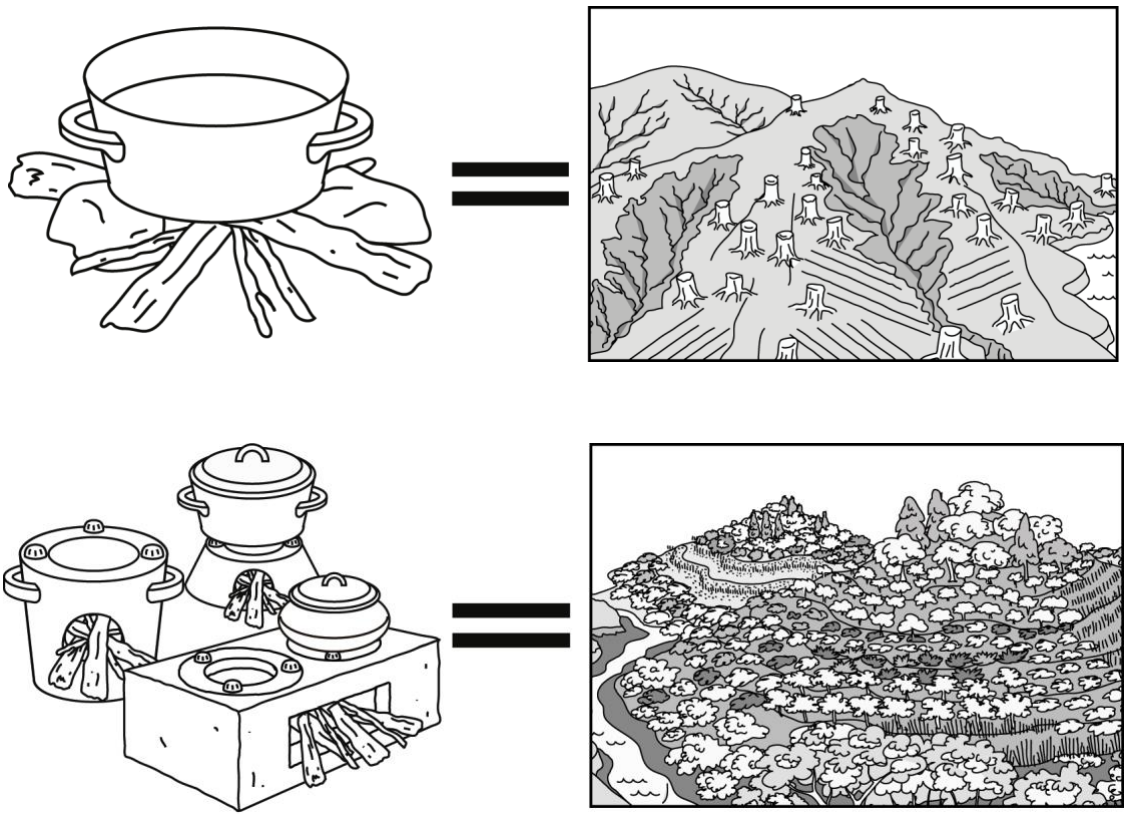
Sustainable Nutrition Manual: Flyer Series

Food, Water, Agriculture & Environment

Topic 12: Energy Use in the Kitchen



Extracts from

SNM Part 1: Healthy Humans

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Accessing the Sustainable Nutrition Manual

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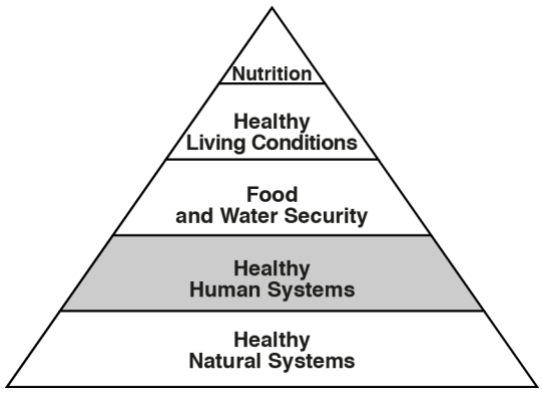
Topic 12 Introduction: Energy Use in the Kitchen

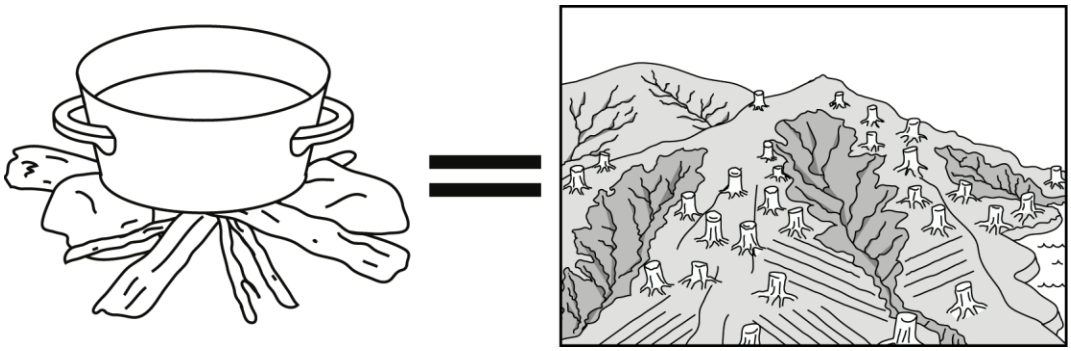
Food preparation in Malawi currently takes much more human energy and fuel energy that it needs to, and this is robbing the landscape of our trees. We will learn more about why this is a huge and serious problem in Part 2 of the manual, which is about healthy and sustainable environments. For now, let us just look a bit at what happens in the kitchen at home.



- Cooking on three-stone fires, or any smoky stove, is not efficient. You burn lots of wood for very little cooking and heat
- The wind blows on the fire and makes the wood burn much too quickly
- The wind blows most of the heat away from what is cooking and into the air
- Smoke from three-stone fires and badly designed stoves and kitchens causes breathing and eye problems
- Bad wood-burning practices, like using wet wood, too much wood at once or burning very large pieces of wood, also causes too much unhealthy smoke
- The wood for all these fires is cut from the lands around, leaving soil bare
- Bare soil gets washed away when it rains, or blows away when it is windy, because there are no trees and plants to hold it in place
- Not enough trees are planted to replace the number of trees being cut down for firewood, charcoal, building, etc.
- So, we have less soil and trees, but more dust, smoke and health problems

(Adapted from: Improved Cook Stoves Manual – Peace Corps Bolivia 2008)

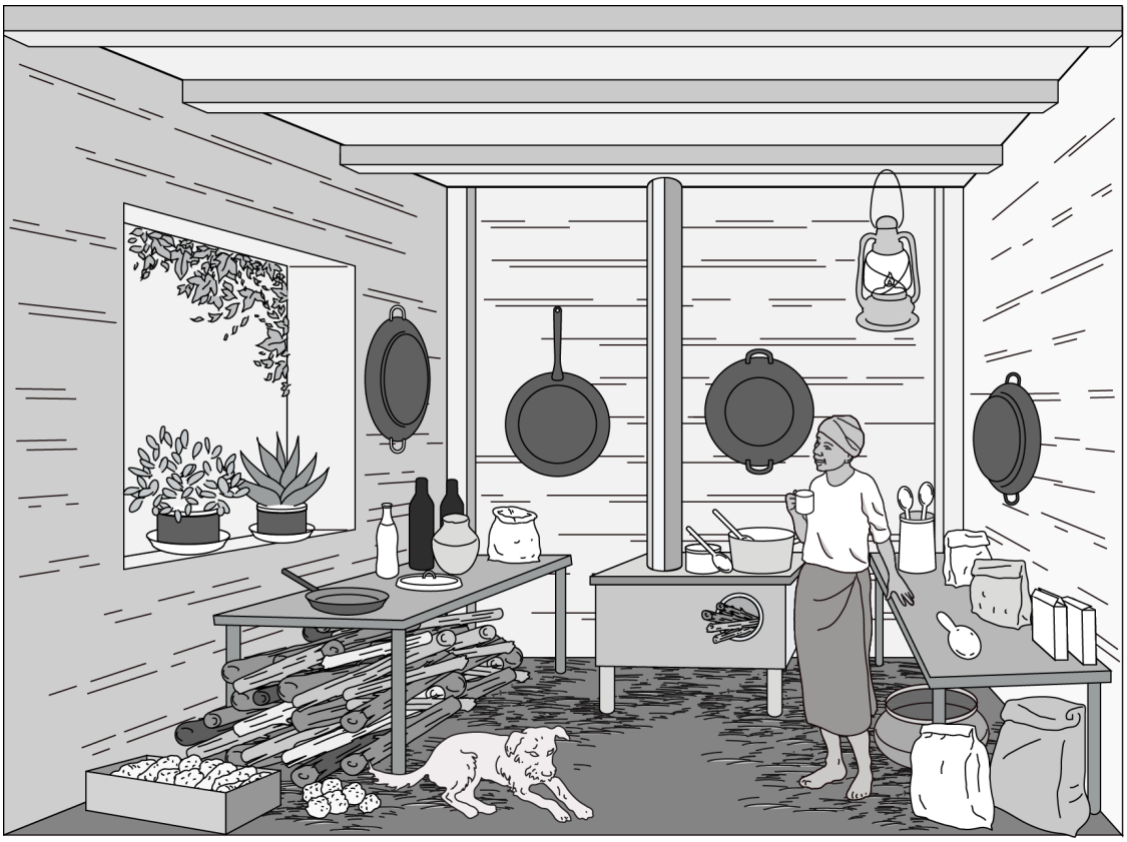
Three Stone Fires



Rocks on hillsides appear to be growing, but really the soil is disappearing from around them. We simply cannot keep going like this. It is unsustainable for us and for other species that rely on the environment. What will happen when all the trees and the soil have gone? How will people in Malawi live if this happens?

We must use our resources more wisely before it is too late! There are many ways to do this: If we use energy-efficient cooking methods, and if we plant more trees than we use, the benefits will be both personal and environmental. People benefit in many ways when they adjust their cooking methods, so let us look at the advantages of being fuel-efficient, before we learn about different methods & equipment to help us do this.

Energy-efficient Cooking



(Adapted from: Improved Cook Stoves Manual – Peace Corps Bolivia 2008)

- Well-designed stoves and kitchens produce less smoke, ash and air pollution
- People will be able to breath better and they will have fewer eye problems
- Fuel-efficient cooking often uses recycled waste (using paper charcoal, the sun, wind, manure for biogas, etc.) to fuel your home
- This helps to conserve trees and forest cover, looking after the environment and soil fertility at the same time
- Fuel-efficient cooking also reduces the use of other energy input, like electricity and human labour
- Less time is spent collecting firewood
- Less time is spent cooking (especially if you eat more raw foods like salads!)
- More time and money is available for other activities

Energy-efficient Cooking Habits

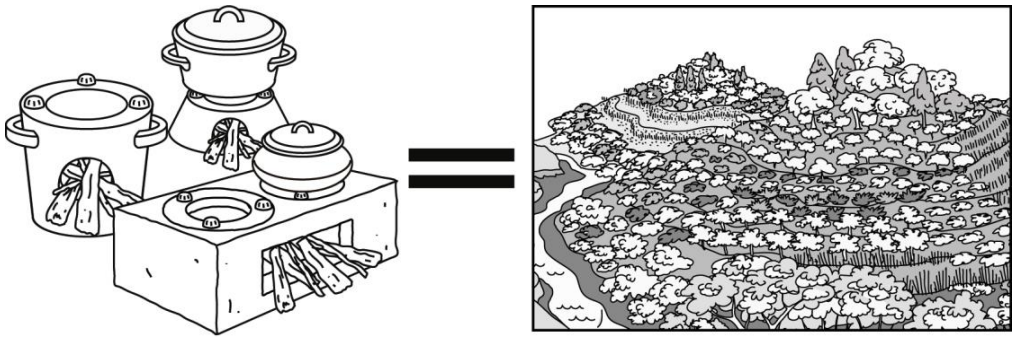
Eat raw foods: The less food is cooked the less fuel is used. Eating foods raw (those that are suitable to be eaten raw) saves time, energy, fuel and fewer nutrients are lost when food is not cooked.

Use methods of cooking that burn less fuel: efficient wood stoves, basket cookers, solar cookers, etc. Use other kinds of fuel, like paper charcoal, sunlight or bio-gas stoves. More information about these is coming right up!

Cover the pot! If there is no lid on the pot, lots of heat escapes and the food takes longer to cook. Covering the pot keeps the heat inside and reduces cooking time.

Soak beans: Beans can take 1-3 hours to soften by boiling. Soak the beans overnight the day before you want to cook them or sprout them a few days before cooking. This reduces cooking time to one third of the usual time.

Fuel-efficient Wood Stoves



There are many styles of fuel-efficient wood stoves that can be made of metal or clay. They are often of simple design but have been designed with care, and a lot of thought, to manage three things:

Control the airflow

You need just enough air for the fire to burn. Too little and the fire goes out. Too much air and the fire burns too quickly. These stoves balance the amount of air correctly. Fires burn most efficiently if air flows from beneath the wood, up through the wood toward the centre of the pot. Fuel-efficient stoves often have three air holes: one under the wood, one on the side of the stove (which is optional), and then just enough gap between the stove and the pot for the air to exit. The air holes are often adjustable to manage different amounts of wind and different types of fuel.

Guide the flames

The flame's tips should hit the centre of the base of the pot. Any fire that goes around the edge is not being used efficiently. The heat just rises into the air and does not go into the pot to cook your food.

Hold the heat

Stoves often have insulated walls for making the most of the heat for as long as possible. Why let it escape if you can use it more wisely?

Paper Charcoal "Briquettes"

Another way to use less wood is to burn something else instead. You can cook efficiently using waste paper if you make "paper logs" also known as "briquettes" to burn.

Gather wastepaper

This can be any type of paper or cardboard that has been used in an office or school, from food packaging or other sorts of packaging.

If it was originally made from a tree, then you can use it! (But it is best not to use very shiny paper or very colourful printed paper as these are both full of chemicals.)

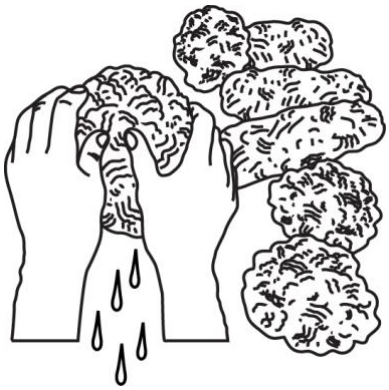
Add dried leaves and grass if you do not have enough recycled (pre-used) paper. You can cut or tear the paper to speed up the next step.

Soak the paper

Put the paper in a container that can hold water such as a drum, bucket or pail.

The water does not have to be really clean as long as it is ok to touch with your hands. You can use water left over from washing dishes or clothes, or water harvested from your roof or collected from a river or well.

Soak the paper in water until it is soft. This will take a few hours or leave overnight. Thicker paper takes longer.



Make the paper logs

Make sizes and shapes that work for your kitchen. When the paper is soft, pull out a handful and squeeze the water out. Shape it into a variety of big and small balls and sticks.

Different shapes are useful for different situations so be diverse and try lots of shapes. (Some places in Malawi have machines to do this step quickly to make large amounts of paper briquettes.)

Let the paper briquettes dry

Choose an airy, sunny place. If you put them to dry on flat woven baskets (*lichero*) they can be moved around easily to follow the sun.

After 1-3 days they will have dried out (depending on the weather and the size of your paper logs.

The briquettes become much lighter when they are dry. Keep the paper logs dry in an old bag, box or basket until you need them.

Using paper briquettes

Paper briquettes need a bit more air to burn, compared to wood. If you are using a fuel-efficient stove have the air holes open wide.

Paper charcoal also works well in the open, on a 3-stone fire, if it is not a very windy day.

You may need to clean out the ash during cooking, depending on how long your meal takes to cook.

Paper briquettes produce more ash than cooking with wood, so use a type of stove that has holes for the ash to drop away from the fire. A typical charcoal '*mbaula'* in Malawi is a metal frame with a clay insert for the charcoal to sit on. The clay part has holes in it for ash to drop through, and there is adjustable ventilation.

Starting the paper briquettes takes a bit of practice. Begin a small, hot fire with little twigs and / or cardboard, using the small paper logs or break one of the paper logs into smaller pieces. (Do not use plastic to start your fires! This is a very unhealthy practice in Malawi because it pollutes the air.) When the fire is hot add the larger paper logs carefully, so they do not put out the fire.

Cooking: Do not use the paper charcoal for grilling food because there may be chemical inks on the paper, which will get into your food. Because of the soft ash it is best to cook things in a covered pot, which is also more fuel-efficient. 10 paper balls (the size of an adult's hand) can burn from 30 minutes to an hour, depending on the stove and how the paper charcoal was made.

Insulated Basket Cookers / Coolers

Insulated baskets allow you to keep hot food and drinks hot or cold food and drinks cold. Whatever temperature your food / drinks are when you put them into the basket your insulated basket will keep them that way for hours. Insulated baskets save time and fuel because you do not have to keep feeding the fire, or running an expensive refrigerator, so you can go and do something else instead!

To make a basket cooker / cooler

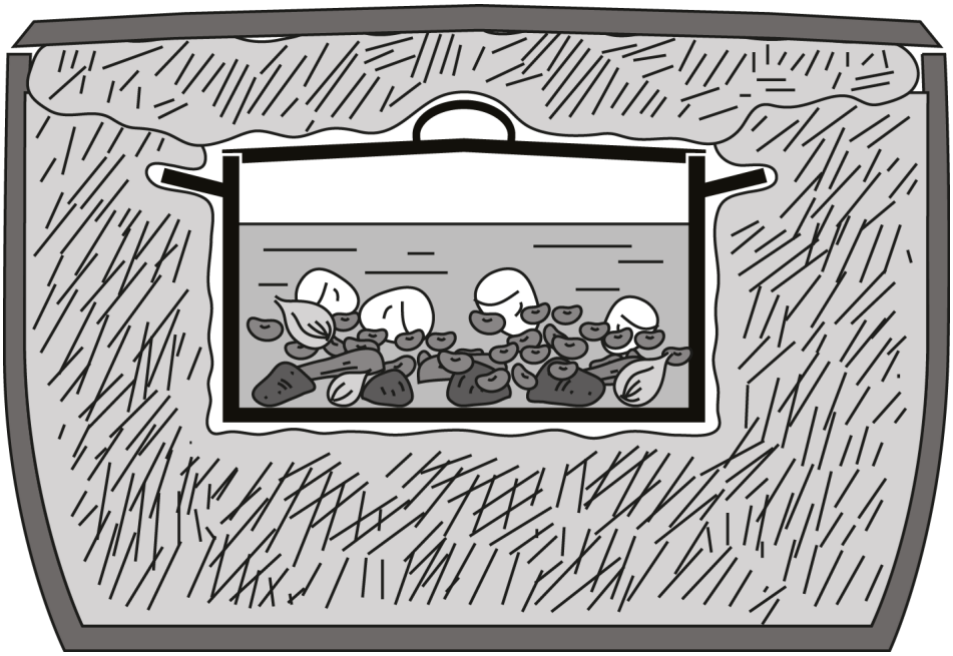
Container
A large basket, container or sack that can hold your cooking pot / drinks with enough space for the insulating material all around it. The container does not have to be new, but it should be clean.

Insulation
Put clean, dry material in the bottom of the container and round the sides. This will hold the temperature steady in the container. The insulation should not be easy to melt and should be soft enough to fit close and snug around the food container you will put inside.

You can use dried grass or leaves (banana leaves work well), soft paper, scraps of cloth or even soft plastic stuffed inside a cloth liner. If you recycle soft, clean plastic bags as your insulation, be sure to have a strong layer of cloth or other material that will keep the hot pot from touching the plastic. If you are keeping things cold, recycled soft, clean plastic bags will work fine.

Leave a space in the middle of the insulation for the cooking pot. You can adjust the insulation to fit different sized pots or items and it should be packed tightly so that heat will not escape.

Cover
Some kind of insulated cover for the container so none of the heat can escape. An old sack or cloth will hold the dry material in place. The cover will be tucked into the inside edges of the insulated container to trap as much heat in as possible.



Using the insulated basket cooker / cooler

- For dried legumes, soak them overnight, and then cook for about 15 minutes.
- For grains, tubers or fresh legumes, cook for about 2-4 minutes.
- For cooled food and drinks, keep them in a refrigerator or freezer until you need to transport them in the insulated container.

Put the food or drink into the Insulated Basket. Remove the pot from the stove or item from the refrigerator / freezer and put it quickly into the insulated container and cover it. Tuck the cover into the insulated basked securely so the heat doesn't escape.

Wait while the food finishes cooking. The food will continue cooking and stay hot for about to 6 hours.

- For dried legumes, wait at least 3 hours before opening the cover
- For grains, tubers or fresh legumes, wait 1 hour before opening the cover
- For cold items, they will stay cold for about 6 hours.

Solar Cookers

There is plenty of sunlight in Malawi and it is completely free! Why not use this sun for cooking? Solar cookers can be made from a wide range of materials and they are simple to use. They do not work at night or on very cloudy days though. Lots of sunlight is crucial! Find an outdoor spot that is sunny for several hours, that is not in a strong wind and where the food will be safe and clean.

Solar cookers work in three ways to catch light from the sun and convert it into heat:

- **Dark coloured pots** and materials absorb (hold) the heat. Dark surfaces get very hot in sunlight, but light surfaces reflect the sun and heat away. Food cooks best in dark, shallow, thin metal pots with dark, tight-fitting lids that hold in the heat and moisture. If you do not have a black pot, use the darkest colour you can find (or just use whatever pot you have).
- **Heat is trapped in a box-like structure** (often insulated) with a clear heat-resistant lid that lets sun in, or a strong plastic bag that keeps heat around the pot as long as possible.
- **Shiny, silvery panels direct the sun's hot rays** onto the pot. You can make a shiny surface with tin or use cardboard and cover it with anything silver, like aluminium foil, or the silver foil found inside several types of food packaging.

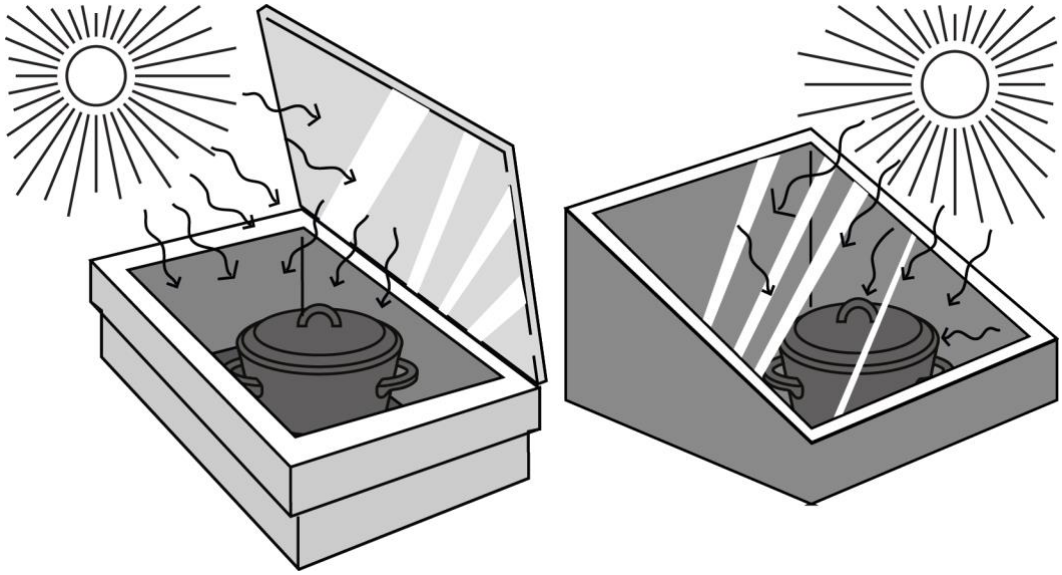
Solar cooker designs

- Box cookers
- Curved concentrators (parabolic)
- Panel cookers

There are hundreds of variations and Solar Cookers International share a lot of ideas and designs on their website. (See Part 3, Appendix 4 Acknowledgments)

Solar box cooker

These are the most common kind of solar cookers. An insulated box is made that will fit your cooking pots. The box can be made with cardboard or any other suitable material you can find. The box has double walls, which are stuffed with insulation (clean soft paper, plastic, cloth, cardboard, dried leaves or grass, etc.). The cooking container should be black and be shallow and wide enough for the sunlight to enter and hit most of the pot.

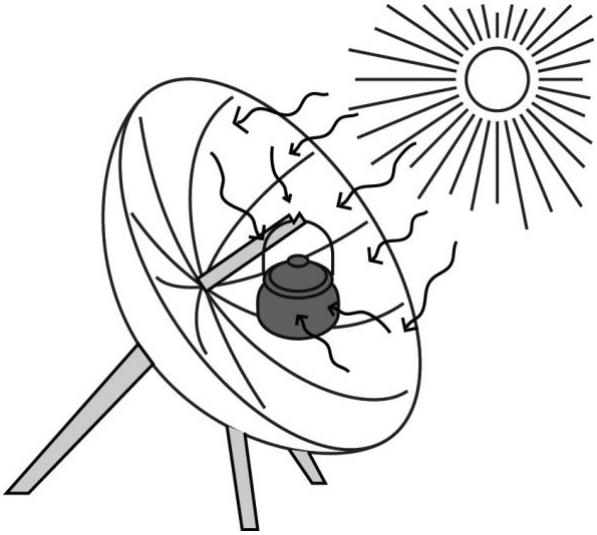


The top of the box is covered with glass or clear material that can allow sunlight to enter the box and trap heat. The inside of the box should be black, ideally, to absorb heat. An adjustable reflector can be attached to the top of the box to direct more heat and light onto the pot

Curved concentrator cookers

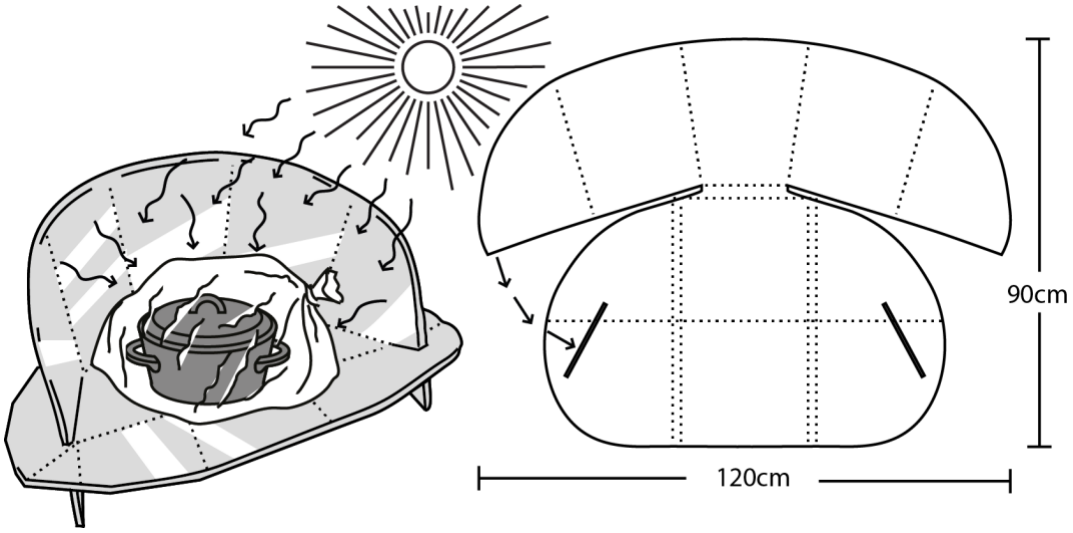
These **Parabolic** cookers cook very fast at high temperatures but require more input (effort and materials) to make the cooker.

They still can still be constructed with creative thinking. They are usually made with metal legs and potholder, and shiny metal for the curve (parabola).



Panel cookers

These have elements of box and parabolic cookers. They are simple to make from many sorts of materials. There is a larger pattern you can copy on Poster 16 at the end of this part of the manual. Then follow the instructions given here.



Using your solar cooker

Many types of food can be cooked in a solar cooker, and water can be disinfected (purified and sterilised so it is safe to drink.

- Start the cooking a bit earlier than usual...
- Use a dark pot
- For the panel cooker, put the pot in a clear tough plastic bag
- Place the pot in the cooker in direct sunlight
- Finish cooking the food while you relax or do something else!

Here is a general guide for cooking for cooking times for a family of five:

- 30 minutes to 1 hour for green vegetables
- 2-3 hours for *nsima*, rice, baking bread, fresh legumes (beans or nuts), small pieces of meat, sauces or soups, or cut up tubers
- 3-5 hours for dried legumes which have been soaked overnight, large pieces of meat or whole tubers
- One hour for every litre of water for SODIS (Solar Disinfection)

With a little practice, you can start cooking foods today without any fuel costs at all! And you do not have to stay by the food while it is cooking, so you will save your energy and time too.

You will find out how easy this is when you start using it with different recipes given later in this part of the manual.

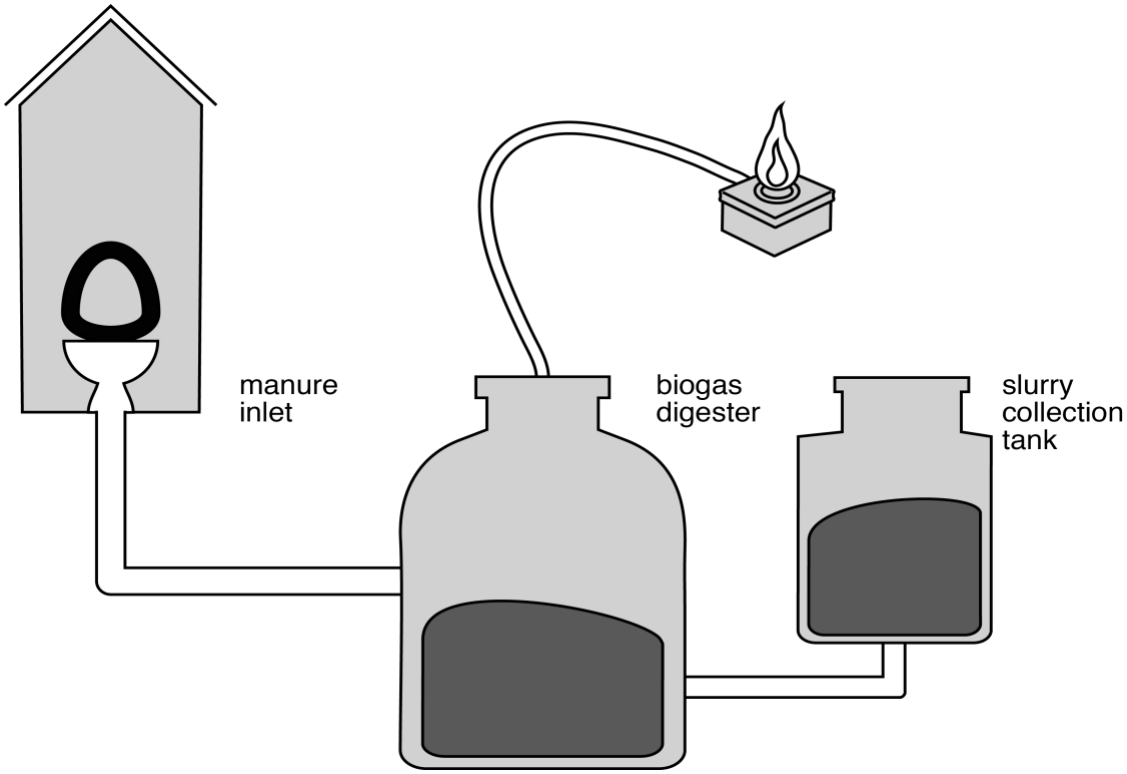
Bio-gas Systems

Bio-gas is natural gas that is made when organic matter decomposes (to feed the Nature Cycle). Bio-gas is also what your body makes when you digest food, and you 'pass wind', commonly known as farting!

There is a lot of unused organic matter (especially manure) from humans and animals in Malawi. If we capture the gas, we can use it for fuel. Any latrine or animal pen can be designed to produce fuel for cooking and lighting, with a bit of thought and planning.

There are already some bio-gas systems working in Malawi. There is a well-known system at Phwezi Secondary School in Rumphi, which has been working since the 1970s to fuel gas stoves for the kitchen.

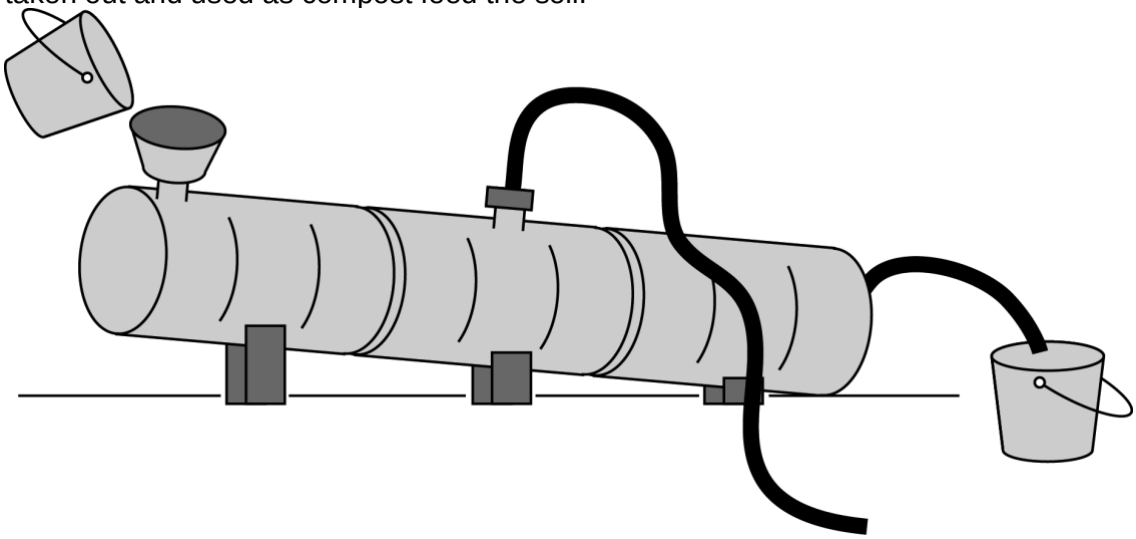
The Department of Energy is keen to promote bio-gas systems and hopes to create examples in Lilongwe and Blantyre so that people can learn how to build their own systems. With 16 million people in Malawi and the numbers of animals increasing, this could be a lot of fuel and a lot of organic fertilizer!



Organic matter (like manure and fresh plant scraps) is put into a 'digester'. Water is added. The digester works like a stomach to digest food. There are many different ways to put this material in the digester. It can be a part of the regular sewage system or there can be a door or opening to add the organic matter (then close it again so the gas does not escape). Organic matter should be added often so that gases are always being made. Water will need to be added too.

Decomposition makes gas. As the organic matter rots down and decomposes, gases rise to top part of the digester (the drum or pit). The gas is taken out of the digester through a pipe or hose so it can be used to power a gas stove, a gas lantern or a generator for electricity.

Organic fertilizer is what is left over. This is slurry and it is very good for the soil. As the organic matter rots and decomposes, it moves down to an area where it can be taken out and used as compost feed the soil.



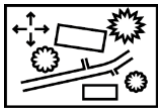
This picture shows a system made from 3 drums. The manure goes in at the top end, the gas rises and is taken away using the pipe in the middle, and the slurry is taken from the other end and used to enrich the soil and strengthen the Nature Cycle. The drums could be on a natural slope instead of a stand. The designs are endless!

Biofuels

Biofuels are different to biogas. Biofuels are usually fuels made from plant materials that are either rich in natural oils (like jatropha) or processed from plant materia l (for example, Malawi is increasing the production of ethanol, which is made from the by-products of sugar-cane processing).

A few places in Malawi have started working with biofuels but the practice is not widespread yet. There are organizations listed in Part 3, Appendix 4 with more information about this subject.

What energy sources are you using? Are they healthy for the earth and people? What resources could you be wasting that you could make use of?



Look at your map and note where your cooking energy comes from. Note any other sources of energy that you already use, or could use, like sun, water or wind power?

Your Notes:

Overview of the Sustainable Nutrition Manual

Food, Water, Agriculture & Environment

Purpose

This manual is for people who eat, grow or buy food and who want to improve their lives, their community and the environment that they live in. It has been written for, and by, people living in Malawi. It will show you how to eat and live better and guide you in designing a sustainable future.

The manual aims to show that by thinking differently and thinking sustainably you can improve your health, diet, lifestyle and surroundings easily and cheaply and gain an understanding of the term Sustainable Nutrition.

Use the ideas in this manual and you will be able to:

- Improve your diet and health
- Save money that was spent on food, medicines and chemicals
- Double or triple yields and harvests (or even more!)
- Reduce the amount of watering in your gardens and orchards
- Reduce the amount of work done on your land and in your home
- Have healthier plants and animals
- Reduce infertile and unproductive areas of land
- Use free resources to improve soil and water in your area

Part 1 - Healthy Humans

is about the human body and nutrition. You will also learn about food choices and the benefits of diversity in diet. It has lots of useful ideas to improve life and many delicious recipes and suggestions for tasty, healthy meals.

Part 2 - Healthy Environments

is about natural systems and sustainability. You will learn about the Nature Cycle and the Water Cycle and natural sustainable systems. You will be introduced to Permaculture ideas and gain an understanding of the benefits of diversity in Nature.

Part 3 - Healthy Designs

is about designing for sustainable living. This book brings parts 1 and 2 together and guides you to make a personalised plan for Sustainable Nutrition. This book is practical to design everything on your land. There is lots of information in the appendices about foods of Malawi and other resources that will be useful as your design develops.

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