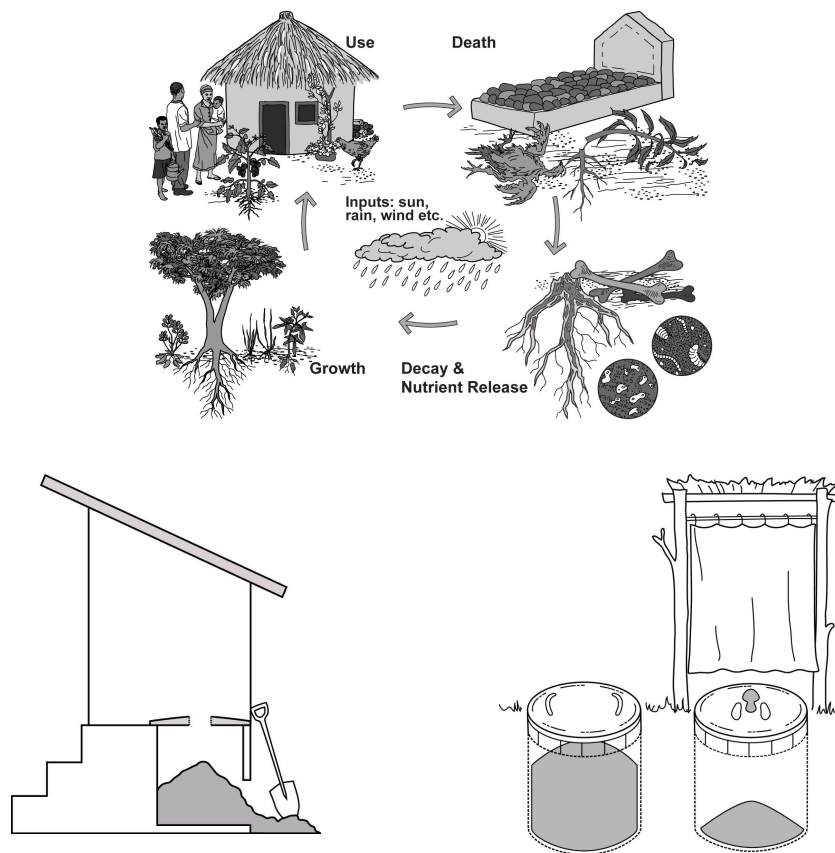


Composting Toilets

Humanure: an important part of nature!



Extracted from Sustainable Nutrition Manual: Part 2 Healthy Environments

Sustainable Nutrition Flyers are adapted from the:

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Food, Water, Agriculture & Environment

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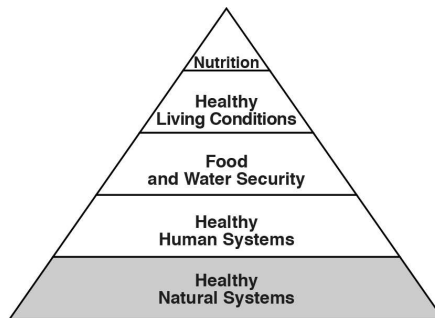
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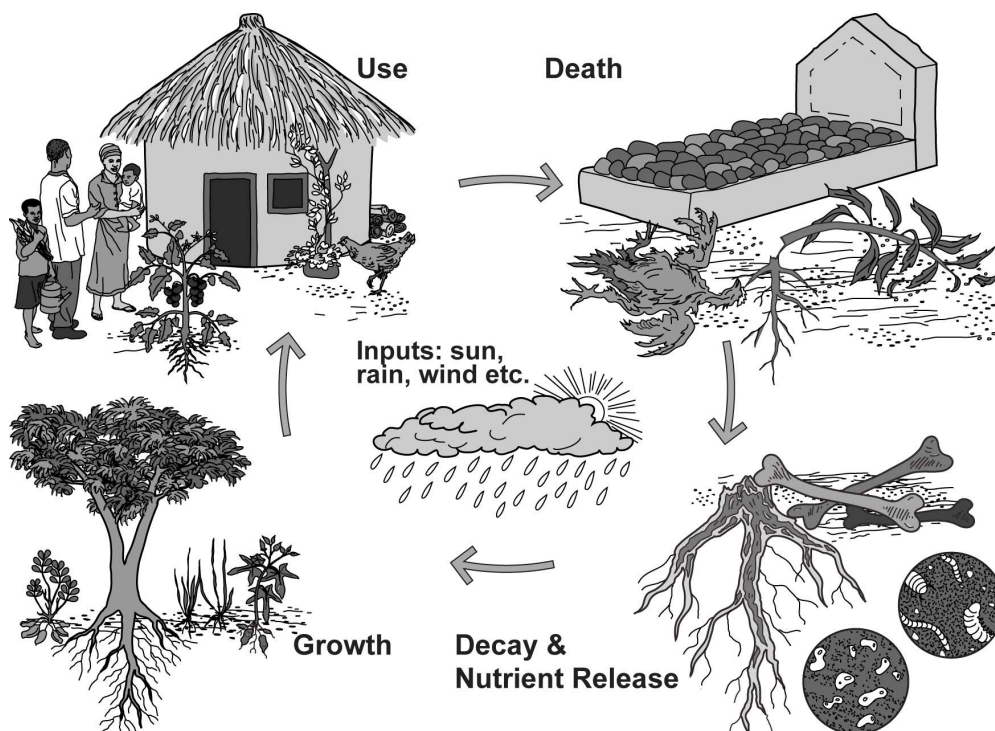
Nordin, Stacia. *Sustainable Nutrition Manual: Food, Water, Agriculture & Environment*. 2nd ed. Ed.
Sarah Beare. Lilongwe: World Food Programme Malawi, 2016.

Sustainable Natural Systems

Sustainable Systems move from one stage to another in a circle - a never-ending cycle that has no beginning and no end. The Nature Cycle is the way that the Natural World keeps itself going. It has been doing this for millions of years and is the most Sustainable System ever. There are many cycles in natural systems that keep going forever, such as the Water Cycle, which recycles all the water on Earth to continuously provide the water needed to sustain life on Earth. We will cover the Water Cycle here and we will look at sustainable designs for water management, conservation and harvesting on page 67.)



The Nature Cycle



If humans work with the Nature Cycles they will provide us with everything that we need to live. But if we break the circle, and destroy the cycle, it will not be able to give us what we need to live. What does Nature need if she is to provide us with food and nutrition security? Nature needs her nutrients too! This part of the manual will explain how the Nature Cycle provides these for the soil. It also will show what you can do to support and strengthen the Nature Cycle, instead of destroying or damaging it.

Ever since life began in the world the soil, water, plants, trees, animals and insects have all been working together sustainably in their eco-systems in a cycle. This is how the earth maintains its own health and develops the amazing diversity and the richness of Nature that we are able to use in our lives. Think back to Part 1 on the digestive system – the nature cycle and the human digestive system have a lot in common.

Death

The Nature Cycle can start at any point, and we will start with death, as it is such an important part of life. Death provides the food, the nourishment, for the whole cycle (very similar to the food that we harvest from nature for our nourishment). Death recycles all the natural organic matter of life on Earth. Think of a leaf or an animal that has died and fallen to the ground. What happens to it as time passes?

Decay & Nutrient Release

After death, the leaf or animal may be eaten by animals and insects and made into manure that returns to the soil. Or it may be crushed under a foot or paw (very similar to our teeth crushing our foods). After it is crushed it mixes with natural juices in the soil made by very tiny animals called micro-organisms (very similar to the enzymes in our digestive system, especially in our stomach). As the leaf decomposes the nutrients from it are released into the soil. Then they are absorbed by the roots of plants growing in the soil (very similar to how the intestines absorb nutrients).

Growth of plants, trees and animals

When the plants have all the nutrients, soil, sun, water and air that they need, they can grow strongly (just like people!). Different kinds of plants and trees (different species and different varieties) need different conditions and amounts of these inputs (just like different people!). Some plants need lots of sun or water, for example, and some need hardly any. Think about the differences between the plant and animal life in different eco-systems - from deserts to lakeside, or marshes to forests. Also think about people in different parts of your country, and different parts of the world.

Use of plants, trees and animals

All the plants and trees that are growing in the soil are used, or eaten, by humans, animals, insects, birds and fishes. Plants and animals use each other in other ways too. A climbing plant might grow up a tall tree, for example, or a bird uses plants to build its nest. Humans use all this plant and animal life for eating, building, and making all the things we need for healthy and productive lives. While alive, all animals and humans make manure, which must be returned to the soil (just like at the end of our digestive system), and when living things die their bodies return to the soil too, feeding and strengthening the Nature Cycle.

Inputs

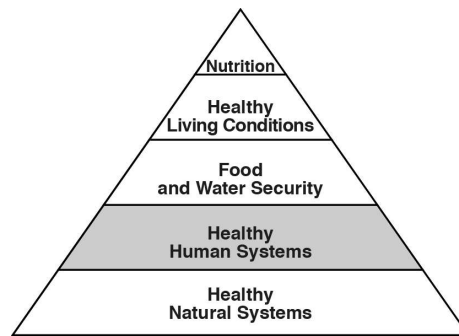
Just as death is a vital part of life, so are the natural 'inputs' of sun, water and air. These inputs are needed at every stage in the Nature Cycle. They help the breakdown of natural materials. They help the growth of plants, trees and animals. They help us wash, dry or cook the things that have grown, and they help us use other natural materials for building, energy and every other thing we create; nature is the provider.

Topic 21: Composting Toilets

In Permaculture there is no such thing as waste. Everything is a resource, including human manure.

An adult human produces enough NPK in a year to grow about 250 kg of maize. This is more than enough for 4 adults who eat a balanced diet! We could stop using artificial fertilizer if human manure and urine was used properly and not wasted.

Composting toilets are designed to return human manure and urine back into the soil where it belongs (according to the cycles of nature).



Composting toilets make a healthy and nutrient-rich fertilizer for healing and enriching the soil. It is a totally natural, sustainable, biodegradable resource. (Composting toilets are not the same as using 'night-soil', which is when human manure is used without composting it first – night soil is usually an unhealthy and dangerous practice.)

The number of people in Malawi using composting toilets has grown in recent years. There are excellent composting toilets in schools, hospitals, businesses, markets, offices and homes. Composting toilets are included in the School Health and Nutrition guidelines (2010) and are promoted in Malawi's Sanitation Policy (2008).

Problems with flush toilets

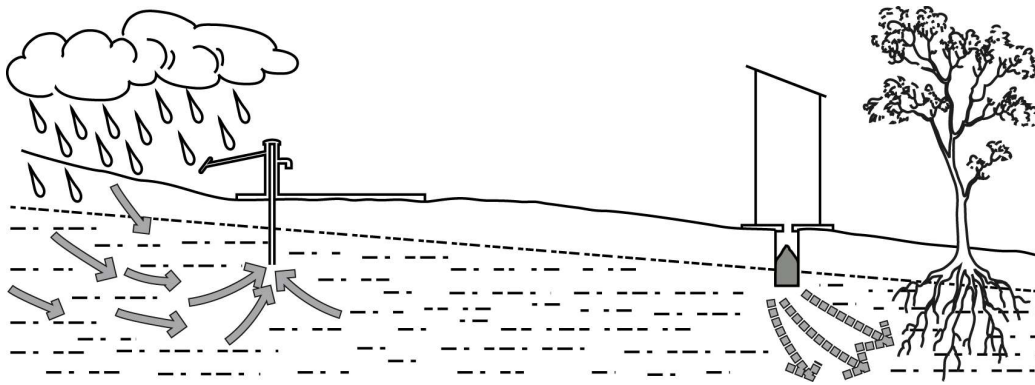
- Flush toilets are hard work and take a lot of resources to build
- Flush toilets waste a lot of water
- Flush toilets waste the manure and urine
- Flush toilets can pollute water supplies

Flushing toilets are only sustainable if the water source is sustainable and if the resources from the toilet are put through a composting or bio-gas system to produce energy and / or fertilizer. (See Part 1, Topic 12, Energy use in the Kitchen).

Problems with pit latrines

- Pit latrines are hard work to build
- Pit latrines risk collapsing
- Pit latrines can pollute the water supply
- Pit latrines must be dug again when the pit has filled
- Pit latrines smell bad and attract cockroaches and other insects

Pit latrines are very common in Malawi. They must be built at least 30 metres from any water supply (according to the national sanitation policy), and should be sited down hill, away from water sources. Otherwise, the water you drink may be contaminated with the manure from the toilet.



The manure in the pit decomposes very slowly because there is no diversity of organic matter to balance it. If you add organic matter you reduce the smell, and help it rot down, but the pit fills up quicker.

Composting toilet systems

Composting toilets have many benefits, which are attracting more people to use them:

- **They can be less work** to build, especially the designs that are permanent shallow pits, buckets / bins, or small temporary holes. There are also higher input designs.
- **They supply endless free fertilizer** as the 'wastes' from humans are continually returned to the Nature Cycle as nutrients. Say good-bye to wasting money on sacks of NPK!
- **They do not smell or attract insects.** Because the manure and urine is covered with organic matter after each use, there is no smell and decomposition is quick.
- **They greatly reduce (if not eliminate) the risk** of contaminating underground water, but should still be built more than 30 metres from any water source, to be safe.
- **They do not need water** to make them work
- **The designs are more stable** than pit latrines and less likely to collapse.

How Composting Toilets Work

All composting toilets work the same / similar way with the same principles.

Every time you use the toilet you cover the manure and urine with a handful or two of organic matter and soil. The manure, soil and organic matter builds up in layers and micro-organisms digest the manure and other organic matter to create healthy soil. Very simple! Within 4-6 months the manure has completely gone, replaced by wonderful rich soil for your plants.

A container of organic matter is usually kept next to the toilet or behind it. Crushed dry plant matter mixed with soil is the best combination. Sawdust, peanut shells, rice husks, crushed leaves and/or dry grass all work well mixed with an equal amount of soil or half-finished compost. Use enough organic matter to cover the manure and soak up any urine. (Some designs separate manure and urine, because urine can be used directly without composting first and you want to avoid getting the compost too moist – it depends on the system you design.) People usually scoop the organic matter with their hands and doing this is a good reminder to wash them! Make sure you design a place to wash hands near to the toilet.

Once the compost toilet chamber is full, close it and leave it for 6 months to compost. After 6 months, the compost can be taken out and used like any other compost. It looks like, and is, good, rich compost and it will be wonderful in your garden, farm, orchard or forest!

With some designs, when the hole is a little over halfway full, cover it with soil and add a tree with some helpful plants around it. You do not have to wait 6 months and you do not harvest the compost because the roots use the nutrients on their own.

Designs for Composting Toilets

There are several ways to make a composting toilet. Some are extremely cheap; others are more expensive. Make your decision based on your resources and creativity. We will look at a few designs in use already but you can adapt them to your own situation.

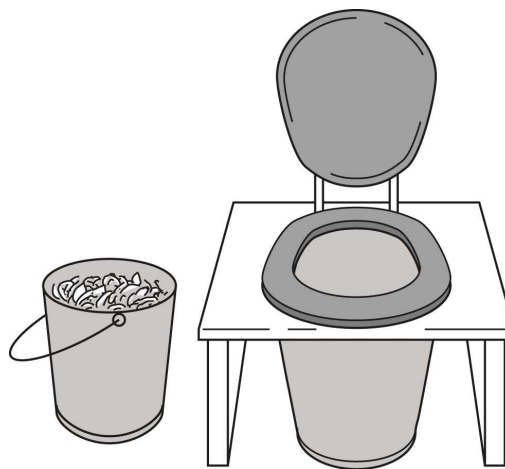
With each composting toilet design you need a container with a mix of organic matter and soil next to the toilet. This is for covering the manure and urine. You also need somewhere to wash your hands after using the toilet, and a few plants growing where they can benefit from the hand-washing water, of course!

Bucket system (loveable loo)

This system is the cheapest and can be used by just about anyone, anywhere. You do not need much more than a bucket and somewhere to empty the bucket when it is full.

You can easily make this design comfortable, private and pleasant to use. This system is great for a family but can be adapted for larger groups.

Use a 20-litre bucket. Build a toilet seat frame around it. You can make a wooden box, or take the seat out of a chair that fits over the bucket. Or you can just squat over the bucket (as over a pit latrine).



Privacy shelter. The toilet can be put inside a house in a private place, or you can make a special shelter outdoors. The toilet will not smell when used properly (except when someone is actually using it, which is normal for any toilet.)

When you use the loo make sure that you cover the manure and soak up the urine with the dry organic matter / soil mix. If the toilet starts to smell you need to use more covering material. Make sure your covering mix both covers manure and soaks up urine.

When the bucket is full (in about 2 days for a family of 5), it needs to be emptied onto its own compost pile. You can dig holes in the ground, use old drums, create bins, or make heaps on the ground. Put it out of the way somewhere. It is safe as long as the compost is covered well and left alone, so no one digs in it. It needs to be undisturbed for 6 months.

The 3-bin system

This organises the compost well and makes good use of space. (A compost pile tends to spread out a bit, but a bin holds the compost together). The bins can have a door or gate that can open on the front of them to hold even more compost in.

- **One bin** is being filled with the manure from the toilet bucket.
- **Another bin** is the compost that is maturing (when that bin has been filled).
- **The third bin** holds organic matter for covering the fresh manure after it is emptied into the first bin. This can also be used for re-filling the container (for covering materials) that is next to the toilet.



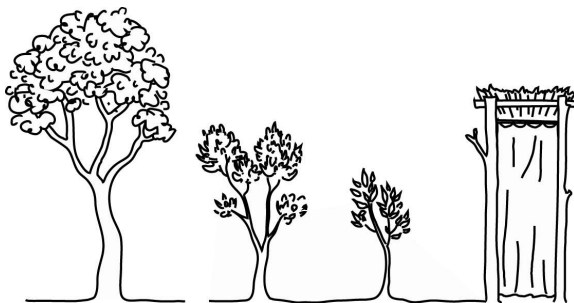
After emptying the bucket into the compost bin, rinse it with a little water and pour it on the compost. All the manure and moisture in the compost bin should be covered with dry organic matter so there is no smell or flies.

When a bin has been filled, let it mature for six months. Start putting the manure into the other empty bin. By the time this second bin is filled the first one should be ready to use in gardens, fields and orchards. Always keep lots of organic matter in the middle bin so you do not run out.

Each bin gives the equivalent of two bags of NPK, which would cost about USD100! But this natural fertilizer is much more valuable than a bag of chemical NPK, and has many more nutrients, micro-organisms and organic materials that are much better for the soil and improve its water holding capacity

So, when you have your compost toilet working, invite some guests over to learn about your new system and to help you fill it. Every guest can add to your resource!

Moving shallow pits (arbor loo)



This toilet is moved every few months and a tree is planted each time the toilet is moved. This is where the name comes from, as 'arbor' means tree. This is good for people who want to plant trees and have the space for it

- Dig a small pit (usually 60 cm x 60 cm is good but it depends on your design).
- The toilet (san-plat or chair with no seat etc.) is placed over the pit – the san-plat will often determine the size of the pit, to make sure it doesn't fall into the pit.
- Cover your manure / urine with organic matter after each use. The urine will sink into the ground and any plants or trees around will drink it up.
- Wash your hands after each use.
- When the pit is almost full, cover it with soil and plant a seedling in the centre.
- Dig a new pit somewhere else and start again.

Many builders in Malawi know how to make a **san-plat**, which uses about ¼ of a bag of cement and some sand. Make sure that you can move the san-plat when it is done! Make it strong, but as light as possible. It helps moving it if you design it with handles and make it round so it can be rolled.

For privacy, create a lightweight structure that you can move, using poles, mats, sacks, cloth etc.

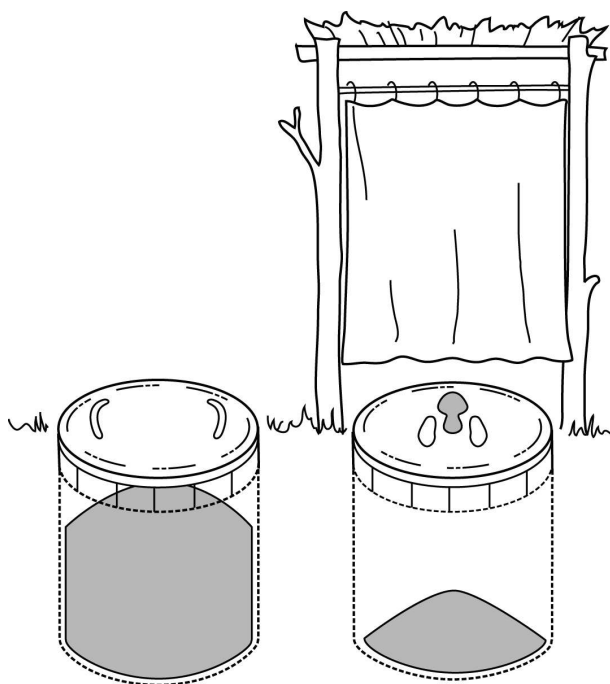
Permanent shallow pits (fossa alterna)

For this you have two or more holes in the ground that are used over and over again. This is where the name 'fossa alterna' comes from as it means 'alternating pit'. While one pit is filling up, the others are closed and composting for 6 months.

The pits are shallow so that the compost can be dug out of them when it is ready. Usually they are 1 x 1 x 1 metres or less in size. The pits need to be strong enough to hold the san-plat so they are usually lined with bricks, clay or mud.

You can either have a moveable san-plat like in the arbor loo, or you can make a san-plat for each pit that is lifted up to empty the pit.

You need to make it clear which toilet is in use and which toilet is closed and in the composting process. (You could just put something heavy, such as the filler bucket, on the toilet that is full and turning into compost. This will remind people to use the other one!)



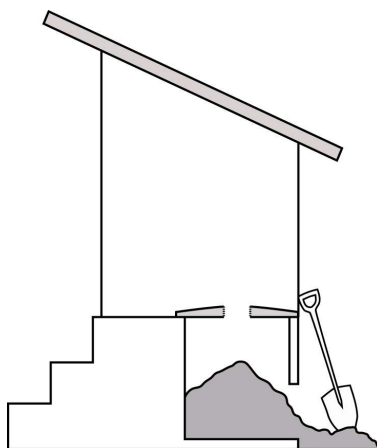
Permanent chambers (sky loo)

This toilet is called a Sky Loo because the toilet (the 'loo') is above the ground, in the 'sky'. They are good for institutions that have lots of people, as the bins can be made quite large, are easy to maintain and access the compost.

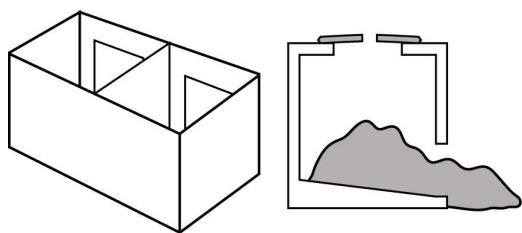
They are also good for people who can afford to build them at a family level, as there is more input that will need to be considered if it is worth the extra effort.

This system is gaining recognition for use by schools, health and other public places.

Two cement chambers are built with doors for taking the compost out of the back. This design can be built quite large to hold lots of compost.



These systems often channel the urine away to a container or banana-pit, depending on how the chamber is designed to manage moisture. Diverting the urine also allows you to use the urine more quickly (because it does not need composting first).



As with most other models, one chamber is used until it is filled up and then closed and then the other chamber is used, while the first chamber composts for 6 months. When the compost is ready, the back door is opened for easy harvesting.

Urine

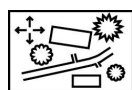
About 15-17% of your urine is nitrogen and can be used fresh, without composting. The amount of nitrogen will vary with the quality of your diet, so be sure to balance the food groups you eat and drink enough water every day.

Urinals can easily be made for people to use with buckets or jugs. In Malawi it is a "*gututu*". In some countries it is a 'chamber pot'.

Using urine: Mix 1 part urine with 5 parts water and pour it around plants and trees that need it.



Where is your toilet? Is it a toilet that cares for people and the earth?
If not, what can you do to improve it?



Note on your map where your toilet is and what kind of toilet it is.

YOUR NOTES

Sustainable Nutrition Manual

Food, Water, Agriculture & Environment

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 a practical one to use 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.

Nordin, Stacia. *Sustainable Nutrition Manual: Food, Water, Agriculture & Environment*.
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