cope, and the open dumping and burning of waste is leading to public health concerns, local air pollution, accelerating climate change, blocked urban drainage systems, aggravated floods and the spread of infectious diseases. The pollution of agricultural soils, freshwater and marine systems, coupled with the harm to livestock from ingesting waste, cause additional long-term and costly problems, both locally and globally.

There has been some effort amongst both the international development and academic communities to understand and document the scale of the growing waste crisis, and large-scale, city-wide solutions. Typically, these systems are funded through a combination of municipal taxes and the sale of large quantities of separated and bulked materials to global recycling markets.

At least three billion people are still in need of waste management services that their municipalities are unable to provide. Tax collection schemes are patchy so money is scarce; collection and transport costs are high; and the quantities of recyclable materials in the waste may be too low to be attractive to regular markets.

These communities have an urgent need for accessible information about alternative models of waste management³. Processing waste materials locally avoids high external costs and can help meet local demand for sustainable fuel, soil enhancer and construction materials. The sale of these products can generate a demand for clean, separated materials, thereby transforming the local waste problem into an opportunity.

Recognising and treating *waste* as *resources* provides a cost-effective way to deliver waste management at a community level.

Waste management: an engine for sustainable development

The Global Goals for Sustainable Development were agreed by the leaders of 193 countries in 2015. The 17 Goals, which have 169 targets among them, aim to bring an end to extreme poverty, inequality and climate change by 2030. There are many linkages between the Global Goals and improved waste management – poverty reduction, improved health and equality, provision of clean energy, cleaner cities and healthier populations, and the protection of air, land and water from pollution. Making progress in addressing waste management issues will contribute directly to 12 out of the 17 Sustainable Development Goals (see Figure 2).

³ The GWMO (2015) recommended “guidance on low-cost reuse and recycling (‘waste to wealth’) technologies – including those which involve minimal or low capital investment and which produce products for a local market.”

<p>Waste management can help deliver all Sustainable Development Goals</p> <p>Key: <i>dark grey = direct link</i> <i>number = target that explicitly requires a basic level of waste management</i> <i>light grey = indirect link</i></p>	1. Access for all to basic waste collection services	2. Stopping uncontrolled dumping and open burning	3. Managing all waste properly, particularly hazardous waste	4. Reducing waste and creating recycling jobs	5. Halving food waste from markets, shops and homes, and reducing food losses in the supply chain	'Governance' factors which underpin sustainable waste management
1 NO POVERTY	1.4					
2 ZERO HUNGER						
3 GOOD HEALTH AND WELL-BEING						
4 QUALITY EDUCATION						
5 GENDER EQUALITY						
6 CLEAN WATER AND SANITATION		6.3				
7 AFFORDABLE AND CLEAN ENERGY						
8 DECENT WORK AND ECONOMIC GROWTH						
9 INDUSTRY, INNOVATION AND INFRASTRUCTURE						
10 REDUCED INEQUALITIES						
11 SUSTAINABLE CITIES AND COMMUNITIES	11.1 11.6	11.6	11.6			
12 RESPONSIBLE CONSUMPTION AND PRODUCTION			12.4	12.5	12.3	
13 CLIMATE ACTION						
14 LIFE BELOW WATER						
15 LIFE ON LAND						
16 PEACE, JUSTICE AND STRONG INSTITUTIONS						
17 PARTNERSHIPS FOR THE GOALS						

Figure 2: Waste and the Sustainable Development Goals. Managing waste properly can help deliver all the Sustainable Development Goals⁴.

3.3 Who is this toolkit for?

This toolkit has been designed for community and civil society leaders, non-governmental organisations, and waste and resource managers who want to understand how to set up small-scale community recycling and waste management schemes in lower and middle income countries. Part A will also be useful for international agencies, national governments, cities and municipalities, the formal waste and resources industry, and anyone wishing to develop their understanding of the global waste crisis and how to tackle it.

⁴ For more information about the Sustainable Development Goals and targets visit sustainabledevelopment.un.org/sdgs

3.4 How do I use this toolkit?

This toolkit is divided into three parts. *Part A: Be informed*, sets out the essentials of community waste management, focusing on both the challenges and the opportunities.

Part B: Be prepared, breaks down the process of understanding the different materials in waste, how they can be recycled into new products, and the key considerations to starting a community-scale project with waste.

Part C: Be inspired, provides inspiration and how-to guides so that people can gain the necessary skills to transform waste into a resource.

By following the advice in this toolkit, communities may be able to recover up to 80% of their waste and turn it into useful products.

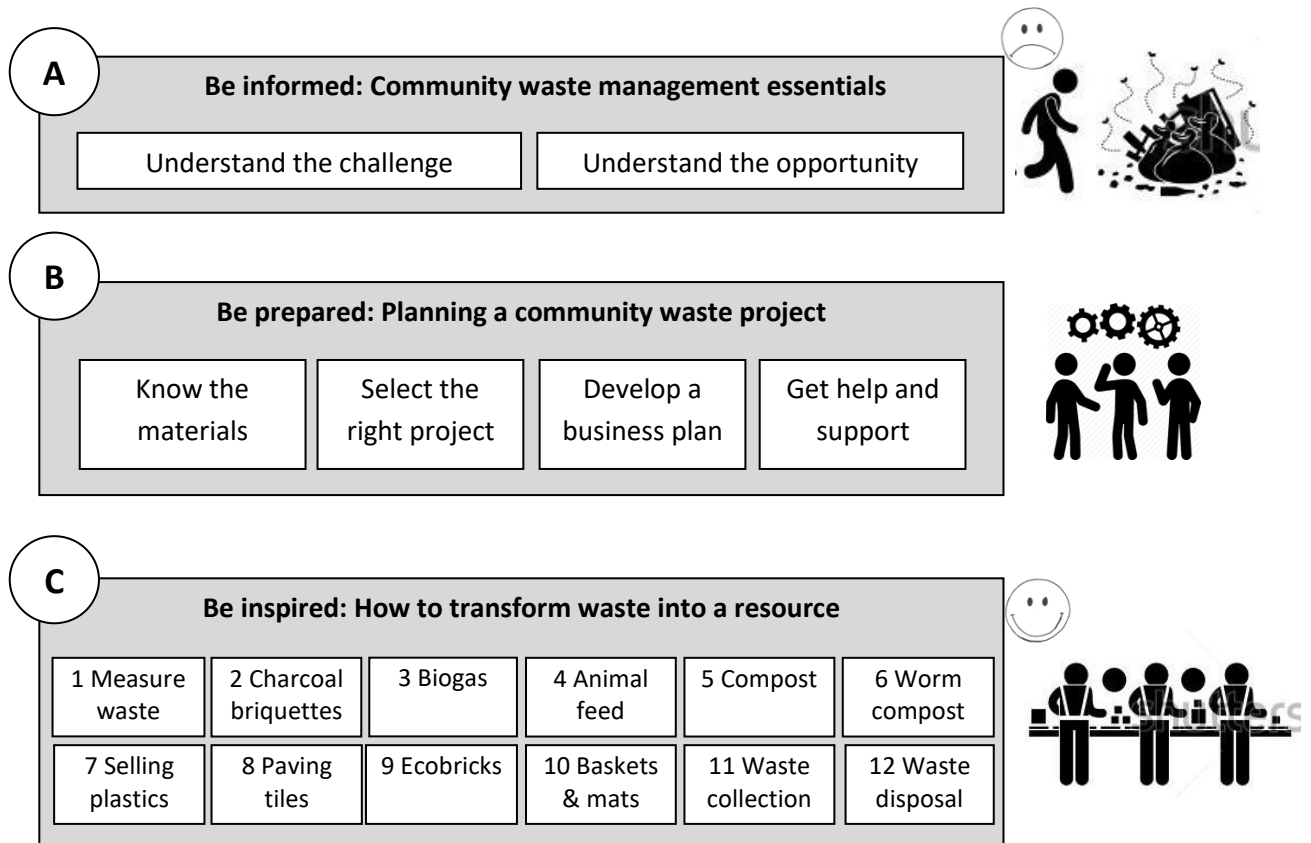


Figure 3: This toolkit provides the information you need to start a community waste management project.

A

**Be informed:
Community waste
management essentials**

4. Waste: the challenge

4.1 What is waste?



Waste can be defined as something that is no longer wanted or needed for its original purpose, and so the owner discards it.

Most languages have a word for “waste”.



Figure 4: Most languages have at least one word for “waste” – these are examples from the WasteAid community waste conference, The Gambia, April 2017.

How many different words for “waste” can you think of?

4.2 Where does waste come from?

In a typical community, waste will come from many different sources and will be made from many different materials. There are some examples in Figure 5 below.



Homes

- Food and garden waste
- Paper, metal and plastic packaging
- Ashes and dust
- Clothes and shoes, sacks and cloths
- Sanitary napkins and medical waste
- Broken electrical appliances and batteries



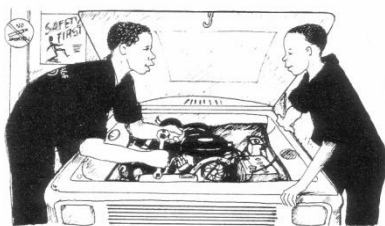
Markets

- Fruit and vegetable trimmings
- Rotten fruits and vegetables
- Rotten meat, bones, skins
- Paper, metal and plastic packaging
- Sacks and cloths



Farms

- Plant waste (shells, leaves)
- Animal wastes (manure, feathers, skins, bones, dead animals)
- Agricultural plastic
- Machinery parts
- Chemical residues and containers
- Tractor tyres



Workshops

- Oils and grease
- Broken parts and scrap metal
- Tyres
- Aerosol cans
- Oily rags



Clinics

- Sharp materials
- Medical waste and drugs
- Human waste
- Napkins and bandages
- Cleaning materials and chemicals

Figure 5: Where does waste come from? There are many sources of waste within a community.

4.3 Waste: a global challenge

We all generate solid waste, and we are all affected by it: individually, in our homes and communities, entire countries and internationally.

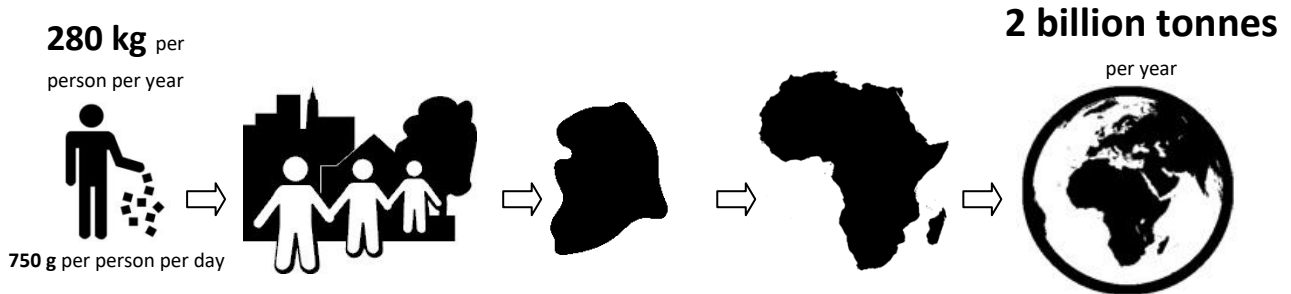
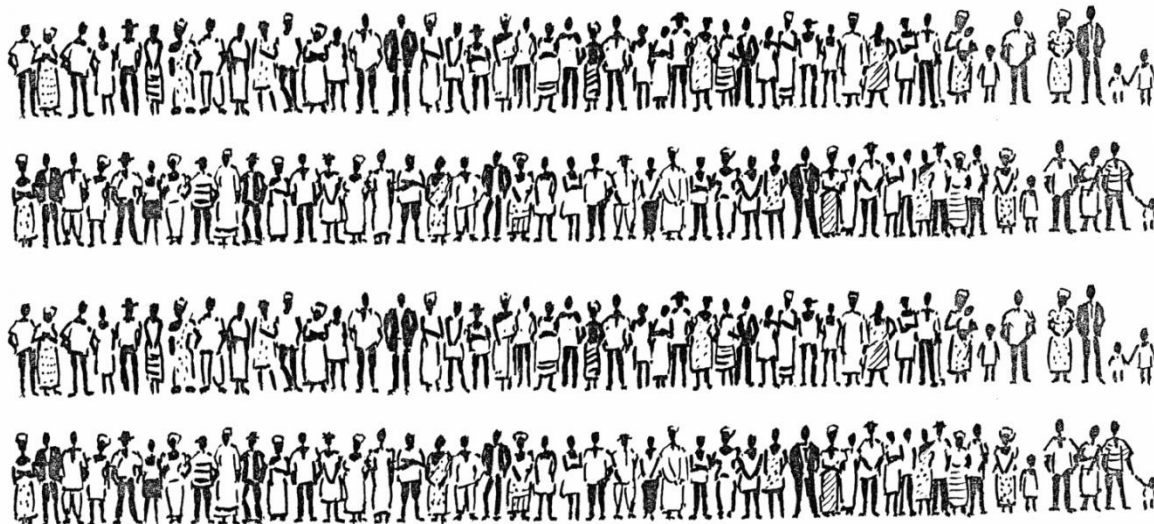


Figure 6: The Global Waste Management Outlook estimates that some 2 billion tonnes of *municipal* solid waste are generated globally every year, which is around 280 kg per person per year (0.75 kg per person per day)⁵. Municipal waste is defined as waste from homes, streets and similar urban wastes from businesses⁶. Waste generation is significantly greater in urban than in rural areas and is closely linked to economic growth.

Decisions that we make about our waste at home can have global consequences. Carbon emissions from our waste are accelerating climate change, and it is predicted that by 2050 there will be more plastic than fish (by weight) in the oceans⁷. Dead seabirds and mammals washing ashore with stomachs full of plastic are a sign of what can happen when we fail to manage our waste properly.

We each generate much more waste now than 50 years ago. Population growth and urbanisation mean that billions of people are at risk from the problems caused by unmanaged waste. By 2030 there will be 41 cities with populations over 10 million, and 32 of them will be in lower income countries that often lack comprehensive waste management systems.



⁵ The amount of waste produced is related to income level: wealthier people (generally) produce more waste.

⁶ The total amount of waste generated each year also includes commercial, industrial, construction and demolition waste, and is estimated at around 7 to 10 billion tonnes per year.

⁷ Ellen MacArthur Foundation (2016) The New Plastics Economy: Rethinking the future of plastics.

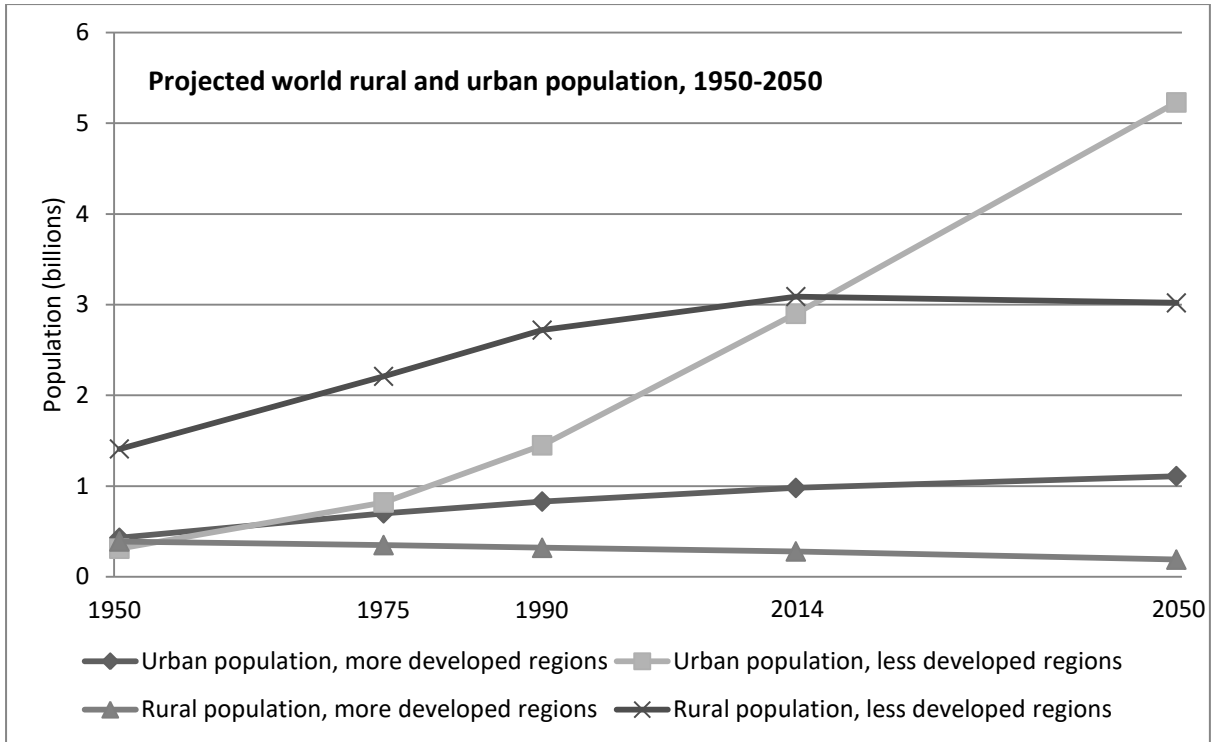


Figure 7: Projected world rural and urban population, 1950-2050. Source: United Nations Department of Economic and Social Affairs, World Urbanization Prospects: The 2007 and 2014 Revisions.

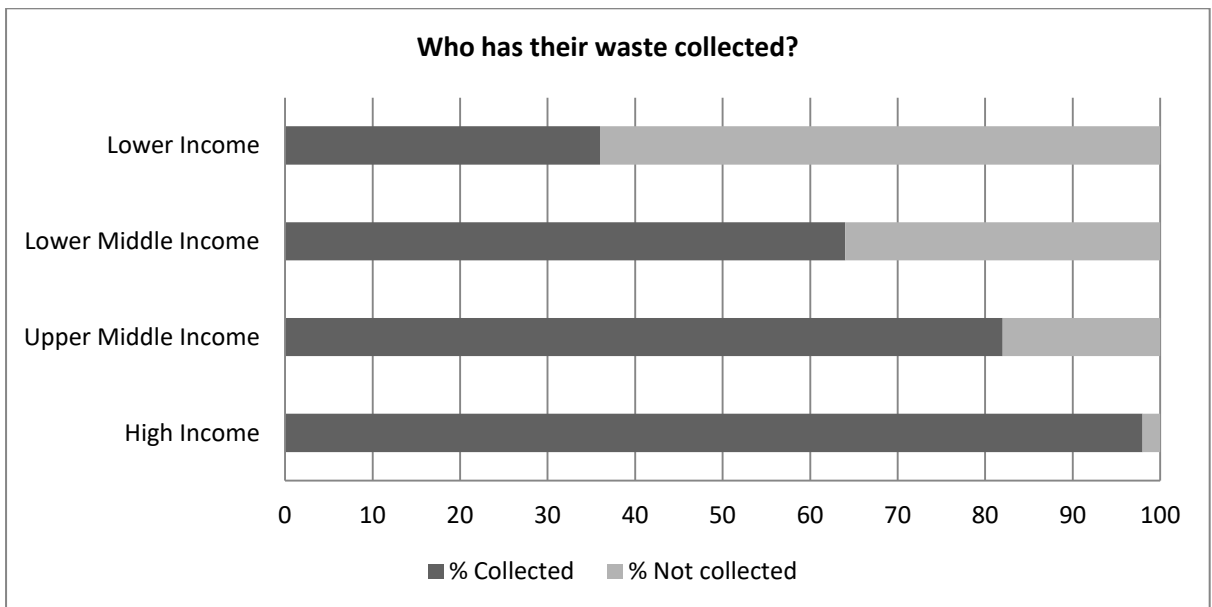


Figure 8: Percentage of the population with waste collection. On a regional basis, collection coverage has the following ranges: Africa (25% to 70%); Asia (50% to 90%); Latin America and Caribbean (80% to 100%), Europe (80% to 100%) and North America (100%). Source: GWMO 2015.

4.4 What happens where there is no waste collection service?

Uncollected waste creates unsanitary conditions and causes serious risks to public health, particularly for children. Scavenging and contact with waste can lead to increased cases of dysentery, diarrhoea and cholera.

Sharp items such as broken glass or needles are harmful underfoot, and open wounds are easily infected.

Flies, dogs, rats and snakes are attracted to waste heaps, particularly in hot climates. Livestock that eat waste often become ill, either from disease or from stomachs full of plastic.



Each year approximately 9 million people die of diseases linked to mismanagement of waste and pollutants, 20 times more than die from malaria⁸.



Figure 9: Uncontrolled burning of waste is very hazardous.

Heaps of waste can combust suddenly and even small fires can spread quickly out of control, devastating densely populated areas. Smoke from burning waste is a health hazard: it enters the lungs through the nose and mouth. Tiny particles in the smoke can poison the blood and cause breathing problems, lung disease, and cancer. If the burning waste contains plastics this is even more dangerous.

Uncontrolled burning of household waste causes an extra 270,000 premature deaths every year around the world⁹.



Figure 10: Dumped waste blocks drains and pollutes watercourses.

Waste is unsightly. It smells unpleasant and lowers the morale of communities. Accumulated waste and blocked drains encourage mosquitoes to breed, resulting in the spread of malaria, dengue fever and yellow fever. Blocked drains also cause severe flooding, leading to the loss of lives and property.

⁸ UNEP (2015) Pollution is the largest cause of death in the world, SDG fact sheet; World Health Organisation (2017) Global Health Observatory data on malaria mortality.

⁹ Kodros JK et al (2016) Global burden of mortalities due to chronic exposure to ambient PM2.5 from open combustion of domestic waste, *Environ. Res. Lett.* 11 124022.

When waste is washed by the rain it can contaminate water supplies, harming people, livestock and crops. Plastic waste eventually finds its way into streams, rivers and the sea, causing serious ecological and public health problems.

Studies have found up to a third of cattle and half of goats have consume significant amounts of plastic, and that those that consume more plastic tend to be more emaciated, more prone to disease¹⁰.

Where there is no adequate waste collection service, people have no option but to manage waste themselves – often burning it at home or dumping it in the local area. Figure 11 below shows the local environmental, health and economic costs of openly dumping and burning waste.

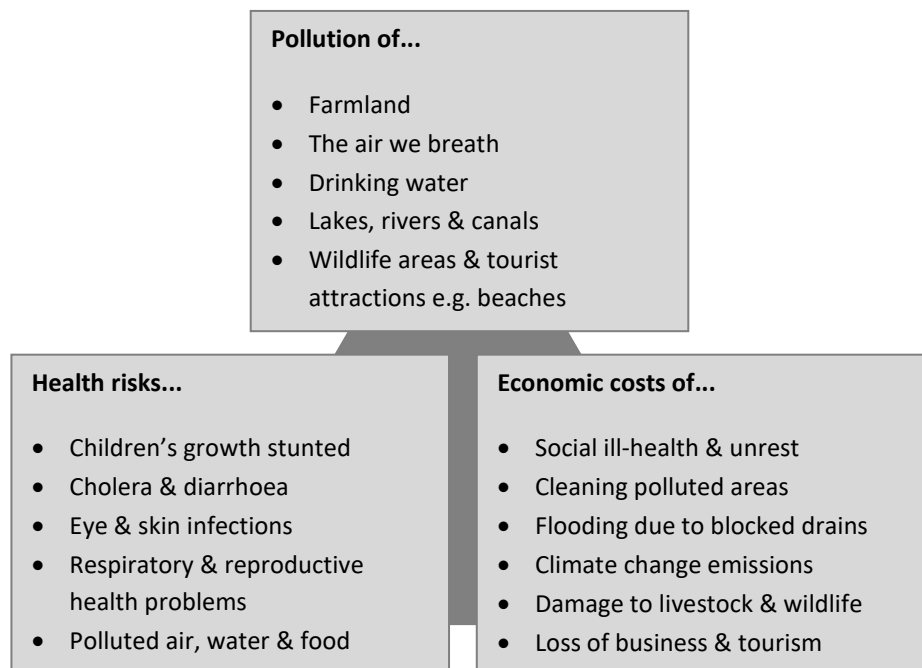


Figure 11: The environmental, health and economic costs of unmanaged waste¹¹. Costs to society exceed the financial costs per capita of proper waste management by a factor of 5-10. It is much cheaper for society to manage its waste now in an environmentally sound manner than to carry on dumping.



Collecting waste keeps neighbourhoods clean and reduces health risks, particularly for children.

For advice on designing and operating a simple community waste collection service, see How to collect waste safely and efficiently (How-to guide 11).

¹⁰ Various sources, including Tiruneh R, Yesuwork H (2010) Occurrence of rumen foreign bodies in sheep and goats slaughtered at the Addis Ababa Municipality Abattoir, *Ethiopian Veterinary Journal* Vol 14, No 1; and Mushongal *et al* (2015) Investigations of foreign bodies in the fore-stomach of cattle at Ngoma Slaughterhouse, Rwanda *J. S. Afr. Vet. Assoc.* Vol 86, No 11 Pretoria.

¹¹ Adapted from Table 5.2 in the GWMO.

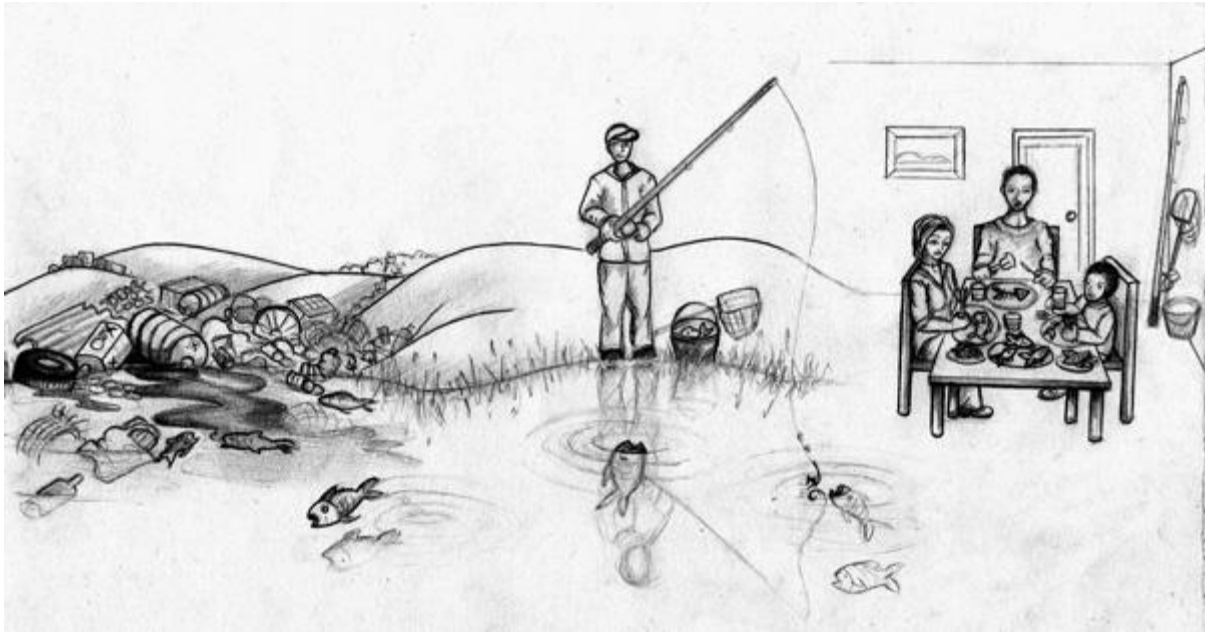


Figure 12: Dumped waste can easily pollute the food we eat.



Figure 13: When livestock eat waste they can be harmed or even killed.

4.5 What happens when there is no controlled waste disposal site?

Even where waste is collected there is often no proper disposal site. It is estimated that 40% of the world's waste is disposed of at informal dumpsites. There is often no monitoring at these sites, and nobody to control the placement of waste, operation of the site or environmental protection¹².



People living on or near informal dumpsites are exposed to many potential hazards. Fires are often ongoing, polluting the air with unpleasant black smoke and odour. The smoke can cause breathing difficulties and harm the skin and eyes of those nearby. It can be very challenging to extinguish a fire on an open dumpsite, with limited access to water and the fire reaching far below the surface.

For the many people living at dumpsites who scavenge through the waste, there are constant threats of injury, vermin, disease, and most worryingly, being buried alive in falling mountains of waste. In March 2017, 65 people died when a dumpsite at Addis Ababa in Ethiopia collapsed; a month later, an informal dump of Colombo City in Sri Lanka collapsed, killing 26 and leaving hundreds of families homeless.



Uncontrolled dumpsites, and in particular the mixing of hazardous and other wastes, can cause disease in neighbouring settlements as well as among waste workers. Mixed waste on dumpsites has little value, and sorting mixed waste can be a dirty and dangerous task.

Dumpsites are a greater health risk for the millions that live near to them than malaria¹³.

When rainwater washes through the dumpsite it can pollute both surface and groundwater. Many dumpsites are on the coast (38 of the 50 largest dumpsites in the world are in coastal areas), and spill waste directly into the sea.

Uncollected and openly dumped waste in low income countries is the largest source of marine plastics. This accounts for more than half of the estimated 8 million tonnes of plastics entering the oceans every year and the impact of this pollution on marine life is of major global concern¹⁴.

Dumpsites also have a large financial cost with the loss of tourism from polluted beaches and reducing fish stocks. Closed dumpsites remain contaminated and hazardous places for a long time, and continue to pollute the local air, land and water. Globally, the release of methane and black carbon (in smoke) from uncontrolled dumpsites is accelerating climate change.

¹² ISWA (2016) A Roadmap for Closing Waste Dumpsites, The World's Most Polluted Places

¹³ K. Chatham-Stephens *et al* (2013) Burden of disease from toxic waste sites in India, Indonesia and the Philippines in 2010, *Environmental Health Perspectives*.

¹⁴ Jambeck, J.R. *et al* (2015) Plastic waste inputs from land into the ocean, *Science*, 347.



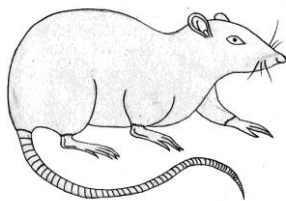
A controlled waste disposal site keeps neighbourhoods clean and reduces health risks, particularly for children.

For advice on designing and operating a simple community waste disposal site, see How to dispose of waste safely (How-to guide 12).

4.6 Taking care when handling waste

Dumped waste attracts vermin, flies and mosquitoes, inflicts wounds and spreads disease. Always take care when you are handling waste, whether it is your own or someone else's!

Common hazards from waste



Dumped waste attracts birds, rats, dogs and other animals, which spread disease. It also attracts flies and gives them a place to breed.

Flies land on waste and faeces and also touch food and open cuts and wounds, spreading diseases like diarrhoea, cholera and dysentery.

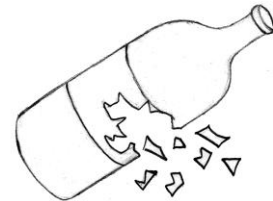
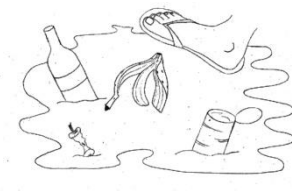


Mosquitoes breed in pools of water, in blocked drains, old tyres and pots, and spread diseases like malaria, cholera, dengue fever and yellow fever.

Broken glass and sharp metal can also cut feet and cause open wounds.

Medical waste and needles that have been in contact with sick people can transmit diseases.

Do not set waste on fire. Smoke from burning waste can harm your eyes, skin, nose, throat and lungs. Cover your nose and mouth and avoid the smoke.



Some wastes are hazardous. They should be disposed of carefully at a designated site, preferably lined with clay and away from waterways, and never burned.

Commonly occurring hazardous wastes include:

- Personal hygiene and clinical waste
- Some waste electronic and electrical equipment, especially batteries
- Used aerosol cans
- Waste oils, paints and solvents.



Figure 14: Health hazards from poorly managed waste.

5. Community waste management: the opportunity

Where there is no waste management service, communities have two options:

1. Wait for outside intervention from national or local government, perhaps with support from international aid agencies. In the meantime, continue in the same way, with waste accumulating and causing health, economic and environmental problems; or
2. Work together to find a better way to manage their waste, and turn a problem into an opportunity.



As well as making the community more clean and safe, community waste management brings local economic benefits:



- Local youth, women and marginalised groups can organise waste collection and reprocessing activities, creating jobs and generating income.
- New products made locally from waste, such as low-smoke cooking fuel, organic compost, and construction materials can be used instead of expensive alternatives.
- A stronger, healthier community is better able to continue with their daily work.

Community waste management can be financially sustainable if activities are local and low-cost.



Processing waste locally keeps the value of the materials in the local economy.

Essential rules: With the right knowledge, everybody can reduce the amount of waste they produce and can sort waste materials for proper management. Some materials, such as metals, may already have strong markets, and it might be possible to bulk and sell the materials on. For everything else, it is important to separate the materials that can be processed into something useful or valuable, and then dispose safely of what is left.

This chapter discusses these essential principles that underpin community-scale waste management.

5.1 Waste: what are the options?

It is always better to not create waste in the first place. Most of us can reduce the amount of waste we produce, even just a little.

Some waste is unavoidable, and within this waste there are some materials that have value. To access this value, the materials need to be separate and clean. They can then be sold, or processed locally into new products or cooking fuel.

What is left needs to be buried safely, preferably in a planned and managed landfill.

The order of preference below will guide you through the options, starting at the top.



Reduce, re-use and re-purpose items

- Say no to plastic bags and other packaging you don't need
- Buy re-usable and washable items instead of single-use disposable items
- Repair things and use them more than once
- Find another use for things

Recycle and recover the materials

- Sell the materials to a middleman or factory to be recycled
- Transform materials into products that are more valuable than their original use, such as crocheting plastic film wrap into a handbag
- Reprocess materials, for example by turning plastic waste into paving tiles
- Compost food waste and plant materials to produce an organic soil conditioner

Recover energy

- Process food waste and manure to produce biogas
- Transform woody waste, plant shells and dry leaves into low-smoke charcoal
- **Never burn plastic waste**

Dispose

- Bury the waste in a properly planned and managed sanitary landfill
- If a landfill is not yet achievable: Control, cover and contain the waste at a suitable site, away from homes, wells and watercourses and at least 1 metre above groundwater levels

Figure 15: The typical order of preference for dealing with waste. See the How-to guides in this toolkit for information on recycling, recovering energy, and disposal.

5.2 Reducing waste

The businesses that make and package products have a responsibility to reduce waste. They can do this through designing products and packaging using less material, and making sure that once the item becomes waste the materials can be separated easily for recycling.

Individually, everybody can still limit the amount of waste they produce. Waste reduction starts at the market or shop. By changing your purchasing habits, you can significantly reduce the amount of waste created in and around the home.

Take your own bag to the market, and say no to plastic bags and other packaging you don't need.

Buy only what you need. Items that rarely get used can be borrowed or shared with others.

Buy re-usable and washable items instead of single-use disposable items.

Buy products that can be re-used, such as bottles instead of cans. Items like this produce very little waste because they don't have to be discarded after they have been used just once.



Buy products with little, or reusable packaging. For products you buy regularly, if possible buy them in bulk instead of smaller amounts.

Find another use for things, such as paper and plastic bags, jars and pots and paper and card.

Try making your own face creams, soaps and hair products using natural local ingredients.

Repair broken items, such as clothes, furniture and electrical items.

What other ways can you think of to reduce waste?



***Reducing your waste can be easy and fun,
and will save you money!***

5.3 Collecting materials to sell on



Figure 16: Anybody can collect materials, provided they have permission.

In many parts of the world there are markets for metals, paper and card, some plastics and some textiles. The market value of these materials varies depending on quality and supply and demand.

Recycling markets rely on *value chains*, in which people understand the value of the material and know how to recover some of that value for themselves.

For example, an office produces small amounts of clean, dry waste paper, which it gives or sells to a paper collector. The collector visits several offices, and when he or she has enough material, sells it all to a broker or middleman. They will collect up even more, and sell a large amount of waste paper to the paper mill, where it will be recycled into new paper.

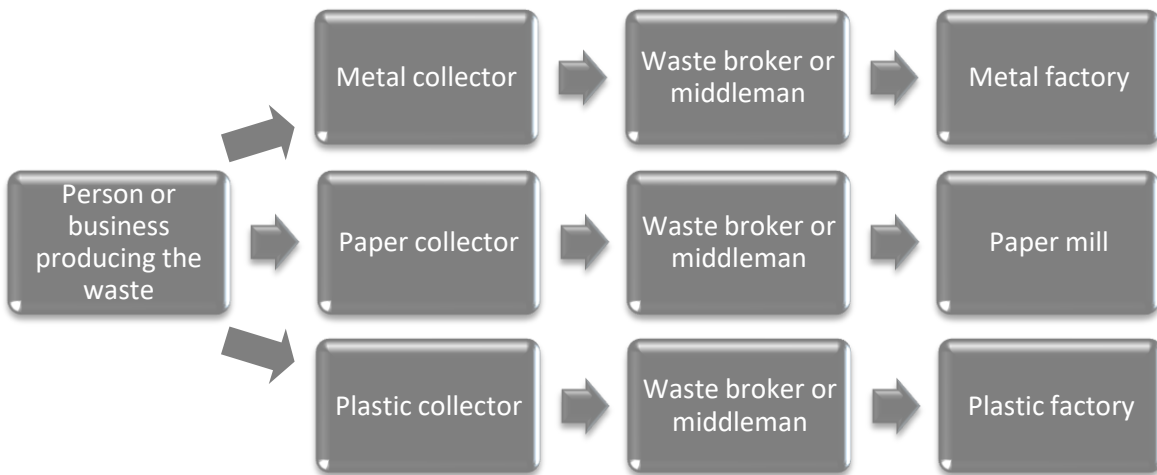


Figure 17: Examples of value chains for metal, paper and plastic.

The factory will only pay for clean, separated materials.

This is because the wrong materials could damage expensive recycling equipment, and reduce the quality of the final recycled product. Any contamination from other materials will reduce the price paid for the target material. For this reason, everyone in the value chain will want to make sure their material is as clean as possible.



It is always better to work with clean, separated materials than with mixed waste.

Ask the waste producer to keep the materials that you want clean and separate. Once waste materials are mixed they can become unpleasant to work with. If the target material is mixed with something that damages it, the value can be reduced or lost completely. Working with waste usually relies on small margins for large amounts of material. Make sure you protect that margin!

5.4 Making the most from recyclable materials in your community

Some materials don't have strong value chains (see 5.3), for example because the virgin material itself is cheap to produce, or because materials are so mixed that they cannot be separated for recycling.

Plastic bags and film are examples of waste materials that are *low value* because they are cheap to produce. When plastic film and food waste are mixed together (which they often are), they have *zero value*. Since nobody wants to collect these materials for recycling, they usually end up being dumped or burned.

This is where the community can step in. If the plastic bags and film are kept separate, they can be recycled into new products. Meanwhile the food waste – now free of plastic contamination – can be transformed into useful compost.

When customers buy these new products, a new value chain is created. With time, people stop seeing the material as a “waste” and instead recognise it as a valuable resource.

Figure 18 provides an example of how working with one particular type of waste, in this case plastic packaging, can generate employment, create new products, and provide a service for the community.

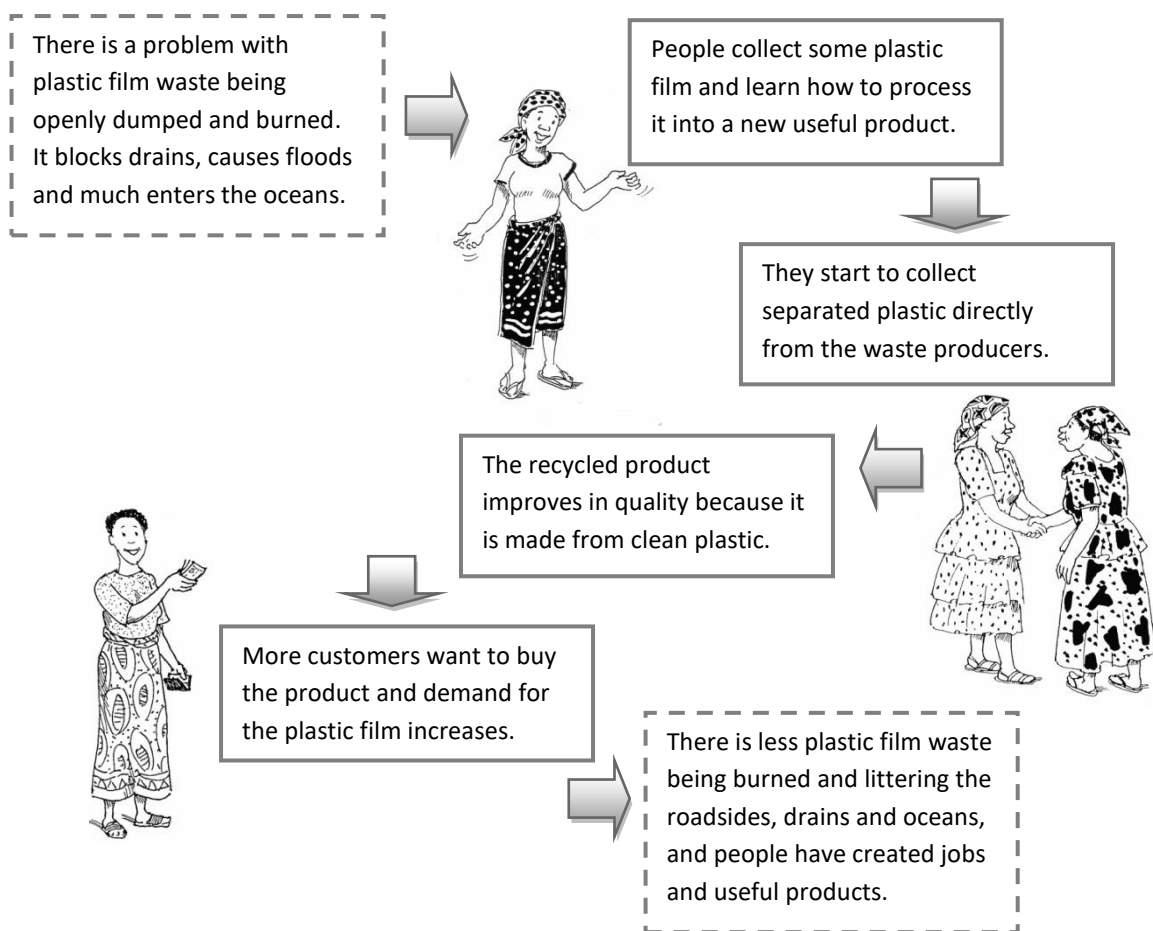


Figure 18: Benefits of working with waste. Working with waste can generate employment, create new products, and provide a service for the community.



Keep your costs as low as possible.

- Waste materials can have a value if they are clean and separated.
- If transporting and reprocessing your materials is too expensive, you will not make any money from your recycling enterprise.
- Most techniques for recovering the value from waste will require a small initial investment for tools and equipment. It is better if the tools and equipment can be made locally as the price will be lower and they will be easier to repair. It is cheaper to share tools with friends and neighbours.
- It may not make sense to set up a waste project that relies on large amounts of electricity or energy, as the cost may be higher than the value of the waste materials, and the electricity supply may be unreliable.

5.5 Dealing with the waste that is left

After you have reduced the amount of waste being created (see 5.2), explored external recycling markets (see 5.3) and recovered value from the unavoidable waste materials (see 5.4) there will nearly always be some waste left. This remaining waste might include sanitary napkins, oily rags, some textiles and various other items. These need to be collected regularly and buried safely, preferably in a planned and managed landfill. How-to guides 11 and 12 discuss the important things to consider in planning simple and low-cost waste collection and disposal.

It is very important that waste is disposed of with care. Unmanaged dumpsites become hazardous places very quickly, with uncontrolled fires, vermin, disease, and a high risk of injury (see 4.5). Always take extra when working with mixed waste: it can be dirty and dangerous (see 4.6).

5.6 Delivering community waste management

If you are reading this toolkit in sequence, you are aware that solid waste management is vital for sustainable development (see chapter 3). You understand the challenges presented by unmanaged waste (see chapter 4), and the positive opportunities presented by a community-scale approach to waste management (see chapter 5).

You are now ready to start planning the transformation from waste resource. To do this, you will need to:

- Understand the differences in common waste materials
- Select the right project for your materials, budget and skill level
- Develop and follow a simple business plan
- Get help and support from others in the community, and local government.

These steps are discussed in Part B.

B

**Be prepared:
Planning a community
waste project**

6. Introduction to planning community waste management

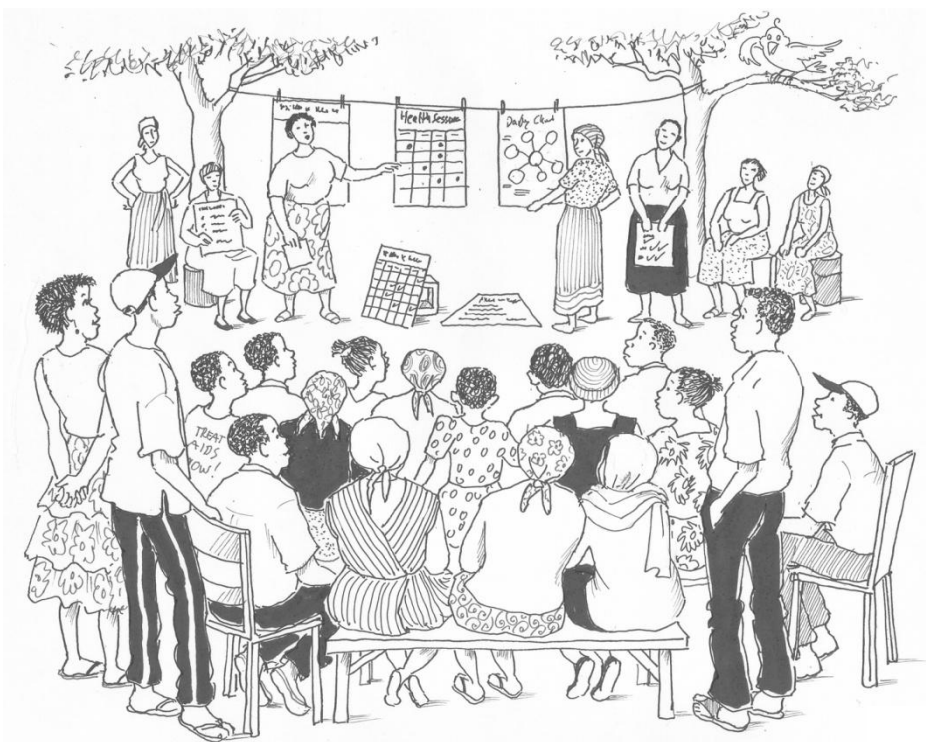
Part A of this toolkit discussed the problems caused by unmanaged waste, the importance of managing waste properly, and the opportunities available from transforming waste materials into something new. The community-level approach to waste management is valuable where there is no waste management service provided by the government or municipality.

Part B of this toolkit covers in more detail the steps you will need to take to make a waste project successful. To start with, you will need to understand which materials are being wasted, and how much of each different material you can access (chapter 7).

The next step is to explore the options for processing these waste materials into something of value, and to assess the existing and potential markets for those products (chapter 8). Once you have decided on the project you wish to proceed with, you can develop a more detailed business plan to make sure you will be able to run the project effectively and make a profit (chapter 9).

Finally, you will need to speak with other people in your community about your project, so that they can give you help and support (chapter 10).

Be prepared: Planning a community waste project			
Know the materials	Select the right project	Develop a business plan	Get help and support
CHAPTER 7	CHAPTER 8	CHAPTER 9	CHAPTER 10



6.1 Planning your community waste project: key steps

Managing waste in your community can be a very positive and valuable activity. It is important to plan and communicate your ideas to others, as this will give you a greater chance of success.

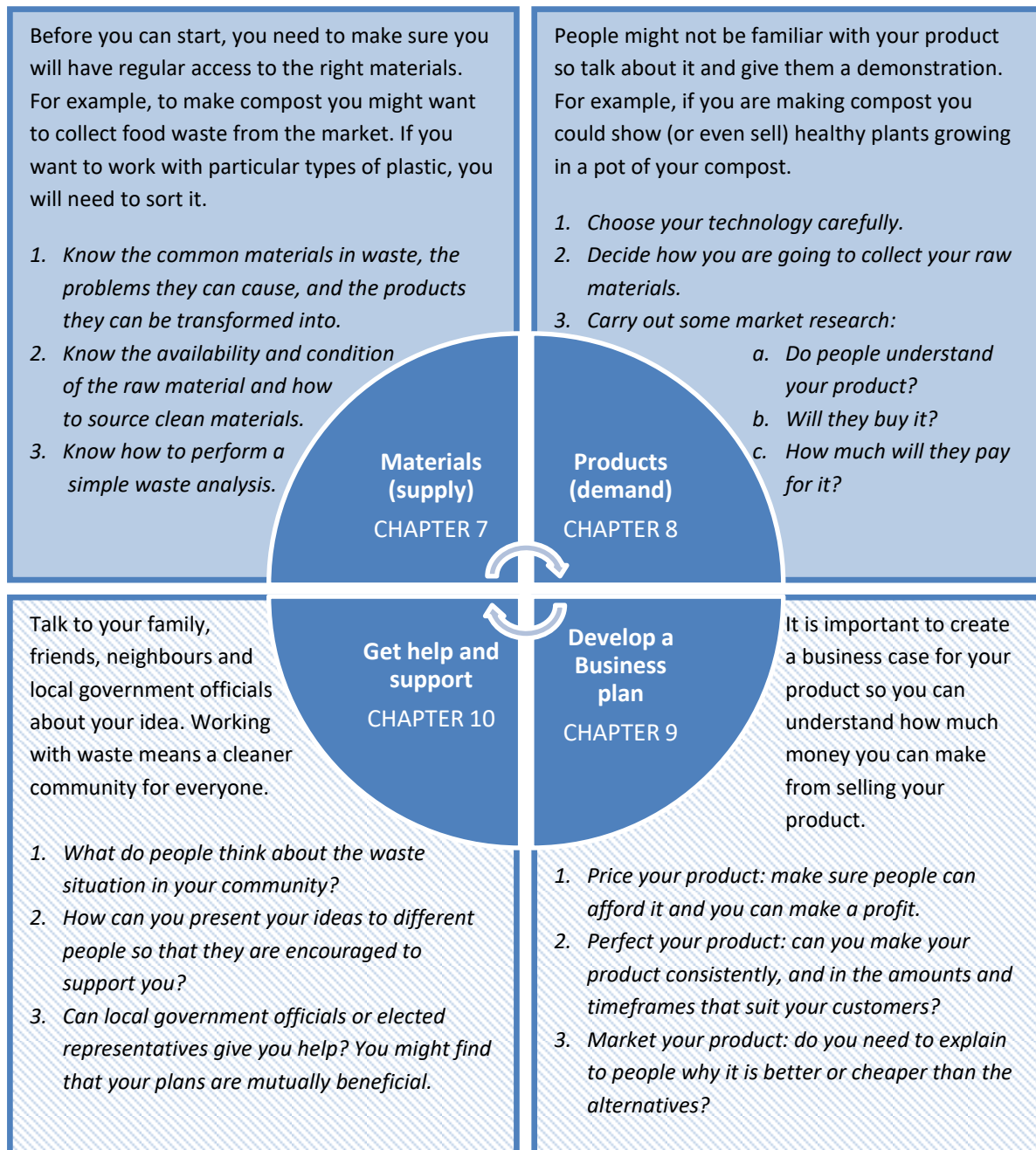


Figure 19: Key steps to planning a community waste management project.

7. The common materials in waste




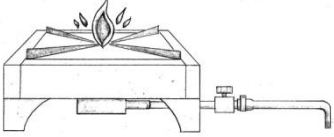

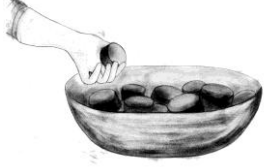

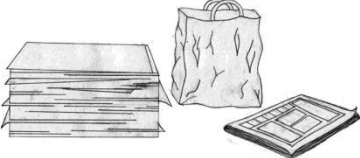



<p>Food waste</p> 	<p>Common problems</p> <ul style="list-style-type: none"> Attracts vermin that spread disease Pollutes waterways Releases methane gas which accelerates climate change, leading to floods and droughts
<p>Opportunities</p> <div style="display: flex; justify-content: space-around; align-items: flex-end;"> <div style="text-align: center;">  <p>Animal feed (How-to 4)</p> </div> <div style="text-align: center;">  <p>Compost (How-to 5 and 6)</p> </div> <div style="text-align: center;">  <p>Biogas (cooking fuel) (How-to 3)</p> </div> </div>	
<p>Woody waste</p> 	<p>Common problems</p> <ul style="list-style-type: none"> Blocks drains, leading to flooding and collecting stagnant water where mosquitoes breed Sets on fire easily Releases methane gas (climate change)
<p>Opportunities</p> <div style="display: flex; justify-content: space-around; align-items: flex-end;"> <div style="text-align: center;">  <p>Charcoal briquettes (How-to 2)</p> </div> <div style="text-align: center;">  <p>Compost (How-to 5)</p> </div> </div>	
<p>Paper and card</p> 	<p>Common problems</p> <ul style="list-style-type: none"> Blocks drains (flooding and mosquitoes) Sets on fire easily Breaks down very slowly Releases methane gas (climate change)
<p>Opportunities</p> <div style="display: flex; justify-content: space-around; align-items: flex-end;"> <div style="text-align: center;">  <p>Collect and sell (How-to 7)</p> </div> <div style="text-align: center;">  <p>Charcoal briquettes (How-to 2)</p> </div> <div style="text-align: center;">  <p>Compost (How-to 5)</p> </div> </div>	

Figure 20: Different waste materials can be processed in a variety of ways to make useful products (food waste, woody waste, paper and card). See illustrated How-to guides in Part C of this toolkit.



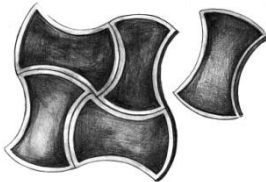


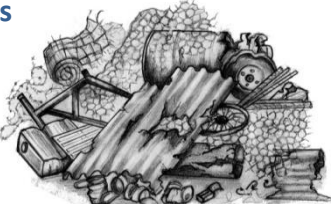






<p>Plastics</p> 	<p>Common problems</p> <p>Hazardous if burned; Blocks drains (flooding and mosquitoes)</p> <p>Enters the food chain (on land, in rivers and in the oceans) where even small amounts harm wildlife, crops, livestock and human health</p>
<p>Opportunities</p>  <p>Collect and sell (How-to 7)</p>	 <p>Paving tiles (How-to 8)</p>  <p>Ecobricks (How-to 9)</p>  <p>Woven bags (How-to 10)</p>
<p>Metals</p> 	<p>Common problems</p> <p>Can cause injury</p> <p>Enters the food chain (on land, in rivers and in the oceans) where even small amounts harm wildlife, crops, livestock and human health</p>
<p>Opportunities</p>  <p>Collect and sell (How-to 7)</p>	 <p>Melt to make something new (see local metal worker)</p>
<p>Glass</p> 	<p>Common problems</p> <p>Broken glass can cause injury</p> <p>Blocks drains (flooding and mosquitoes)</p>
<p>Opportunities</p>  <p>Collect and sell (How-to 7)</p>	 <p>Ecobricks (How-to 9)</p>  <p>Grind into sand (see local construction worker)</p>

Figure 21: Different waste materials can be processed in a variety of ways to make useful products (plastics, metals, glass). See illustrated How-to guides in Part C of this toolkit.

7.1 Know the availability, condition and sources of waste

Before you decide to work with waste, you will need to be able to answer these questions:

- Which waste materials are available?
- How much is available?
- When is it available?
- What condition is it in?
- Where is it being produced?

A sensible place to start is with a waste analysis (see 7.2 and How-to guide 1).



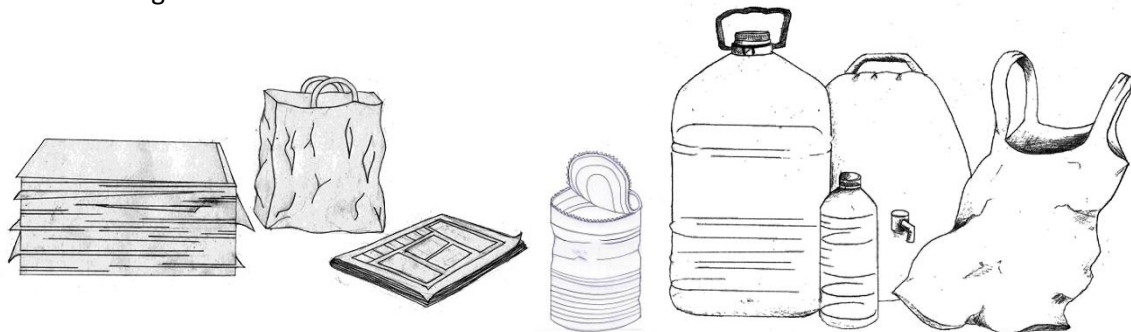
Once you understand the general make-up of your waste, you can decide on priority materials to work with. For example, if half of the waste is vegetable trimmings and woody waste, then it will make sense to target this material as a priority.

What factors affect waste generation?

Different types of waste come from different sources (see 4.2).

Some wastes are seasonal. A village will probably have more green leafy waste in the rainy season, with more woody waste produced in the dry season. Tourism and large sporting and religious events also affect the amounts and types of waste available. Some wastes appear in one place but not another. For example, a coastal fishing community will generate significant quantities of fish waste, and a market town will have more packaging waste.

Where you choose to analyse the waste will affect what materials you find. If you want to know the amount of waste materials *generated* in a family compound or a workplace, you need to measure and record the waste *as it is produced*, but before it is *managed*. For example, weigh the food waste before it is fed to animals and the paper before it is burned, and weigh or count plastic bottles before they are re-used. You could do this for a week, six times in a year, and see how your waste generation changes with the seasons.



Alternatively, you might choose to study the waste *as it is disposed*, at the dumpsite. This waste is currently *not being managed* (other than being collected and transported) and you will need to take special precautions (see 4.6).

7.2 A 10-step waste analysis

The standard process for a simple waste analysis at a dumpsite is described here in 10 simple steps. The process is described in detail in How-to guide 1, *How to measure your waste*. You can adapt it for different situations, but be consistent so you can measure differences over time and between locations.

1. Choose a suitable area to work in.
2. Spread large sheets on the ground and set up tables for sorting the waste.
3. Label a series of containers according to the different materials in the waste (you can use samples or pictures instead of words if it makes it easier to understand).
4. Weigh the empty containers and record their weight.



5. Take a sample of waste, weigh out 100kg (you may want to use 50kg or another amount if 100kg is too much, just make sure each of your samples weigh the same) and place it on the sheet.
6. Sort the materials into the different containers. (Where possible, separate any materials that are attached, such as the paper label from a metal tin.)
7. Sort all the waste until the largest piece left is 1cm, and put all the small pieces into a container labelled "Other".
8. Weigh and record the weight of each storage container with its contents (this is the gross weight).
9. Subtract the weight of the empty containers (step 4) from the gross weights to find out how much of each material you have (the net weight).
10. Summarise the results in a table and calculate the percentage of each main material group in the waste. To check your calculations are accurate, all the percentages should add up to 100.

Repeat the process several times to make sure your sample is representative.

<i>Main material groups</i>	<i>Kg</i>	<i>%</i>
<i>Organic material</i>	<i>911</i>	<i>37</i>
<i>Other</i>	<i>482</i>	<i>19</i>
<i>Plastics</i>	<i>381</i>	<i>15</i>
<i>Textiles</i>	<i>195</i>	<i>8</i>
<i>Paper and paperboard</i>	<i>145</i>	<i>6</i>
<i>Construction and Demolition</i>	<i>139</i>	<i>6</i>
<i>Hazardous Waste</i>	<i>131</i>	<i>5</i>
<i>Metals</i>	<i>83</i>	<i>3</i>
<i>Glass</i>	<i>34</i>	<i>1</i>
<i>Total</i>	<i>2500</i>	<i>100</i>

Figure 22: Example results from a waste analysis of 2.5 tonnes of waste. More than a third of the waste (by weight) is organic material, and there is very little metal or glass.

8. Select the right project

8.1 Are there existing markets for the materials?

You may find that some materials already have established buyers, so you might be able to collect these materials and sell them directly. Materials with existing markets often include: metals, certain types of plastic (PET bottles, HDPE gallon containers), paper and cardboard, food waste for pig feed.

Visit the scrap yards and industrial parts of your local towns to understand if anyone buys these materials. The amount that people will pay you for your waste materials depends on:

- How much you have
- How clean the material is – can you guarantee it doesn't have other materials mixed with it?
- Whether you can bring it to the recycling yard or they have to collect it from you
- How you package the material – if you have baled it, or given it to the recycler in the way they want it, they will pay you more.

You might find that the best thing to do is sell some materials and process other materials yourself. There might already be a collection service for certain materials, traveling from village to village to buy small amounts of sorted materials.

How-to guide 7 discusses how to maximise the value of plastics when selling to merchants.



8.2 Considering different recycling technologies

Once you have matched the waste materials to the available technologies (see Figure 20 and Figure 21), consider the following factors.

1. Cost	<p>You will probably need to buy (or make) some equipment to begin with.</p> <p>Consider your operational costs (energy and water consumption, maintenance, rent, transport).</p>
2. Land availability	<p>Most of the recycling processes need shelter from sun and rain, with additional space for proper operation and to reduce the risks of accidents.</p> <p>You will probably need water for washing materials and yourself.</p> <p>You will also need to consider your neighbours, particularly if your recycling process is noisy or smelly.</p>
3. Electricity supply	<p>Some equipment will need an uninterrupted three-phase electricity supply. Power cuts can cause major problems both for the material being processed and the machines.</p> <p>Manual machines, although slower, might be more profitable.</p>
4. Technical knowledge and information	<p>You will need to practise your technique before trying to sell your product.</p> <p>If you are using machinery you will need training and support so you can maintain and repair it properly (this is very important, particularly for biogas).</p>
5. Potential markets	<p>Carefully assess the markets for materials and products. This will help you decide on the types of machines and equipment required.</p> <p>Consider joining a co-operative. Working with others can be more efficient and lead to higher profits.</p>
6. Raw material supply	<p>Raw material availability is vital. Is there enough? Is it seasonal?</p> <p>Can you access it directly from the source? Is it clean?</p>
7. Means of transportation	<p>Transport costs can determine whether a project is financially viable or not. Long journeys combined with the bulky nature of plastics or organic waste will result in very high transport costs.</p> <p>Also consider what will be needed to transport the finished product for sale.</p>

Figure 23: Factors to consider when selecting the appropriate recycling technology for your project¹⁵.

¹⁵ Adapted from Faninger T (2009) *Reducing vulnerability of developing country recyclers to global markets – a case study of plastic recyclers in Kenya*. MSc thesis, Imperial College London. Fieldwork hosted by Practical Action.

8.3 Access the raw materials

It is always better to work with clean, separated materials. For this reason, it is better to try to access materials in good condition, try to access materials as close to their *source* as possible (for instance, the home, hotel or factory).

If the material comes from the market, speak directly to the stall holders and ask them to keep the material aside for you. Agree on a day and time to collect it. If the material comes from people's homes, ask them to keep it for you and arrange a suitable day and time to collect it. If you are working with plastic you could collect it once a week, but if you are working with food waste you might need to collect it every day.

Flies lay their eggs on decaying organic matter, and the eggs hatch after 2-5 days. To avoid having lots of flies around (see 4.6), it is better to collect food waste on a daily basis. This is particularly important in warmer climates.

Remember that transporting waste can be expensive and time-consuming. It is better to work within a local neighbourhood so you do not need to move materials very far. A good rule is to try to move the materials no further than you could push them in a wheelbarrow.



Some waste materials are seasonal. If your waste materials come from hotels, are these open all through the year?

8.4 Is there a potential market for your recycled product?

What do people in your area want or need? Here are a few questions that might help:

- Do people need fuels to cook with? Are the fuels they use at the moment expensive or very smoky? Could you make anything cheaper and better?
- Would farmers or people with kitchen gardens be interested in manures or composts for growing their crops, or nutritious feed for their livestock?
- Do people need building materials? What do they use at the moment? Is it expensive or does it cause problems? Could you make anything cheaper and better?
- Are there tourists who might be interested in environmentally-friendly gifts or souvenirs, such as bags or jewellery?
- Are there any similar projects or ideas that have worked elsewhere that you could bring to your community?



Market research: will people buy your product? Encourage them by demonstrating how your product is better or cheaper than the alternative.

Make a small sample of your product and let people try it.

9. Develop a business plan

9.1 Price your product

It is important to create a business case for your product so you can understand how much money you can make from selling your product. You will need to include all costs involved in making your product:

- Labour, including your own: how will you value your own time?
- Protective clothing, such as overalls, boots, face mask, gloves
- Tools and equipment, including a suitable table and shade
- Fuel if your recycling process requires electricity or fire
- Sacks for collecting the material or selling the product
- A cart or vehicle for collecting material and fuel (or feed if you are collecting with an animal-drawn cart)
- Rent and any other regular payments or taxes
- Contingency, replacing of equipment
- Publicity and marketing costs, including transport and free samples
- Any other overhead costs, such as purchasing products or supplies

With time and experience you might be able to reduce some of your costs.



Pricing your product:

- 1. Make sure you cover all your costs and make a profit***
- 2. Keep the price low enough to attract customers***



When you know the full cost of making your product, you can decide how much to charge customers so that you can make a profit. Profit is important for a business to grow, employ more people, process more waste, and provide more security for the workers.

Here are some tips for pricing your product:

- You must cover all your basic business costs.
- Your customers need to be able to afford it – the price should be the same or preferably lower than what your competitors charge.
- Your price needs to be logical for the product.

You can calculate a base price (i.e. the lowest price you will accept) for your product using the simple equation in Figure 24. You can adjust your profit up or down depending on what your customers can afford and will pay.

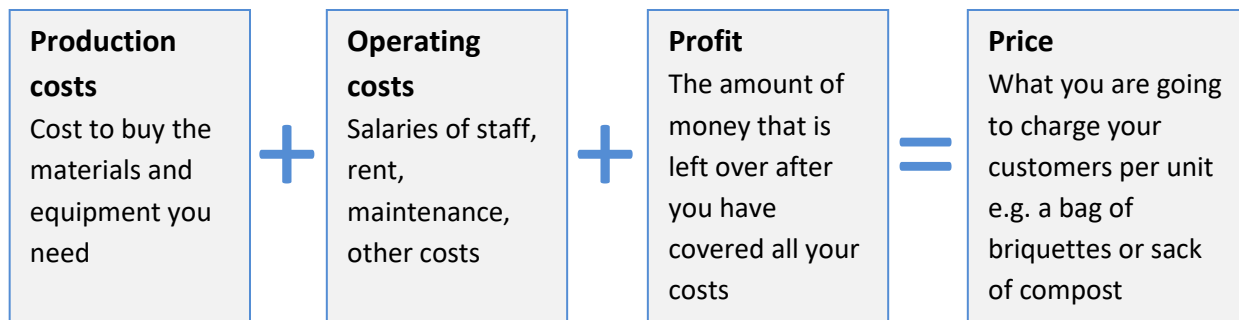


Figure 24: Calculating the price of your product.

The numbers in Figure 25 below are from a real-life example from The Gambia¹⁶.

The business case behind charcoal production (2 people working for 1 day)

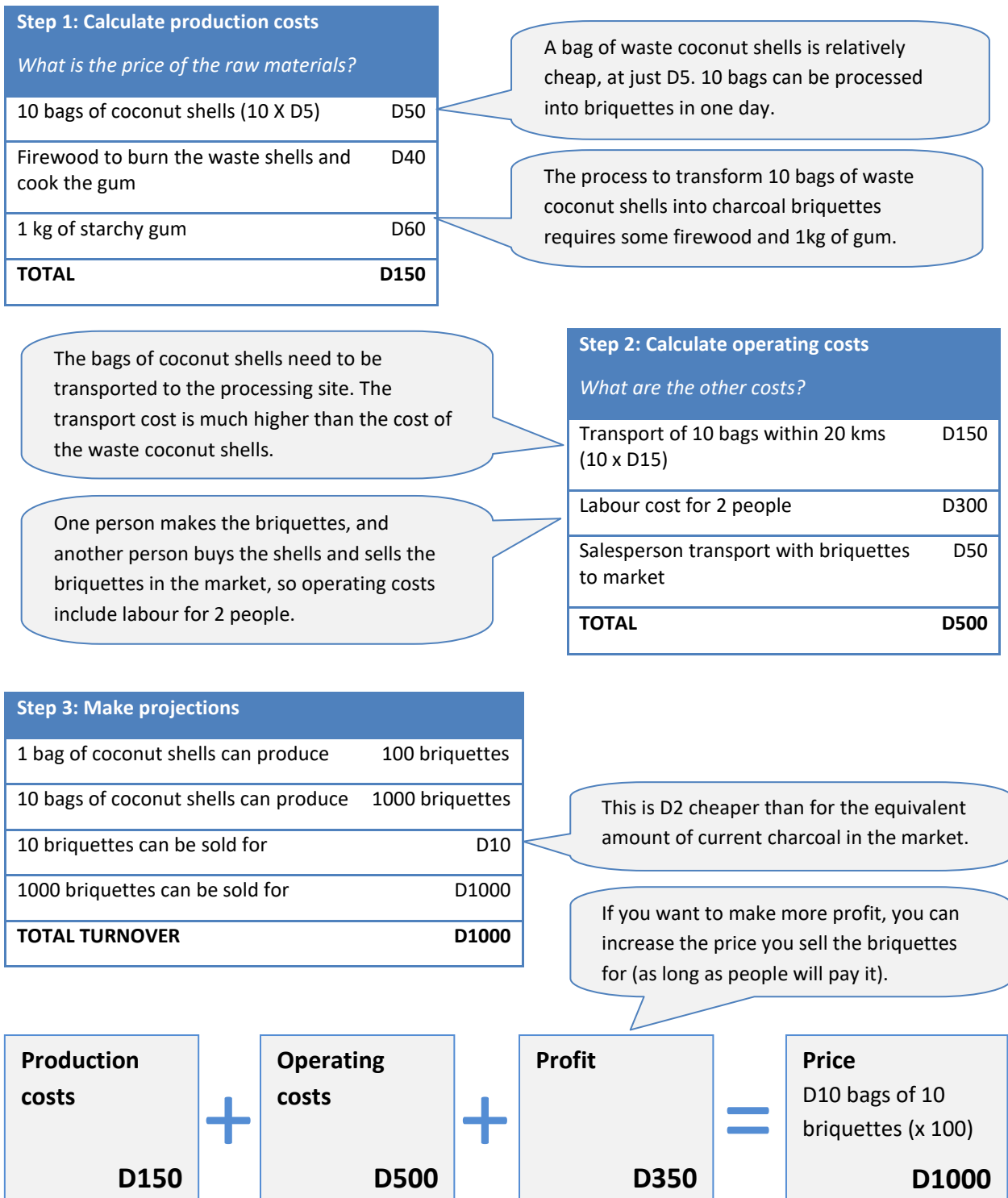


Figure 25: Daily cost and profit for making charcoal briquettes in the Gambia¹⁷.

¹⁶ 1 US\$ = D50

¹⁷ The start-up capital needed for the business is D5000, which can be borrowed and paid back over time. Data from Women's Initiative The Gambia.

9.2 Perfect your product

Once you have decided what you will collect and how you will process it, you need to perfect your product. Take the time to practise until you can make a consistently good quality product.

For instance, if you have decided to make animal feed from fish waste, you will need to:

1. Practise the recycling process, collecting, drying and milling the fish waste until you are very good at it.
2. Find a chicken farmer to test the product and give you feedback. Do the chickens like it, do they seem healthy, and do they produce good eggs?
3. Decide on the price you will sell your animal feed for (see 9.1). How much do farmers usually pay for animal feed supplements? Can you sell yours cheaper?
4. Give free samples away to potential customers. Do they like your product? How much would they pay for it? Do they have any advice on how you could improve it?

9.3 Market your product

Once you have perfected your product, you will need to prove to your new customers that:

- Your product is as good as the alternatives (or better),
- The price is right,
- You can process it correctly and consistently, and
- You can provide a regular supply at the right time and place.

Think about these things to help you market your product:

- Can you provide free samples to potential customers and traders? This will get them used to it and overcome any worries they may have.
- Can you develop a partnership with a shop owner who is interested in selling it?
- How much can you supply?
- What information do you need to provide with the product? It might appear unusual to potential customers, so you will need to make sure they understand why it is better and cheaper than the alternative.
- Is the demand for your product seasonal? Will you be able to make and sell a regular quantity of your product all through the year? If not, how will you make money in the off-season?



10. Get help and support

It is much easier to work as a team than alone.

Talk to the community about the benefits of waste management. Encourage your friends and neighbours to get involved and become advocates (see 10.1 and 10.2). Get support from local government by demonstrating the benefits of cleaner, healthier communities and the job opportunities from recycling (see 10.3).

10.1 Let's talk about waste

Everyone makes waste, but many people never think about what happens to their waste after they throw it away. Everyone has a personal experience of waste, from producing it at home to being annoyed when uncollected waste makes the neighbourhood look dirty.

What is *your* experience with waste? How about your neighbours? What do they have to say about it?

Remember everyone is different: some people will not be interested, and others will want to help.

First, you need to decide **what** you are planning to discuss with the community (these are called your key messages). You will need to present the problem as well as your proposed solution, and be open to hearing other people's views.



Figure 26: Example key messages about waste. It is important to encourage other community members to think about waste and how they can help improve the situation.



How your community manages its waste can have positive or negative impacts on:

- **The local economy**
- **Public health, especially children’s health**
- **The local and global environment**

See chapters 3, 4 and 5 of this Toolkit for ideas to discuss.

You might be asking people to change their behaviour, such as:

- Stopping discarding or burning waste in the open,
- Starting to store waste materials separately so they can be collected for recycling,
- Making sure they dispose of their waste in the allocated area, or
- Buying a new recycled product.

Figure 27 suggests some ways that can help people change their behaviour.

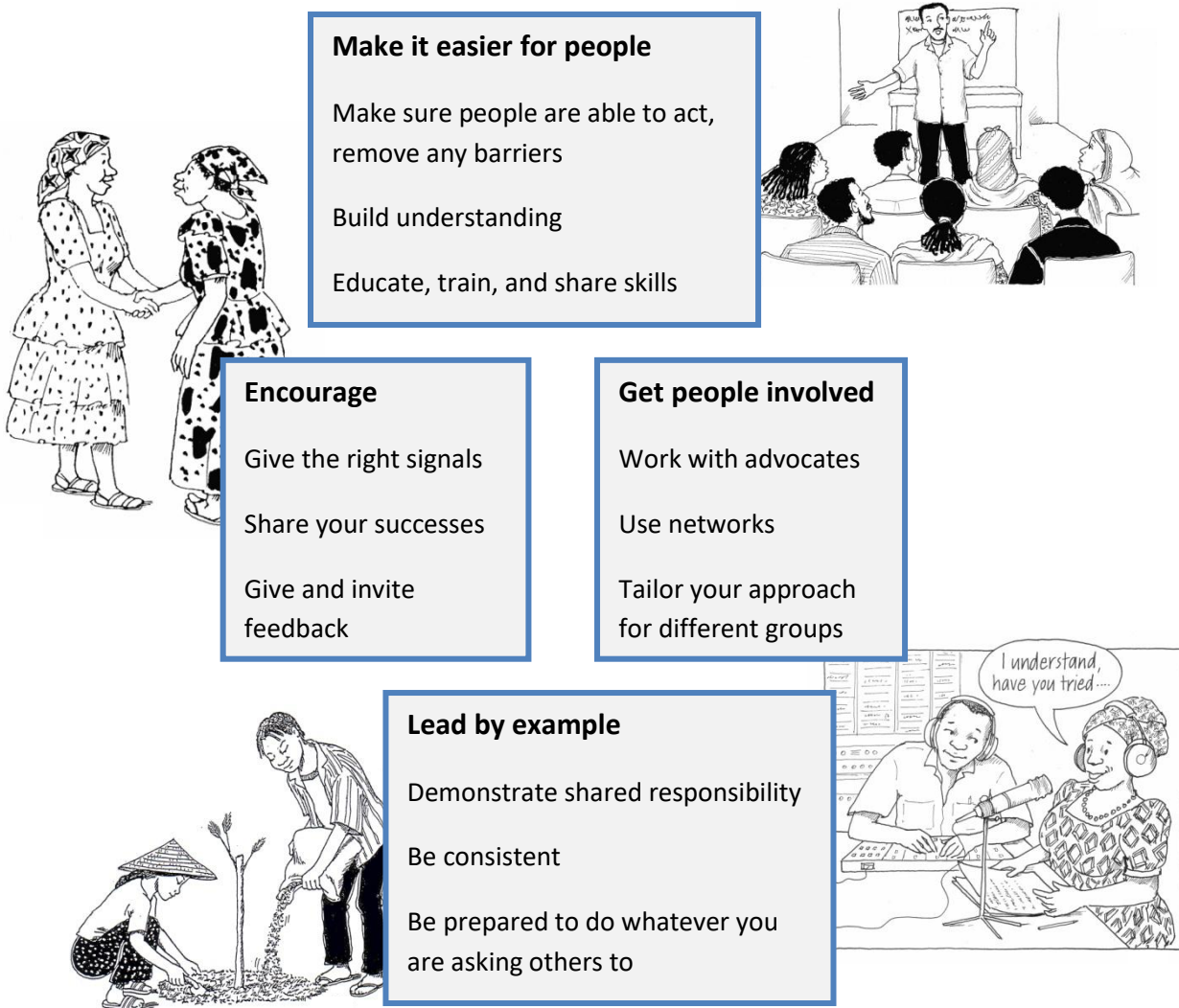


Figure 27: Helpful advice for changing behaviours towards waste in your community.

10.2 Tailor your message

Different groups of people within a community have different priorities. They meet at different places, talk with different people and form different ideas.

When you talk to different groups of people, choose suitable examples so that they can relate to what you are saying. Ask questions about people's experiences and views of waste – understanding their priorities and influences will enable you to communicate with them more easily.

For example, community leaders might be concerned about the general health of the community, and keen to provide employment opportunities for school-leavers. These are their priorities. The best way of talking to them about waste is to focus on these issues:

- Poorly managed waste is harming the health of the community, and particularly the health of small children. By separating and managing waste properly, we can reduce vermin and the spread of disease.
- There are job opportunities in transforming waste into new products. For example, woody waste can be converted into charcoal briquettes, a low-smoke cooking fuel that does not require timber from the forest.

The main concern of local farmers is producing healthy crops, so you could frame your messages to address their priorities:

- Waste that is not properly managed can pollute watercourses, damage crops and kill livestock.
- It is possible to make cheap but good quality compost from food waste that can improve soils and crop yields.



People also take advice from different people, and so it is useful to ask people who support your ideas to talk to their friends and social networks on your behalf. This is called *advocacy*.

It can be very helpful to have several advocates for your idea in different parts of the community.

Figure 28 shows some typical groups within a community, and what their different concerns and influences are.



Group	What are their priorities?	Who do they listen to?
Community leaders	Ensuring a healthy environment for everyone Reducing the risk of flood Helping young people find jobs	Other senior community members
Business owners	Having clean areas to work in Improving and growing tourism Finding new business opportunities Developing new ways to reduce costs or make more profit	Community leaders Newspapers and magazines Radio programmes Other business owners
Farmers	Having clean and fertile land to farm Producing healthy crops and livestock Protecting watercourses from pollution Developing new ways to reduce costs or make more profit from their produce	Community leaders Other farmers
Parents	Protecting children's health Providing a decent home Finding ways to reduce costs for the family Finding job opportunities for their children	Village elders Radio programmes Other parents
Young people	Having training and employment opportunities	Village elders Parents Other young people Social media
Children	Having clean and safe areas to play in	Parents and other adults Other children

Figure 28: Understanding people's different priorities will help you communicate effectively with them about waste.



Use advocates of your project to help spread the messages to different groups of people.

Remember that some people will be in more than one group, for example farmers who are also parents.



10.3 Present your project to government

Working with government officials

Your local government probably has some responsibility for managing waste, so it is important that you involve the right people in your plans.

- Does your national government have a National Waste Strategy?
- Does your local or municipal government have a Local Waste Strategy?
- Do you need any specific permits or to carry out an Environmental Impact Assessment before starting work?

Government strategies or plans regarding waste management will probably include goals on waste reduction and recycling. A community waste management project will help achieve those goals so you are helping deliver government policy. Your project might also help deliver other objectives, for example in sustainable development, environmental protection, public health and sanitation, and job creation for women and younger people (see chapters 4 and 5 of this toolkit for more ideas).

Find out who is responsible for waste management in your local government and arrange a meeting to discuss your ideas. It is wise to have an agreement in place before you start work, preferably in writing. This is because waste materials might be the official property of government and you may need permission to collect them separately for recycling.

Remember that you may also need permits or licenses and an environmental impact assessment to collect or reprocess waste. Check with the local environmental protection or enforcement agencies.

Ask if the local government officers can help you access waste materials at the source, so they are clean and easy to work with. Is there a site available nearby that would be suitable for waste reprocessing?

Present your plans – maybe government can help you by offering lower rent, business support, or by encouraging others to separate their waste for you.



Try to avoid having to pay for waste materials, unless you are providing a small incentive for individuals to separate and store the clean materials you need.

Checklist for working with government officials

1. Is there a national waste strategy? How does your project support it?
2. Is there a regional or local waste strategy? How does your project support it?
3. Does government have goals for improving waste management?
4. What are the government priorities for dealing with waste?
5. Are there other (non-waste) policies that your project supports?
6. Can government support your project? This could include: loaning equipment or offering to sell it to you at a reduced price; offering a suitable site with reduced rent; providing business development advice and support; providing a small business loan to buy tools and equipment; encouraging businesses or residents to separate their waste for you.

Talking with elected representatives

Elected representatives are those who have been voted into positions of responsibility. They might not know much about waste or how to manage it properly, but they will probably have priorities such as education, health and employment.



It will benefit your project to have the support of your locally elected representatives. An effective way to achieve this is to look carefully at *their* priorities and then present your waste project so that they can appreciate how it contributes to *their* goals (see 10.2).

For example, if a local representative is very concerned about the health of children, then prepare information that shows clearly the links between childhood health and waste (see

Figure 1 and chapter 4 of this toolkit for ideas). If you can demonstrate how your project will help protect the health of children, then the representative will be able to support your ideas and might be able to help you.

If the local representative is also a business owner and keen to help entrepreneurs, then prepare your business plan (see chapter 9 for help) showing how you will make a profit from processing waste materials, and how your recycling business can grow and employ more people over time.

Checklist for talking with elected representatives

1. What are their priorities?
2. Have they considered the waste issue and what are their views on it?
3. Are any projects planned for dealing with waste?
4. Are they aware of how waste can affect people's health, as well as the environment and local economy?
5. Would they be interested in providing some support to a community waste management project that will benefit people's health, environment and local economy?

If you can demonstrate the positive impacts of your proposed project, you will be more likely to gain the support of your local elected representatives. Their support can have a very positive impact on your project!

10.4 Informed and prepared? Let's go!

Part A of this toolkit discussed the challenges and dangers posed by unmanaged waste, and the benefits of dealing with waste as a *resource*. Part B discussed the common waste materials, the products that can be made from them, and how to set up a small waste processing business.

Part C: Be inspired contains How-to guides to inspire you to transform waste into useful products. The waste materials, technologies and processes described in this toolkit vary from country to country. The How-to guides presented here are intended to inspire and enable you to develop and operate safely your own processes, suited to your geographic area and waste materials.

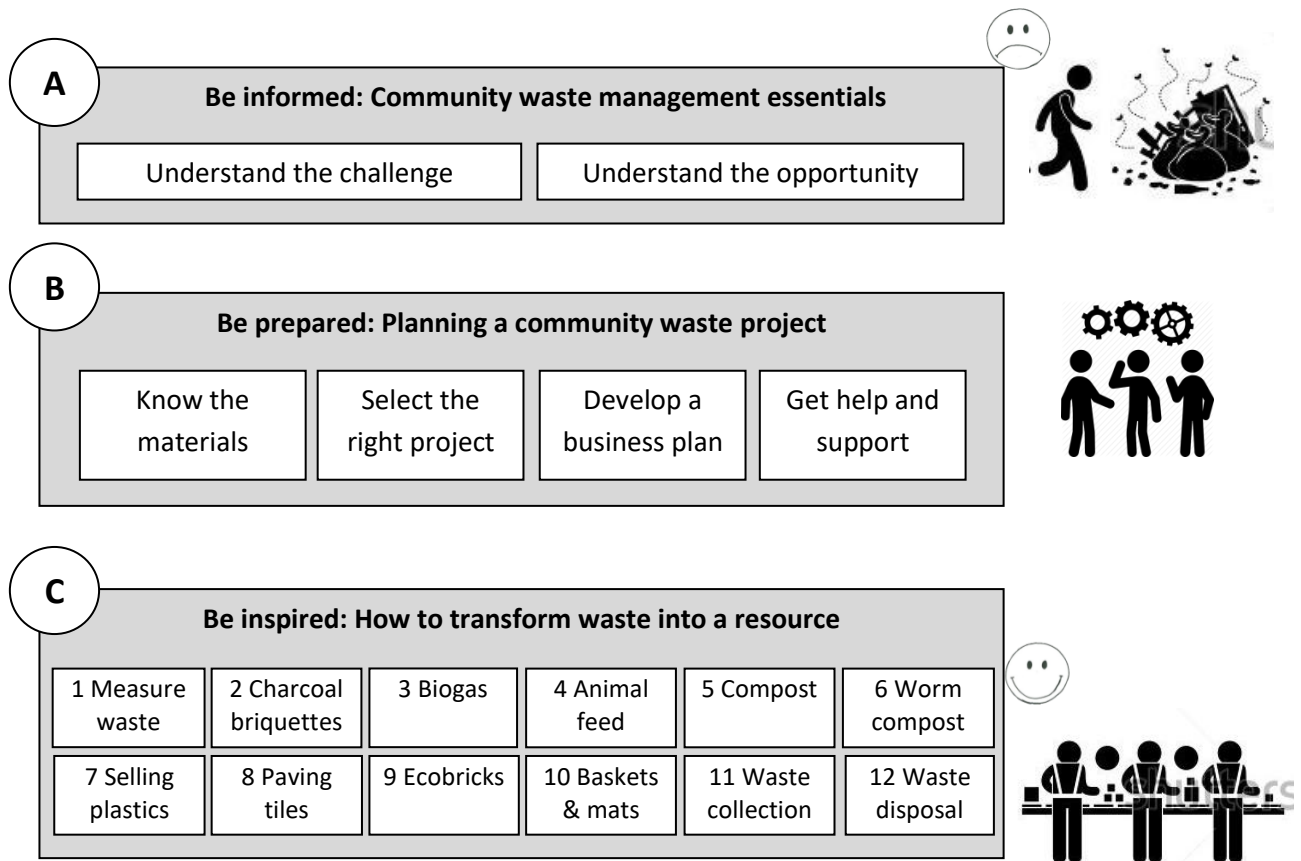


Figure 29: Part C of this toolkit contains How-to guides, to inspire you to transform waste into a resource.

C

Be inspired: How to transform waste into a resource

All the How-to guides are available to download at
www.wasteaid.org.uk

- 1 How to measure your waste
- 2 Woody waste into fuel briquettes
- 3 Organic waste into biogas
- 4 Fish waste into animal feed
- 5 Organic waste into compost
- 6 Organic waste into compost using worms
- 7 Selling plastics to the market
- 8 Plastic film into building materials
- 9 Plastic waste into ecobricks
- 10 Plastic film into crocheted bags
- 11 Waste collection
- 12 Waste disposal