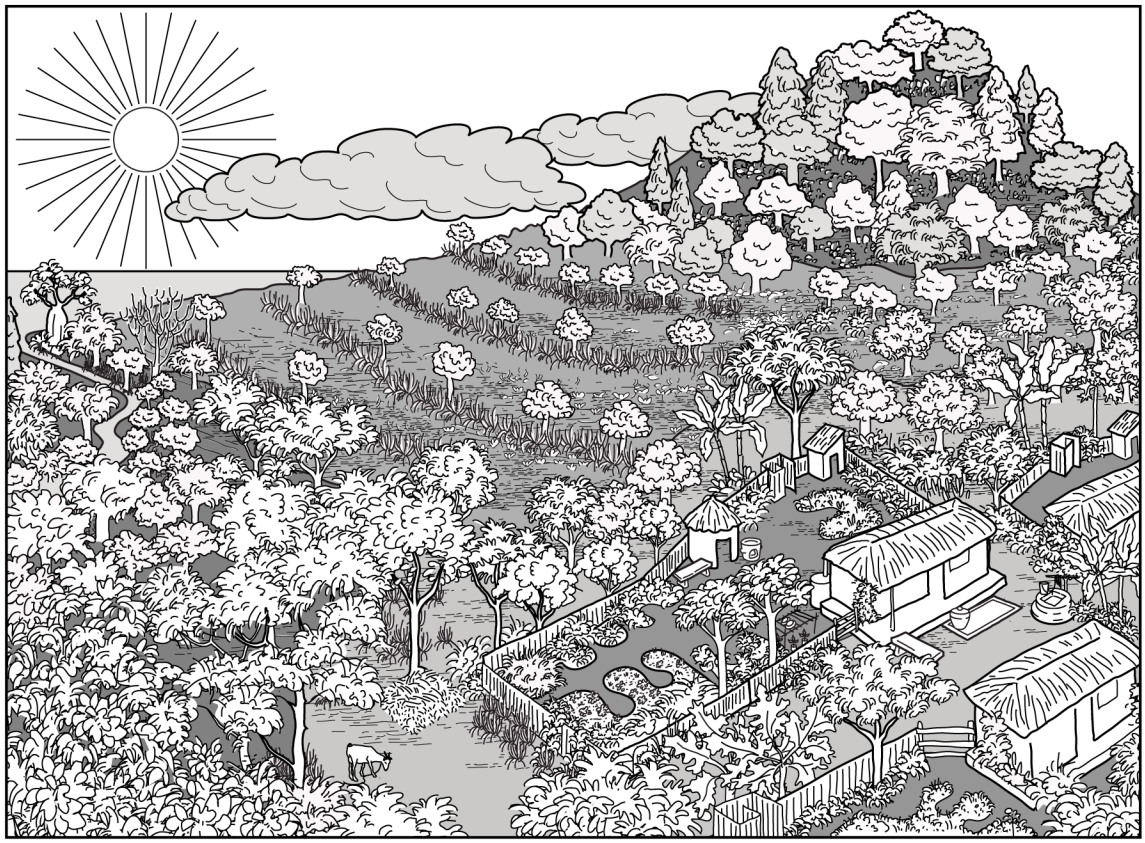
Sustainable Nutrition Manual

Food, Water, Agriculture & Environment

Part 3 Healthy Designs



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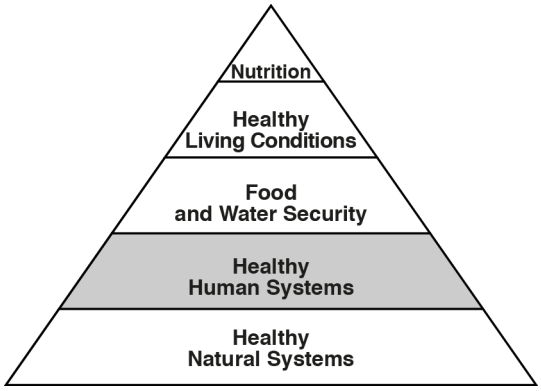
Part 3 Healthy Designs

This part of the manual brings parts 1 and 2 together with your own knowledge and experience. It will guide you to create a personalised design for achieving sustainable nutrition and a better future. You'll draw maps and sketches as you make your plans to make the most of all the resources that you have now, as well as building up resources for the future.

Topic 35: Designing for Sustainable Nutrition

Sustainable nutrition means good food, clean water, diverse environments and healthy living for everyone, forever.

If you have been making notes and discussing these topics as you have been going through the manual, then you have already started thinking about your plan to improve your life and environment.



Are you excited? You should be!

You have learned about:

- **A nutritious, balanced diet and lifestyle** which comes from diverse and healthy environments
- **The Nature Cycle, the Water Cycle**, and what humans do to help or harm them
- **Soil fertility and water management** and how you can improve things
- **Plant and animal species** and the importance of diversity for everything in life

Now it is time to bring these ideas together. Even if we are not gardeners or farmers ourselves we should all be supporting and working towards sustainable food and water systems if we want good nutrition for everyone. This could be choosing what to buy and what companies to support, or by taking action when companies, policies, politicians, etc. are not caring for the earth, the people or sharing fairly.

Design

Anything made by humans, a cup, a car, a house, a hospital, a gate or a garden has been designed, whether they are large or small, simple or complicated. Unfortunately, not everything is designed well or for sustainability. But we are going to change that!

You are going to make a **personalised design for sustainable nutrition** that will include small designs for some of the things we have discussed. These small designs will be part of a bigger design for Sustainable Living that will affect many areas of your life and it is going to change many things for the better.

Having knowledge and understanding is the first part of the design process, which you have already begun. Now, you will think things through further, discuss the issues with others, and come up with creative ideas to change the way you design and use your area – with about 80% thinking and 20% labour.

There are many resources in the Appendices in this part of the manual that you can refer to: A Guide to Common Foods in Malawi, Meal Planning Guides and suggestions for further reading and research.

Overview of the Design Process

The basic flow of designing is outlined here. After this overview, we will go into the details of each step:

Step 1: Mapping the Site

1. **Choose your site:** You should have an area that is 'yours' to improve – it might be through ownership, rental or responsibility, such as a school, office or hospital. You'll want to map the whole site, as a sketch at least.
2. **Observe your site:** Think about what the area is like now. Thinking is free! (Remember the 80:20 rule!) Thinking is the most important part of designing and can be creative and enjoyable. It will help you make the right choices and decisions so that your plan for Sustainable Nutrition works.
3. **Look at the whole idea,** the big picture, then look at the small details, then the big picture again, and then again at the details. This is an important part of the design process; changing focus will help you include everything that is important, big or small.
4. **Sketch a map of the area,** as it looks now, noting any key issues.
5. **Make lists** of resources, issues, problems and solutions.

Step 2: Creating your Design

1. **Start small, then get bigger.** Your design can be any size, but it is best to start small (about 20 x 20 m area) then grow bigger and stronger at your own pace. Learn from your successes and failures and gain confidence as time goes on.
2. **Decide the zones**. Make decisions about what will go where and why.
3. **Draw your design.** This will be a second map, which shows what you plan to do with the site, based on the map of what it currently is.
4. **Start collecting useful tools** needed to make your plan become a reality.

Step 3: Implementing your Design

1. **Make an action plan** so you know what needs to be done, who needs to do it, what resources will be needed and when it should be done.
2. **Mark out permanent structures** such as pathways, roads, buildings and other infrastructure. Minimize compacting the earth and making it hard.
3. **Clear areas very carefully**, if they need to be cleared. Put your design into action, step by step, monitoring each step along the way.

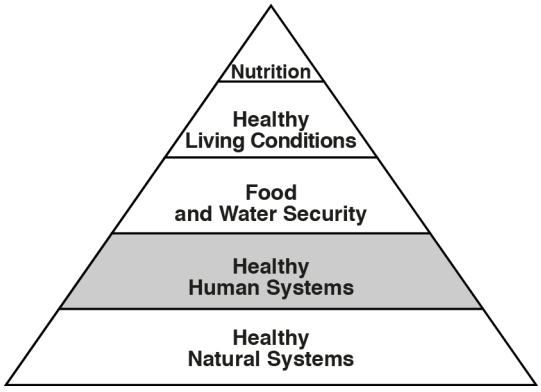
Step 4: Maintaining your design

1. **Make a calendar of activities,** such as: when to transplant seedlings, water, weed, harvest, manage animals, maintain buildings, roads, energy systems, community meetings, etc.
2. **Identify possible solutions** for problems that might arise: pests and diseases, theft, low or high rainfall, etc.

Step 5: Assessing your Design

1. **Monitor how things are working** and adapt your design and action plan as needed. There is a blank form in the appendix to fill in, which will last for 18 months of assessments. There is also one real example to guide you, filled in by the author, based on her own experience.

Topic 36: Mapping the Site (Step 1)



It is time to revisit the notes you have been making about your area. You should, by now, have a sheet of paper with a sketch of your area and lots of other information on. (It does not matter if it looks a bit messy, it will be useful!)

This will be used, along with your notes, to draw 2 new maps, which will help your visions for the site to become reality. A lot has been learned since you started reading, so pause for a moment and think. Look back through the book and read again any notes you made and then follow these steps to organise your ideas into a map and record that will be very important as you design your plan.

You will need to make two new, more accurate maps. One will show the area as it is at the moment and the other will show what the area will be like in the future. Your design will show where buildings, roads, paths and driveways are. It will show where you plan to put things so they work efficiently. Your zones and guilds need to work with things like compost heaps, growing beds, trees, animal pens, water tanks, solar panels, toilets and other structures. Remember - everything works together!

All the areas of a map will be labelled so that anyone can understand your plan without being there. You will use simple signs and symbols to show everything that is in the area. You do not have to be an artist to do this! Do not worry about making the maps perfect or pretty. A map is about getting the information down on paper in a way that you and others can understand.

Observing the Site

Go to the area that is your design site. Take a notebook and something to write with. Note your responses to these questions, which will guide the development of your map, your records and eventually your design. You have done an exercise like this before but you have learned a lot since then. You should do this more than once anyway, because you need to learn as much as possible about your site. You cannot spend too much time thinking about it! Sometimes we do not notice things that are right in front of us until we take the time to look and think.

1. **Close your eyes.** Take a few minutes to slow down, be still and calm and feel yourself as part of the area. What can you hear? What can you smell? How does the site make you feel? Does it help you relax or do you become tense and uncomfortable in this place?
2. **Open your eyes.** What are your first impressions? Is the landscape interesting or boring, pleasant or unpleasant? What makes it that way? What do you like about what you see? What is it you do not like? Does the area seem healthy or unhealthy to you? Write down what you see and what you were aware of when your eyes were closed – the smells, feelings and noises.
3. **Walk around to see the site from different points of view**. Think about what happens at different times of the day and different times of the year? Do this several times to really get to know your site and ask others who know the area better than you do, or who just see it differently to you.

4. **Where are the North, South, East, and West?** How does the sun move across the land at different times of the day? Which areas are always sunny or partly sunny? Which areas are always in shade or sometimes shady? Where does the wind mostly come from? What about the rains? Do these things change during the year?
5. **What is the climate?** How does the climate change in different seasons? Have the seasons been similar every year or are they changing? Are there some areas of the site that are hotter, colder, wetter and drier, sunnier or shadier than other areas? (These are called micro-climates)
6. **What does the soil look like?** Is the soil different in some places? Are there areas that have many plants and some that are bare? Think about all the things that might cause these differences: micro-climates, soil, moisture, sunshine, human activity etc.
7. **Does the land slope?** If so, how much? Are there signs of erosion or soil loss?
8. **How does water flow?** Think of rainfall but also run-off water from water points, roads or roofs. Where does the water go? Are there drains?
9. **What is growing in the area?** Are there mature plants and trees? Are there annuals like herbs? Are there any food plants or other useful plants? Are there natural guilds already, with climbers, supporters, diggers and food for the soil?
10. **What signs of animal life are there?** Can you see any domestic or wild animals? What effects do they have on the area? What needs do they have? How can animals be encouraged and included in your design, so that they can add manure and serve other purposes?
11. **How do humans use the area?** Are parts of it used for work, play, agriculture, animals, access, relaxation etc.? Can you find out the history of the area? History can help you learn what your site has experienced. These can be natural like flooding or fire or it could be pollution and chemical use. Are there plans in place for that area? It is helpful to discuss past history and future plans with people who use the areas near your site.
12. **What kinds of buildings and other structures are there?** What are they made of and what are they for? How do these affect the water, sunlight, soil, wind or rain? What effect does water, sun, soil, wind or rain have on the buildings?
13. **Are there roads, paths, driveways or fences?** Where are people and animals walking? Do they use established paths or are they making their own? Do vehicles move through the area? If so, what sort of vehicles and why?
14. **What improvements could be made?** What are the challenges? What are the solutions? With a lot of thought, some work and determination could this be made into a great place to live, work, travel through or play in?

Review the list of problems you have noticed since you started reading the manual. Wasted space or water, soil erosion, shortage of food, loss of local knowledge, unhealthy toilet practices, high use of firewood, unhealthy plants and soil, unnecessary use of chemicals, low yields, mono-cropping, mono-diet, piles of rubbish and waste etc.

Review and add to the list of resources. Resources are numerous: soil, minerals / rocks, sun, water, plants, animals and human materials. A big tree is a resource for food and shade and maybe it fixes nitrogen in the soil. Water may be causing a problem but is a vital resource that we need to use more efficiently. The wall of a building is a resource if you use it as a supporter for climbing plants. Think about the 7 functions of a guild. What do you have in the area already? (Human needs; soil food, soil-cover, diggers, climbers, supporters, and protectors).

Drawing your Map

Standard information on a map

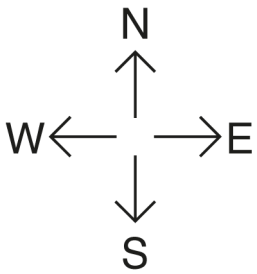
There are some pieces of information that should be written on every map. This information can be written small, so there is room for lots more interesting information.

- **Place**:
  The name of the site and where it is

- **Author:**
  The author is the person making the map, so your name goes here. You can put your phone or email, too in case people want to contact you about it

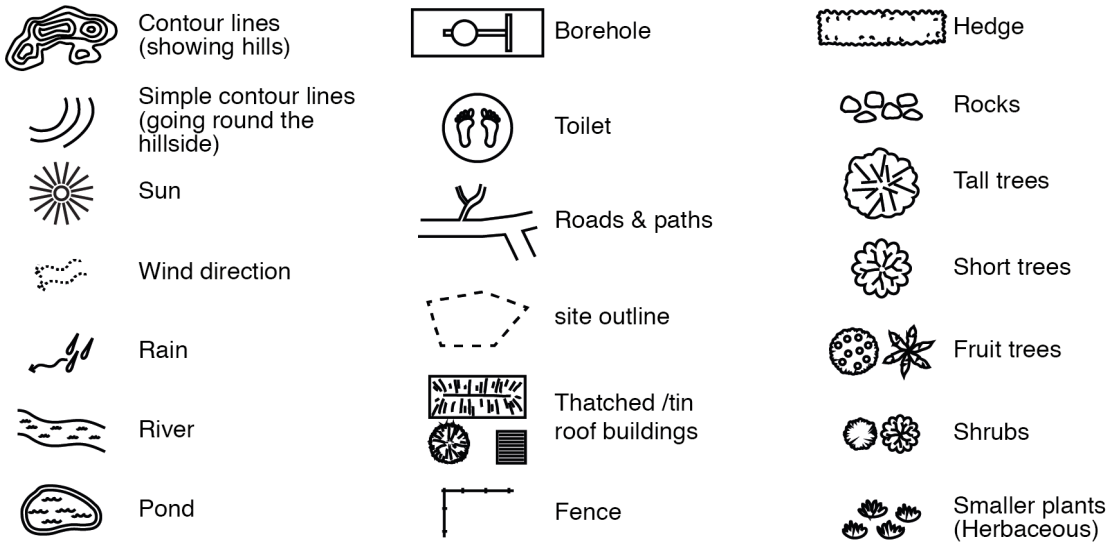
- **Date:**
  The year, month and day the map was made

- **Orientation:**
  This means which direction you are facing when drawing the map. The compass points are N (North), S (South), E (East) and W (West). North is always at the top of the map and south at the bottom.



- **Scale**:
  Maps show things smaller than they are in real life. A road map might show 1 kilometre of road as 1 centimetre on the map, so there will not be much room for detail on the road map. That scale would be shown like this: **Scale 1km : 1cm**. Lots of detail will need to be on your map so 1 metre in real life could be shown as 2 cm on your map, shown like this: **Scale 1m : 2cm**. Choose a scale that suits your purpose. It depends partly on how large your site is, and partly on how large your piece of paper is!

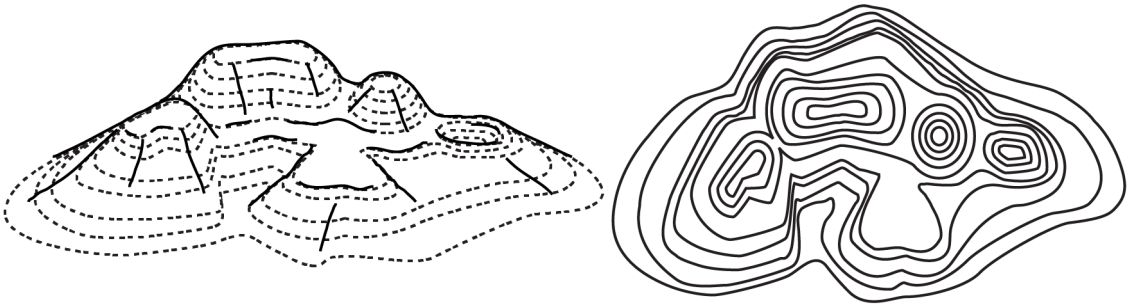
- **Key**:
  Develop symbols to show what is there in a simple way. This is called a key or legend, and it tells what each symbol means. You need different symbols for different kinds of plants, different buildings, paths, roads and geographical features.



Measure the area, or pace round it, counting your steps: Try to get an idea of the shape of the area. (Different ways to estimate area measurements were suggested in Part 1, Topic 22 Water Management when we learned about rainwater calculations.). Try to be as accurate as you can, but it does not have to be perfect.

Draw the boundaries (the edges) of your site on your map. Allow room for some of the area around your site and for the standard map information listed above.

Draw the geographical features that are a part of the landscape: Draw some simple contour lines for the slopes, hills and dips in the land (We looked at contours a little when we learned about Swales in Part 2 Topic 23 Water harvesting.) The second picture here shows the contour lines on this hill as if seen from above. This is how mapmakers show hills and slopes on maps. Add arrows pointing the direction downhill if this isn't clear or obvious.



Draw the other things that are in the landscape naturally: big rocks, large trees, rivers, streams, lakes, ponds etc. Put arrows on rivers and streams to show the direction water flows in.

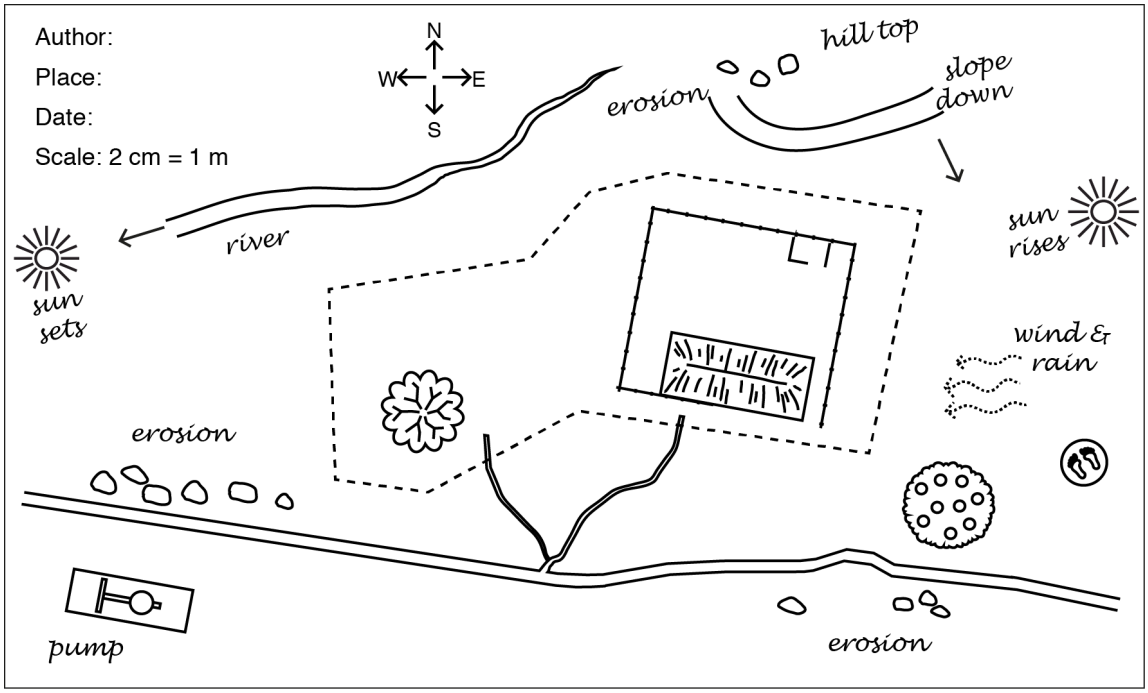
Mark the external factors. These are things like sun, wind and rain. Make it clear which land has the most and least sunshine, the direction the sun travels and where the winds and rains come from. Include the direction any fires would come from, or wandering animals or people, or even smells! Anything that comes on to your site from outside the area, and that could be significant to your plans, should be noted.

Draw the infrastructure, the things humans have built or put there: roads, paths, drains, bridges, buildings (houses, schools, hospitals, shops, markets) boreholes, wells, gardens, orchards and so on.

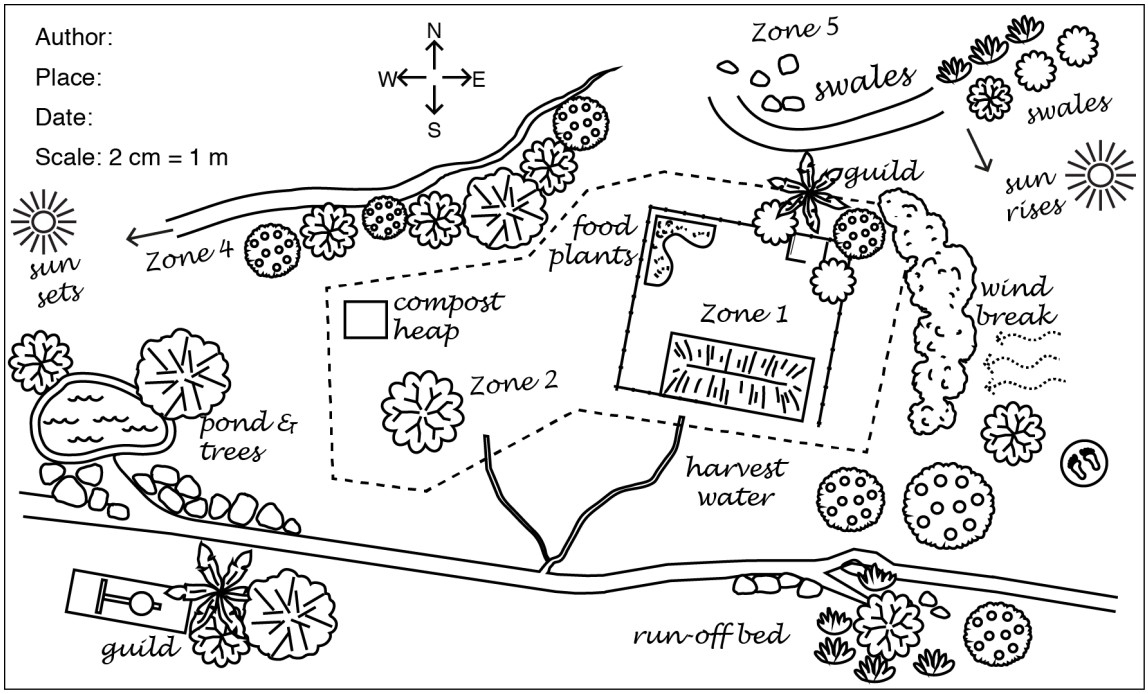
Make notes of what areas are used for: working, living, playing or relaxing, meetings etc. Note any area that you know is going to change, such as a new school block, an extension to someone's house or a new road being built. Note any problems in the area, like erosion, standing water, wasted areas or rubbish.

See the Whole Picture! Stand back and look at the map to see if it looks like your site. Make any adjustments you need to until you are happy with it.

Map of the present site:



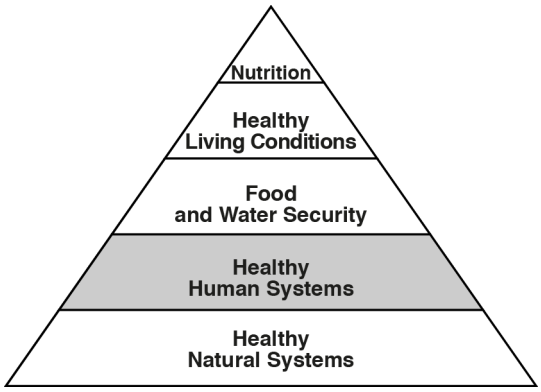
Design for the future:



Topic 37: Creating your Design (Step 2)

Decide what goes where and why. Permaculture zones were described at the end of Part 2. Go back and read this topic again because these are very important decisions and you need to be very well informed.

Making wise decisions about the different zones is a vital part of your plan.



Deciding on the Zones

The more an area is needed, or needs us, the closer it should be to where the people are. The less we need to maintain something or use it, the further away it is placed. Here is a reminder of the key points about the different zones with suggestions where the zones on your site are placed.

Zone 0 Buildings

This area is needed the most and is used, and looked after, every day. These topics have been considered in some detail already (in Part 1) and perhaps you have started making some changes. A few reminders of things that tend to be designed into zone 0:

- Food processing (e.g. solar drying, cooling, pickling, etc.)
- Food preservation and storage
- Food preparation (e.g. solar cooking, fuel-efficient stoves)
- Water, sanitation and hygiene
- Water Harvesting
- Water filtering
- Seed saving
- Worm farms
- Composting toilets

Zone 1 The Garden

This is often the area closest to your zone 0. Things placed in this zone should be things that need you every day and that you can care for every day. So this includes growing annual food plants and animals that need lots of watering, somewhere to recycle kitchen scraps and somewhere to do the washing. If your site is a school, or somewhere without much water, consider designing some of the area around zone 0 Buildings with more perennials, as zone 2 Orchards or even zone 4 Managed Forest. Perhaps you can find an area near some water source (kitchen, well or borehole) to establish a zone 1, and perhaps you could harvest water from a roof to make more of your zone 1. Here are some ideas that are often designed into zone 1:

- Annuals: greens, garlic, beans, etc.
- Plants that need daily watering
- Perennial vines on fences and buildings
- Chickens / rabbits in raised / mobile pens
- Drip irrigation
- Plant nursery for seedlings
- Bath and kitchen water into beds
- Worm farm
- Compost piles
- Compost toilet
- Hand-washing station
- Living fences
- Permanent paths
- Reduced or no sweeping

Zone 2 The Orchard

These are areas for guilds of perennial trees, shrubs, vines and small animals, which do not need too much attention. You can put things here that need watering or irrigation a few times a month rather than every day.

- Small perennials that provide fruits, nuts, fats (like avocado and coconut)
- Low maintenance annuals
- Small animals to work with orchards (ducks, goats, bees, etc.)
- Fish and ponds
- Mobile animal pens
- A bench in the shade
- Compost
- Heavy mulch
- Fewer paths
- Swales along contour lines

Zone 3 The Fields

In your fields there are primarily annuals and larger animals (in pens, rotated with crops or tethered) that will do well with the natural weather patterns of your area. Some perennials will be integrated. The attention this area needs should be seasonal and occasional, not daily or weekly. Here you will grow many of your staple foods and legumes, but any of the other food groups might fit in for you. You can harvest fuel here as long as you keep planting to replace what you cut and burn!

- Annual rain-fed crops (inter-cropped and rotated)
- Perennials on edges or dotted throughout.
- Windbreaks and living fences
- Larger livestock in pens or tethered
- Fewer, but permanent pathways
- Compost piles, heaps and pits
- Use of organic fertilizer, like green manure tea (Part 2, Topic 18, Soil fertility).
- Swales and check dams along contour lines
- Possibly irrigation

Zone 4 Managed Forests

Larger trees and other perennials in this area should be able to thrive with no irrigation, just the natural weather and rainfall of the area. You can have some carefully chosen annuals or wild species growing on their own. Products from zone 4 include: timber, fuel, building supplies, fruits, nuts, oils, livestock, honey, medicines, ponds, etc. This area needs your input to protect it from erosion using windbreaks and water management. It also needs you to support the natural diversity of the environment so that there will always be genetic diversity and there will always be some foods to eat in times when other crops have not done well.

- Large trees for fuel and building
- Trees for fruits, nuts and oils
- Wild annual plants (self-seeding)
- Seed stock for propagation
- Grazing animals (controlled)
- Wild animals
- Medicinal plants
- Bees and beehives
- Ponds with ducks
- Swales along contour lines
- Windbreaks and firebreaks

Zone 5 Natural Areas

The natural areas in zone 5 are kept going by natural cycles alone. Animals, plants and trees thrive there with little, or no, interference from humans. Some hunting and gathering may be allowed, depending on the local rules. Humans should do very little here apart from teaching others about the importance of these areas, and some of the following:

- Promoting and protecting bio-diversity
- Preventing and repairing erosion damage
- Planting native trees
- Sustainably collecting medicines, seeds or foods
- Thinking, meditating, being inspired

Things to Consider to be Efficient

A simple way to save yourself work every day is to think about how people behave (including you!) and arrange your design with peoples' habits in mind. Here are some examples but you will think up many more.

- **Think hard about where you want your paths** before you draw them on your map. Pathways should be designed to get around an area easily and take up as little space as possible. Sometimes a stepping-stone is enough to get into a bed, without adding a path. Paths should also be helpful to other people entering the area. There will be more information about designing pathways when we talk about converting your fields to sustainable, Permaculture methods.

- **Chores and daily tasks:** Make it easy to recycle used cleaning water by growing a guild where someone is currently throwing away used water every day. Put the woodpile somewhere that you pass every day on the way to the kitchen so you can easily bring a few sticks every time you walk by.

- **Access:** Do not put a guild in a popular pathway and expect people to walk round. Put the paths in the places where people want to go and work your planting around them. People are more likely to learn from your efforts if your efforts do not get in their way! If you really do not want people to pass through an area use something big, heavy and strong like thorns, bees, large stones, etc. along with conversation and / or signs and notices.

- **Space around the house can grow lots of food.** The plants do not have to be in square little beds behind the house. They can be dotted around the home and the community. This way they are easy to get to and easy to look after. Kitchen and food scraps are easy to collect and use on zone 1 beds, or feeding to zone 1 animals. Water in this area is easily re-used on plants in a guild.

- **Sweepings and 'trash' piles are full of organic matter.** If they are mixed with plastics, glass and metals that will not decompose sort the piles so you can use the organic matter. Recycle as much as you can from the rest. Metals that rust can be collected together to put at the bottom of a compost heap. They will break down eventually and return valuable materials to the soil.

- **Water run-off is wasted if it does not flow towards something useful**. Harvest the water round wells, boreholes and any source of run-off water. Water is also wasted when washing clothes or dishes. Direct the water somewhere it will be useful to grow plants.

Be creative to save time, effort and energy

While you are designing, be as clever as you can with your space, your time and all your resources. Think about this for today and into the future. Often the best ideas and solutions are very simple. Go ahead, do a little less work and be a little 'lazy' but think more creatively!

- Grow seedlings under the drying rack, so they benefit from the shade and water.
- Save and protect the trees that are there now, as well as planting for tomorrow.
- Use live fencing, for a permanent fence that doesn't have to be remade annually.
- Plant some surplus crops so you can sell some on.

Weather

Wind and rain can damage zones 0, 1, 2 and 3 because of the human structures and the more delicate, higher maintenance species in them. Using perennials and placing zones 4 and 5 in strategic areas of your design can help provide protection.

- **Protection:** You need to know where the winds come from to put in windbreaks to protect your crops and soil. Bush fires spread with wind, so you plan firebreaks where there is risk. Use trees and vines to protect and shelter your house.
- **You can harvest the power and energy of the wind** if you put a windmill in the right place. You can use the wind if you put windows on the side of the building that allows good airflow.
- **The sun always comes up in the East and sets in the West.** Take advantage of catching the sun's rays, heat or shade for species that need it. Knowing where the sun goes is important for all parts of the design, whether they are buildings, plants, trees, animal pens or compost piles. Think about the effects of shade on other species, like yourself, when you are sitting in a cool, shady place relaxing!

Yields and quantities

Remember that for everyone to eat all of the 6 food groups we need to grow and raise species from all of the six groups as a community or region. Consider the number of people in your household that need to eat and the amount they need from each food group. Look again in Part 1, Topic 5, Planning Food Amounts for information on calculating how much food you need.

Income generating projects

You are unlikely to be able to raise everything yourself (be completely self-sufficient) so think about what you will have to buy. Include various ways to make money in your plans so that this is possible. Make things you can sell using recycled materials, make food products from surplus foods, etc. What else can you do for yourself instead of paying money to someone else? What energy can you make using renewable resources? Think ahead… How can you plan to have fuel and building supplies, as well as food, in the future?

Needs for each species

You have a list of resources in your area at the moment. Find the right place for these in your plan. If something does not fit into your area, or you have too many, share them or sell to someone who can benefit. With guilds, just like any other farming methods, the plants, trees, and animals need the right amount of space. The big difference is that with Permaculture guilds you think about how each part can best use all the space and help each other. Look again at stacking to use all the different heights as growing spaces (See Part 2, Topic 26, Permaculture Guilds.)

Fencing

Is fencing really needed as part of your design? It is hard work building fences and takes time, energy and other resources like money and materials. If your community manages domestic animals, you probably do not need many fences. It could be easier to build a moveable animal pen to control where the animals are eating and dropping their manure on the soil than putting in a fence. Some ideas for better fencing are:

- **Live hedges designed with trees and perennial plants of different heights,** growing closely together make a very good live hedge, especially with a few thorny vines or spiky plants like sisal, inter-planted. If well designed, you can stop most intruders from getting through. The live fence can take a few years to become well established and, while you are waiting, you can create something temporary.
- **Live fence poles with dry grasses or reeds tied tightly across.** Live poles include bloodwood (*mlombwa*), *kobo*, tree cassava (*mpira*), moringa (*chamwamba*), cassava (*chinangwa*), jatropha (*msatimanga*). Other trees or buildings can be used as poles if you design your guilds around them.

Make your Design Decisions

You have a lot of information on your map and in your notes to put together into your design. You have taken many walks around your site, looking and thinking, seeing what the site is like at all times of day. Hopefully you have discussed with others, including your family or friends in the community, and you are ready to make your decisions. If you are working with several people on the site make sure everybody gets to talk things through and add to the discussion. This is really important for success. All ages and types of people have something to say, from the youngest to the oldest.

Drawing your Design

- **Re-check your map.** Walk around the area with the map, checking measurements and where you have put things. Make the lines a bit stronger when you have checked things. Make the map as accurate as possible.
- **Make another copy of the map.** This second map will be your design. The first map will be useful for reference and to show the 'before and after' of the area.
- **Sketch your design with its zones.** As when you made the first map, you will sketch your design ideas lightly onto your map before finalizing it. Make decisions about the different zones and mark them on the map.
- **Add the things you have decided to include in your design**, like water harvesting, compost toilets, guilds, bio-gas system, swales, drip irrigation, animals and pens, pond, beehive, a nursery, etc.

Use small pieces of paper or sticky notes and write each element (e.g. toilet or swale) on one note. This way you can easily move the different things around until you are happy with the arrangement. In your notebook, note the resources, techniques, and ideas that you want to use for each of the elements you have decided on.

Make detailed individual maps of all the areas and elements of your design if you need to, especially when the area you are designing is large or complicated. It is a good idea to go to the area and mark out paths, planting beds and other elements with sticks, stones or lines drawn in the soil. This is helpful for showing others your plans and to help you understand how your ideas will work together.

If you have doubts about anything, think and reflect on the issue. Ask others for advice and, most of all, ask yourself, what would Nature do? Every single thing in the plan must be there for a reason and should be an answer to the following questions. It takes a while to remember these but it soon becomes automatic to think like this.

- ***The Three Ethics***
  Does your design care for the Earth, care for its people and share its resources fairly?

- ***Soil***
  What are you doing to heal and care for the soil?

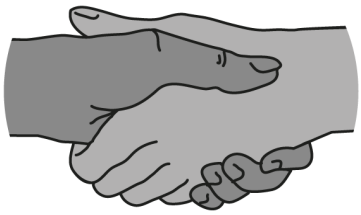
- ***Water***
  How can you make best use of all your water?

- ***Bio-diversity***
  Are you choosing many kinds of species that are right for your area?

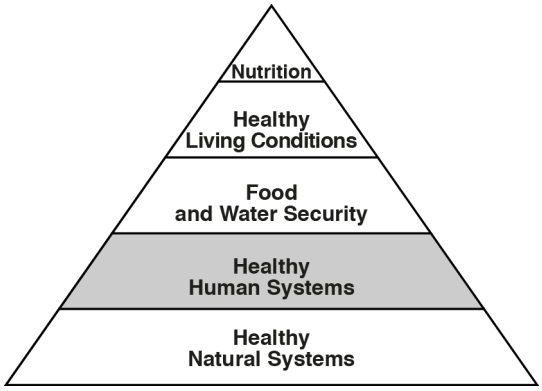
- ***Efficient Care***
  What do the plants and animals in your guilds need to be healthy?

- ***Efficient Space***
  Are you making the best use of space?

Take your time to do this. You will be living with these decisions for a long time so they need to be the best decisions you can make!



Topic 38: Implementing your Design (Step 3)



Your design and notebook will be full of things to do, but you cannot do them all at once, so an **action plan** will help to decide what order to do things in.

Start small and let your vision grow as you see the results and the benefits they bring. Now that your design (your vision) is down on paper you need an action plan.

Whether you are working this out for yourself or working with others in a group, an action plan is important for clear communication. It is simply an ordered list of everything that needs to be done with details of how it will be achieved.

Make an Action Plan

For each element of your design the plan needs to have the following information.

- **What** do you want to do? What **Action** do you need to take?
- **Why?** What is the **Outcome**?
- **Who will do it? Who** else needs to be involved?
- **When** do you want to do it? **When** do you want to do it by?
- **What** resources will you need? **What** else should you consider?

As you make these plans, think about the seasons, climate, other people's workloads, availability of resources and any other things that you need to turn your ideas into action.

You cannot write down everything that you will do over the next few years on one sheet of paper; start with a broad plan that will be a complete design and do a detailed action plan for the first few months or the first few projects you have chosen to begin with. Ideas about your design might need to change as you start working on the action plan. That is fine as long as you tried to think it through first as best as you could. You will need to be adaptable and thoughtful throughout your work.

You should review the action plan every month or so.

- Are you achieving the things you set out to?
- Are the results what you expected?
- What else do you need to do?

Your personal action plan will be very different to anybody else's. The sample below just shows the kinds of information you need. There is a blank Action Plan (Appendix 3, page 96) that you can either photocopy or draw onto paper. Whatever you use is fine, just be sure you are thinking ahead, to be as efficient as you can be!

There are also some tips in this section on how to start and some useful tools to consider which will assist you in making your action plan. The next topics, 39 and 40 are about maintaining and assessing your designs and will also be useful for your action plan.

Date	August 2014	**Season**	Hot / dry	**Name**	Phiri Family
Week 1					
Action	**Outcome**	**Who?**	**When?**	**What is needed?**	
List: Resources, problems, and possible solutions Draw sketch map	To develop plan To show and discuss with neighbours See the Whole Picture!	Mum and oldest child	Monday afternoon May take a few days. Will add to the list over time	Paper, notebook, pencil, tape measure. Put map and plan where all can see them (Make a notice board for this?)	
Discuss pathway design with neighbours	Community understanding and agreement	Mum and Dad with the adults Children with other children Youth with other youth	During the week		
Take photos of site	To record development and involve kids	Kids	After school	Borrow camera from friend	
Eat more diverse foods - add one new food to each meal	Diverse diet = better nutrition Be Diverse!	Mum, Dad take turns cooking with the kids Observe, Learn and Share!	Every day	Kids choose tasty recipes Mum and neighbours swap different veg	
Collect stones and rocks to mark paths	To mark pathways	Kids and their friends	After school, (until there are enough!)	Decide a place to collect stones.	

Date	August 2014	**Season**	Hot / dry	**Name**	Phiri Family
Week 2					

Action	**Outcome**	**Who?**	**When?**	**What is needed?**
Review last week's action plan. List tasks achieved and new actions	Assessment of design	Whole family	One quiet evening!	The plan The map Note-paper Pencil
Continue to collect stones and rocks to mark paths Meet with neighbours to discuss and agree	To mark pathways	Kids and their friends Neighbours	After school, (until there are enough!)	Pile them near the bafa (bathing room)
Make tippy taps for kitchen and near toilet	Better hygiene Recycling plastic bottle	Dad and kids	After school this week if possible	Bottles String Soap Water
Do water needs calculations for the family. Work out how much water can be saved from the roof.	Water harvesting Think Ahead! Be Efficient!	Auntie Precious (who is good at maths!)	Paper and pencil	Paper and pencil, tape measure Get kids to help measure roof size
Collect materials to make a gutter for roof	Water harvesting	Auntie Precious and Uncle Jonathon (they know how to do this) Kids collect tin cans (and flatten them)	Every day, (look in 'trash' piles)	Collect tins cans, box or bag to store them in. See solutions not problems!

Date	August 2014	**Season**	Hot / dry	**Name**	Phiri Family
Week 3					

Action	**Outcome**	**Who?**	**When?**	**What is needed?**
Review last week's action plan. List task achieved and new actions	Assessment of design	Whole family	One quiet evening!	The plan The map Note-paper Pencil
Continue to collect stones and rocks to mark paths	To mark pathways	Kids and their friends	After school, (until there are enough!)	Pile them near the bafa (bathing room)
Mark out pathways near house Collect mulch for areas between paths	No stepping areas start to heal the soil Somewhere to recycle grey water and grow food	The family with neighbours Think co-operation, not competition!	By the weekend	
Build compost heap Collect layers of compost materials	Soil health and fertility Recycle kitchen waste	The whole family		Choose a site for compost heap, with reasons
Assemble tin can gutter	Water harvesting Be Efficient!	Auntie Precious and Uncle Jonathon	Before the next rainy season	Mallet or heavy wood block to flatten cans, wire, hammer, nail for holes
Make an A-Frame	To dig level swales on slopes	Mum and dad	Before the next rainy season	Long pieces of wood, rope or string, stone weight, pencil or pen

Useful tools

What tools are available? You will need to start collecting and making useful tools. These items are not too difficult to get hold of. Look around and make use of what you have and try to borrow some things if you do not have them yourself.

- Rakes made from twigs (or shop-bought) to collect mulch
- Containers, baskets, pots and bags to harvest, collect mulch, store seeds etc.
- Planting containers of any kind: boxes, baskets, old cans etc.
- Bottles for SODIS (solar disinfection) and drip irrigation
- Large containers for water storage, filtration, and making manure teas
- Buckets, watering cans, hose for collecting and pouring water, manure teas, and collecting honey or other produce
- Handcarts or wheelbarrows to carry water, tools, compost, crops etc.
- Sickle, machete to trim perennials, cut, dig, chop and slash
- Hoes, shovel or spade for making planting stations, swales, channels, pit beds
- An A-Frame for finding the contour levels
- Knife, scissors, clippers to trim and propagate plants by grafting, budding etc.
- Twine, sisal, strips of inner tube, rubber tyres
- Timber, hammers, nails, and wood saw to build animals pens, compost heaps, fencing, raised bed edges etc.

Mark out pathways

Start by making changes in zones 1 and 2 (Garden and Orchard). Many of the changes in these zones are really easy to make and will have an almost immediate effect by improving your life, your diet and your area.

It is really useful to **mark out pathways** all over the area, and around your house, early on. Marked paths help people learn not to step on the areas that you will be planting. It is useful to start mulching those areas or making compost piles there. (A compost pile is a fantastic and easy way to prepare some ground for planting in a few months' time! You can get on with other jobs while nature digs for you!)

Mark pathways using stones, rocks, sticks, bricks, or any other method you can think of. Choose the most attractive materials for areas around your house so the area looks neat and tidy. It will look lovely when there are plants growing there, in soil that was dusty and bare before.

Clear carefully

Part 2, Topic 19, Soil Health and Conservation gave some reasons for, and tips on, clearing your area with care. Over-clearing and burning are two very common mistakes in Malawi; instead do the following:

- **Trim plants and trees carefully.** Look at the plants and trees that are already growing and work with them if possible. Do not cut out everything in the area just to make it look 'clean and tidy'! Trim and cut back plants if you need to, otherwise just leave them in place. If you do cut something out leave the roots in the ground to decompose, so that the soil is opened up and enriched as they rot down.
- **Do not burn to clear areas**. Burning damages the natural balance of the area and destroys the diversity. Burning is harmful to the soil, air and humans. Use branches and leaves as compost, bury them, cut them up as mulch, or find another use. If you have to burn it, use it as firewood. Do not waste it.
- **Start small and grow big**. Do not be tempted to clear a big area all at once. Start by working on a small area that is easy to get to, and which presents an immediate problem, like dealing with water run-off, or building a compost pile near the house. Then, one by one, tackle the other things in your action plan.

Think before you dig!

Do you really need to dig the whole of a planting area? Digging exposes the soil to wind and water erosion and disturbs the work of the animals, insects and micro-organisms that will work to make healthy soil if you let them.

- **In Nature the soil is soft and fertile,** ready for the seeds that are spread around. We can copy this but we have to keep the soil in good condition.
- **It can be useful to dig a zone 1 bed the very first time**, depending on the health of the area, so you can mix in lots of organic matter and compost. This is the only time you will ever have to dig this bed if you take care of it after that.
- **Make sure that your planting includes diggers and ground-cover plants** so you never have to dig an area once you have your guilds growing there.
- **Heavy mulching is what you need in zones 2, 3 and 4.** Only dig planting stations as big as you need to for the plant or tree you are putting in.
- **Use animal tractors or pens** to improve the soil for future planting. Thinking ahead reduces your labour and improves the results.
- **Let insects do the digging!** Put a 50cm or more layer of organic material and leave it for a week or two. Insects and small creatures will soften up the soil.
- **Avoid walking on areas that you will be planting**. Encourage people to use pathways, explain why, and make paths convenient for people to use.

Planting

In your plan you considered these, but you still need to be aware of them as you work:

- **New discoveries of plants and animals.** When you find something new ask yourself if you can use it, or work round it, or what purpose it could serve elsewhere.
- **Do not put more than one healthy seed in a planting station**. If you do you will need to thin them out. Each seed needs its space to grow.
- **Sow thickly and thin out later** works with some species but not others. Try it with leaf vegetables, legumes, shrubs and fast growing species.
- **Give things enough space**. Is there enough room for everything in your designs? Everything is different; items can just touch each other when fully grown, or they might take up different parts of the space in terms of how deep the roots go or how high they grow. Some plants are in close contact, like climbers on supporters.

Transplanting seedlings

- When a young plant has at least 3 leaves it is big enough to move or transplant.
- Trim extra leaves from mature stems, truncheons or larger cuttings, so that the plant uses all its energy and water to re-root itself instead of feeding the leaves.

Protect the roots

- If you are moving something that is in the ground or in a planting tray with several other seedlings, try to scoop out the soil around the roots of small plants and seedlings when moving them. A small spoon is good for this.
- If you started your seeds in a bag or container, remove the container before planting. Some containers, like a pumpkin shell, can be put straight in the ground.
- Prepare planting stations a little larger than the seedling's roots.
- Add a handful of mature compost to help to feed the seedling as it re-roots itself.

Move seedlings during the coolest hours

Transplantation is tiring on seedlings, so move them in the evening when they can rest overnight. Check your seedlings several times a day to see if they need water, food, or shade while they settle into their new home.

Get Started in Gardens & Orchards (zones 1 & 2)

When you design an area, you must decide the shape of your guilds and the paths between them. These decisions are important to get right because, once you have made the beds and paths, you do not want to change them ever again.

As you make your plans, talk to others who will use the area, about what may work. They might have useful things to contribute if you ask them what they think. There are three things to consider when planning the pathways in your fields:

- **Reach all the foods without stepping on the planting area.** Reduce the number of pathways and put stepping-stones in useful places.
- **Plant taller plants towards the back of the beds,** like legume bushes (pigeon pea) or small trees, so you reach the food higher up. Live fences in the garden, buildings and other structures can be used as supporters for climbing plants.
- **Work around existing plants and trees.** Even the smallest sprouting plant or tree may be useful in your design and the paths and beds can wind around existing trees, plants, termite mounds, buildings etc. giving the area a very interesting feel and look.

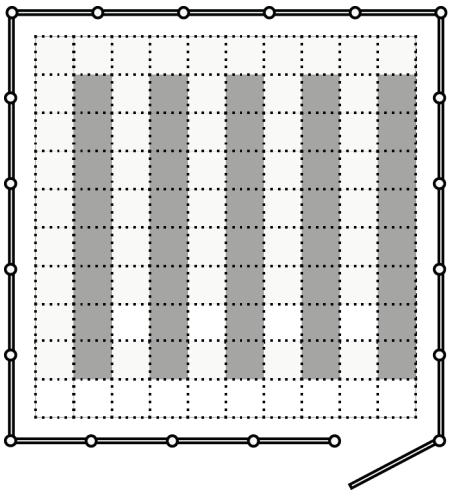
Increase productive land by changing your paths!

The diagrams below show how to adjust the layout to get more land for planting. In this example the whole plot is 10 x 10 metres (100 square metres). Each square on the diagram represents 1 x 1 m. Planted areas are shaded in grey and the paths are white.

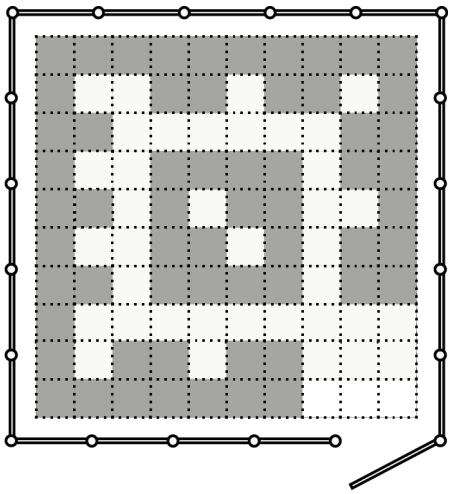
The first diagram shows the usual layout: 40 square metres used for planting. 60 square metres are used for paths. That's less than half of the area being productive!

The second shows another layout that makes better use of the space: 60 square metres used for planting 40 being used for pathways. That's an **extra 20 square metres** for growing food! That's 50% more productive land at no cost (except for thinking differently)! Plus, most of the fence can now be used as a supporter.

Plot 1: 40 square meters planted
60 square meters paths



Plot 2: 60 square metres planted
40 square meters paths



Plots like this can look really beautiful, like ornamental gardens! Square and rectangular beds with straight paths between them are normally used but this is uninteresting and wasteful. Often there is as much land used for paths as is used for growing the plants. The beds can still be in neat square shapes, with straight paths, or they can have curved edges and a winding path.

Adapting Fields to Sustainable Farming (zone 3)

Zone 3 needs special attention. These fields are where most Malawians grow most of their food, especially their staple food crops. The soil on these fields is often very unhealthy, with very few nutrients for the plants. The land does not hold the water and gets washed or blown away. You will need to reverse all these problems, while still growing foods in the fields – and you can! You need to heal the soil and grow a much wider variety of species.

A field in Malawi is usually made of ridges with paths between them. The farmer walks between the rows, which cover half of the field. This compacts the soil, making it hard for water to soak in, reducing the water table and making it difficult for plants and trees to grow deep roots.

Often the ridges run up and downhill so rain water is pushed down slope and much of the water runs away, taking soil and nutrients with it. The seeds are planted on the top of the ridge so the plant is growing in the driest part of the field, raised up on the ridge, and water drains away from its roots very quickly.

This system is not only unhealthy; it is a lot of work. The paths and ridges are made again every year, but the next year the farmer changes the pathways so that now they are where the ridge was for the last season. Now the farmer is walking on the other half of the field, compacting the rest of it. In two rainy seasons, the farmer has trampled the whole field! Combine this with mono-cropping maize, clearing, burning and chemical dependency and this leads to all the problems that we have discussed.

Change your ridges to become permanent beds

By making beds from your contour ridges and creating permanent pathways between them it will be possible to look after the soil, harvest more water, and use much more of your land for growing food. You will also save your own time, energy and money.

These two diagrams show how much space can be gained with a new planting layout.

- **In the first image, traditional ridge planting,** the grey areas are planted ridges and white areas are paths between rows. Only half (50%) of the land is used for planting. In this field 6 rows are planted and 6 are empty.
- **In the second image, heavy mulching is put between two ridges.** This is shown in dark grey. This ground is re-claimed for planting in, and the white areas are permanent pathways. Now three-quarters (75%) of the area is used to grow food. There are 9 rows used for agriculture and only 3 rows are paths.

Image 1: Traditional Ridge Planting

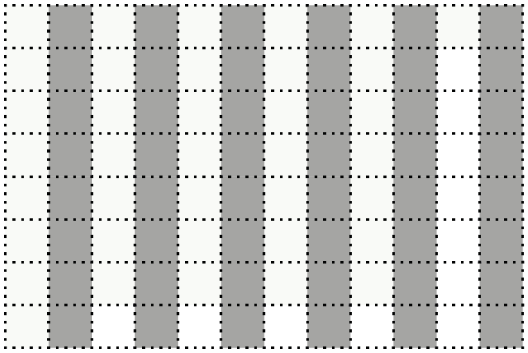
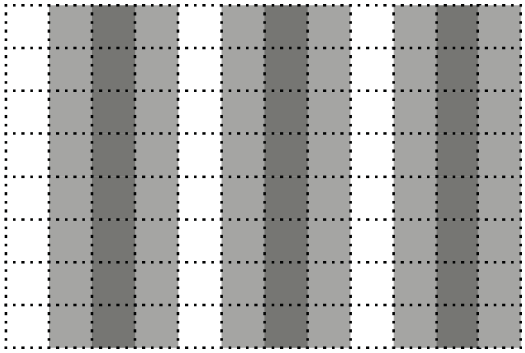


Image 2: Permanent paths & Beds



With permanent paths and beds there are many benefits:

- No need for annual 'ridging' so you will save time and energy.
- Heal the soil and restore its fertility, getting better yields.
- Give plant roots soft nutritious soil to dig deeply into.
- Encourage useful insects and micro-organisms, which improves fertility and increases diversity.
- Increases the amount of water that sinks down to refill the water table.
- Permanent, healthy beds cope better with low and high rainfall, allowing for extended (earlier and/or later) planting seasons.

In the new system of permanent beds and pathways you will care for the beds where they are, and they will not move again. Only 25% of the land is stepped upon. There are other creative ways to reduce that 25% even further.

Put as much mulch as you can find between two ridges. Do this as early in the dry season as possible, before the plants that you don't need (the 'weeds') go to seed. Trim those and put them in the field. If you include agroforestry species nearby you'll have a continuous supply of mulch. Your mixed species harvests will also provide mixed mulching every year, right where it is needed!

To begin with you will be limited by the amount of mulch you can find or good soil that you have. If it is already near the planting season and you have little time or organic materials do the best you can with smaller areas. You can make these changes over time, by doing a few beds a year. If you have not got much mulch see what you can find elsewhere. Where do you often see rubbish being burnt? The market, or behind shops and restaurants, or on a neighbour's farm? Stop them from burning and ask if you can feed your soil with their rubbish!

Choosing what to plant

While you are changing your zone 3 fields to sustainable Permaculture methods you may need to continue using some artificial fertilizers if you want to grow a lot of maize. But if you start to grow a bigger variety of other staple foods, especially local native species like millets, yams, etc. you won't need fertilizer.

You can plant hardy annuals like pigeon pea, sorghum and agroforestry species, which do well in malnourished soil. Include a legume to speed up the healing process. These will save money and you will be eating a much better diet.

Beds the width of three 'ridges' are now available to work with and can be planted with a mixture of species using the centre space and the ridges on either side. This is called inter-planting. There are endless possible combinations so make choices that are suited to the area and the species, sun, wind, shade and climate.

- **Centre spaces** are where most mulch and organic material was put. Plant lower-maintenance and / or nitrogen-fixing crops, agro forestry species, ground-covers like pumpkins or melons and 'digging' crops like cassava, potatoes or yams.
- **Outer spaces,** which were ridges - Plant taller grains or oilseed crops like sunflower or sesame, legumes like soybeans, ground nuts, ground beans, etc.
- **Dotted around** the bed plant climbers like cowpeas and climbing beans. Also leafy annual vegetables can be planted here and there, or may grow on their own naturally.

Use crop rotation to restore fertility

Remember the crop rotation sequence of 'leaf/grain, fruit, root, legume' that we learned about in Part 2 of the manual? (Topic 18, Soil Fertility.) A bed can be dedicated to one crop one year and then to something else the following year, and then, again, something else the year after that. Make sure the rotation includes diggers and legumes, with perennial plants dotted about too. In the guild system, rotation can happen naturally, over time, when things re-grow or are planted in slightly different places each year.

Time your planting

If you want to have beans climbing up maize plants you need to get the timing right. If you plant the bean too early, the maize is not ready to support it. If you plant the bean too late the maize leaves shade the bean too much. Learn about the varieties to use by trying things out, and asking around for advice.

Adding plants, trees and animals to zone 3 fields

Most of the species you choose will self-seed or be perennial species. In a healthy environment they will reproduce themselves. You just need to keep your eyes open for seedlings to nurture or re-plant somewhere else more useful. As more diverse species are grown and harvested all year round, you may want to make schedules for starting new seeds and propagating other food plants, so that there is always a supply of each food group.

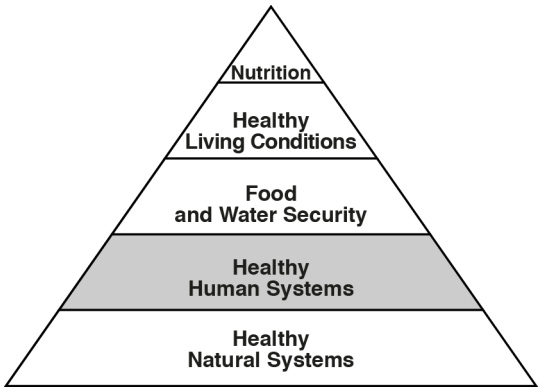
Do you really need such a big zone 3?

Now that you have learned so much about nutrition, and eating a balanced meal, maybe you do not need so much of your zone 3 fields to be devoted to staple foods. Perhaps some of the fields can become other zones: Garden, orchards or managed forests. Make sure the best use is made of resources so that the most diverse food is produced.

Even if you are renting your fields there is plenty you can do to heal the soil, increase your yields and improve your diet. It might be a good idea to rent the land for several years, not just one season. Discuss this with the owner and, if they agree, get this put down in writing, signed by both parties, and officially witnessed. Explain the ways you will improve the fertility of the soil. Get information about land rights issues in your area, and perhaps try to work towards buying your own land.

Topic 39: Maintaining your Design (Step 4)

Now the sustainable design is being put into practise and it will be necessary to maintain and adapt your vision as time passes. Plan and think things through so that the system gets better and better.



Permaculture is a tool to aid thinking about sustainable living and how to achieve it. It provides a framework for thinking about things in order to work effectively and efficiently.

There is still plenty of work to do with Permaculture systems, especially when getting started. Guilds are easier to care for than other agricultural systems, but still need some care and attention, thought and understanding, so reading parts of the manual again will help when reminders are needed.

Calendar of Activities

This is just an example; everyone has a different situation. Think about your own situation and make a calendar of activities for your area. The 'x' in the box means there are things to be done in that zone, in that season, so you can see the busy and more restful times easily.

There is a blank table (Appendix 3 Useful Forms on page 97) that you can copy and fill in yourself.

Calendar of Activities by zone:	Rains Hot			Harvest Cool			Dry Cold			Dry Hot Winds		
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Zone 0 – House												
Preserve food	X	X	X	X	X	X	X	X	X	X	X	X
Stove repairs	X			X				X			X	
Roof repairs						X	X	X				
Zone 1 – Gardens												
Harvest	X	X	X	X	X	X	X	X	X	X	X	X
Plant	X	X	X	X	X	X	X	X	X	X	X	X
Feed soil	X	X	X	X	X	X	X	X	X	X	X	X
Watering						X	X	X	X	X	X	X
Zone 2 – Orchards												
Harvest fruit	X		X	X	X	X	X	X	X	X	X	
Seed Saving	X		X	X	X	X	X	X	X	X	X	X
Heavy mulch				X	X	X	X	X	X	X	X	
Spot Watering							X	X	X	X	X	
Cuttings									X	X	X	

Calendar of Activities by zone:	Rains Hot			Harvest Cool			Dry Cold			Dry Hot Winds		
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Zone 3 – Fields												
Feed soil	X	X	X	X	X	X	X	X	X	X	X	X
Planting	X	X	X								X	X
Harvest		X		X	X	X	X	X				X
Seed saving				X	X	X	X	X	X	X	X	
Animals							X	X	X	X	X	
Zone 4 – Managed Forests												
Trimming	X	X	X	X	X							X
Animals	X	X	X	X	X	X	X	X	X	X	X	X
Honey harvest	X	X	X	X	X	X	X	X	X	X	X	X
Planting	X										X	X
Cuttings									X	X	X	
Zone 5 – Wild Natural Areas												
Visit	X			X			X			X		
Protect	X	X	X	X	X	X	X	X	X	X	X	X
Collect seed				X	X	X	X	X	X			

Watering and Weeding

Observe your plants and you will learn when they need water or more nutrients, and when they are ready to harvest and store. Have another look at Topic 23, Water Harvesting, in Part 2 for clever ways to make the most of the water on your land.

With a guild system you should not ever have to weed a large area, and, in fact, there is not much weeding to do once you have got the right species growing in the right space with the right mulching and the right habits yourself.

- **Using of lots of mulch** keeps many unwanted plants down, allowing room for the ones you have chosen.
- **Trimming is used to cut back some plants** in favour of others (the ones you choose). The cut plant material is put on the ground as mulch, animal food or it is composted.
- **Many plants you may have thought of as weeds might have uses** you have not realised. They could be medicines, climbers, nitrogen fixers, or have some other function. Think hard before you decide something is no use to you at all.
- **Keep a few of every species**; you will eventually learn its importance from someone, or through your own research. Keeping a few of everything promotes bio-diversity in the area.

Daily Harvests

One of the best things about sustainable nutrition is harvesting foods all year round. Instead of just one big harvest of a very few species, you will have many small harvests of many different foods. This spreads work throughout the year and improves your diet. (Appendix 1 Common Foods of Malawi on page 33 gives information on harvest times for different food plants).

- **Use staggered planting** (see Part 1, Topic 27, Seeds and Propagation) to have foods ready at different times (staggered harvests).
- **Frequent harvesting of leafy vegetables** like amaranth, blackjack, chives, oregano or lemon grass makes new growth. These plants can keep going for some time if you water them and keep harvesting their leaves to encourage new growth. Pinch off any seeds that form.
- **In the zone 1 Garden** you may find yourself harvesting bed-by-bed or meal-by-meal, since each guild could be planned as a good combination of foods for a meal.
- **In the zone 2 Orchards** you will harvest during the various seasons of different trees and bushes.
- **Planting different varieties of the same species**, like pigeon peas that are ready in 3, 6 or 9 months, also helps to give staggered harvests.

Managing Animals

Plants, animals and humans must all live together in the community, so it makes sense to manage the animals, keeping them away from plants and trees that can be harmed by them. Several options were discussed in Part 2, Topic 19 for managing animals. Here are some ideas for protecting your plants and trees from unmanaged animals:

Goats seem to eat anything, but they do not like Aloe or their own manure: Collect some aloe leaves and wipe the bitter green part on the plants and trees you want to protect. Getting the smell of goats' manure on the plants and trees you want to protect may help too. Be sure to wash your foods well before you eat them! You can either add the goats' manure to a bucket of water and let it sit for a few days before applying to the plants or rub fresh manure on the trees and plants (be sure to wash your hands well afterwards.)

Chickens usually only harm small seedlings and newly planted seeds. Chickens can be helpful around mature plants because they eat insects and dig the top of the soil. To prevent chickens from hurting small seedlings you can place rocks, broken bricks or thorny branches around the seeds and seedlings to keep the chickens from scratching near them. Another idea is to make a wire basket or frame using scrap pieces of wire. Put the wire basket over your small seedlings until they are big enough to withstand chickens and then move the basket to protect a new seedling.

Monkeys are (annoyingly) very clever animals! Some strategies for dealing with them include: hide the food that monkeys like by inter-planting things closely together and having all sizes and types of plants, so they aren't so obvious. Spraying plants with a tea of chilli pepper juice can teach them that your food burns! If other strategies work share ideas so that everyone can learn!

Solutions for Pest and Diseases

Many pest and disease problems arise because the environment is unhealthy. You can address these problems by working to heal the soil and eco-system. It will take a few months up to a year or two to restore a proper healthy balance, depending on the size of the area and the size of the problem. In general, some strategies to try:

- Change the type of species in that area to a different family.
- Design your area with many flowers, scented herbs, protector plants and variety.
- Look after the needs of all the species (nutrition, space) in the design and you will not need as many treatments (see 'simple remedies' below).
- When problems come re-assess the design (what is included in the plan and/or where things are placed) and/or practices (feeding, watering) and make changes.
- You may need to use a temporary treatment, preferably an 'organic' one, continue reading for simple remedies you can grow and make at home.

Insects

Here are some ideas for dealing with insects, which are especially useful in the beginning, before you have healed the area.

- **Most insects are good for your garden!** Try not to harm them. They pollinate plants and trees and keep each other's populations balanced. (Ladybirds and praying mantis eat aphids for example).
- **Some insect damage to plants is natural**. Live and let live if you can. A few bites out of your plants and trees here and there are not too bad. Look and see how badly the insect is damaging the plant and decide if action is needed.
- **Encourage frogs and lizards to live in your garden** as they balance the insect population by eating insects.
- **Earthworms are great for your soil!** They add rich manure by eating organic matter and turning it into fertilizer. They make tunnels in the ground, digging channels for water and air.
- **Some insects are great food for people, too**. Termites, grasshoppers, caterpillars are regularly eaten in Malawi and are high in protein, fat, B vitamins and minerals. In other cultures (not Malawi), spiders are also eaten.
- **Grow or raise something different on the site if insects keep damaging certain species**. When you stop growing the plant there, the insect will usually stop living there too. Grow something else there for a while, or change to an animal, then try adding the species back later.

Simple remedies

Cheap, easy treatments can change the smell or taste of an area. This can sometimes stop insect damage Get a few handfuls of fresh, green, strong-scented plants like *mpungabwe*, *chanzi* (mint, basil), *kuthawaitsa njoka* (makes snakes run) or plants like *delia*, tephrosia, marigolds, lemon grass, garlic, hot peppers etc. and try the following:

- Use any of the **smelly plants as mulch** and sprinkle them in the affected beds.
- **Smelly water**: Pound handfuls of these and mix with 10 litres of water. Take care to wash your hands after pounding the plants, as some of the juices are very strong.

- Add grated soap to make a thicker mixture that will stick onto the plants when sprayed or poured onto the affected area.
- Leave the mixture overnight / a day.
- Sprinkle the water onto and around the plants using a watering can with a rose or by dipping a bunch of leafy twigs and small branches into the mixture and sprinkling it on the affected area. (Careful not to get it in your eyes!)
- Continue using the mixture for a few days until the insect damage stops.
- Avoid watering the leaves when irrigating, or the treatment will wash off.
- You can use the smelly water for watering purposes at the same time as you are adding the treatment.

Snails and slugs

- Check for slugs and snails early in the morning as they come out to eat the plants at night. Remove them and feed them to chickens, ducks, fish, or other animals.
- Plant 'decoy' bait (sometimes called attractors). For example, snails like to eat marigolds, so inter-plant them and snails will likely eat those instead of your foods!
- Put out shallow dishes of beer: Snails like beer and will climb in and drown!
- Mulch with broken eggshells, rough stones, gravel and / or crushed clay pots around your plants. Snails and slugs do not like to cross this as the sharp edges hurt.

Cutworms

These worms hide in the soil near a plant and eat the stem. Dig around gently with your fingers till you find the worm. Feed it to the chickens! Protect the stem with collars made from circles of cardboard. Place these around the plant's stem to protect it.

Aphids (plant lice)

- Some aphids are seasonal and will go away on their own. If aphids are causing damage, encourage ladybirds (ladybugs) which love to eat aphids!
- Use a smelly water of garlic, hot peppers and soap. Wipe the aphids off gently with a cloth or sponge dipped in the mixture. Repeat this every few days to try to reduce and eliminate them on your plants.

Cabbage worms and moths

The moth lays eggs on cabbage leaves, and the worms (caterpillars) hatch and eat the leaves as they grow.

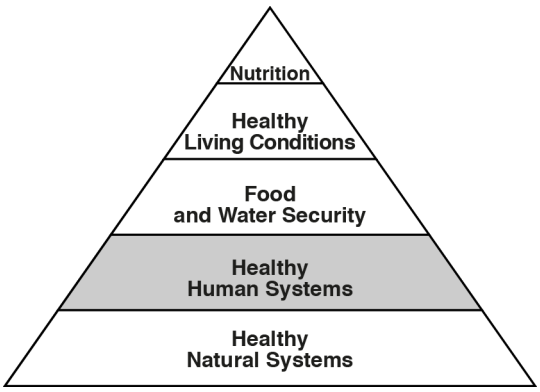
- Grow *mlozi* instead of cabbage! It is a Malawian perennial vegetable that tastes just like cabbage but the moths don't like it. Easy!
- Check the underside of leaves and remove any eggs or caterpillars by hand.
- Dust with flour and salt (mixed and put in an old sock). Dust the tops and bottoms of the leaves lightly.
- Cut tomato leaves into small pieces. Place these on the leaves being eaten, as well as around the plants because the smell will confuse the moths.
- Mix one teaspoon of salt in 2 litres of water. Spray or sprinkle over the leaves.

Topic 40: Assessing your Design (Step 5)

Your first assessment of the area should be made before any work has started, then you should make assessments periodically (every so often) after that.

Changes take some time to really show an effect and become part of people's daily and lifetime habits, so be patient and keep checking on how things are progressing.

Regular and effective assessments will tell if the designs are working well and will help future plan making.



You will develop a habit of assessing all sorts of things daily along with some formal assessments a few times a year, looking at the whole of the design and the area.

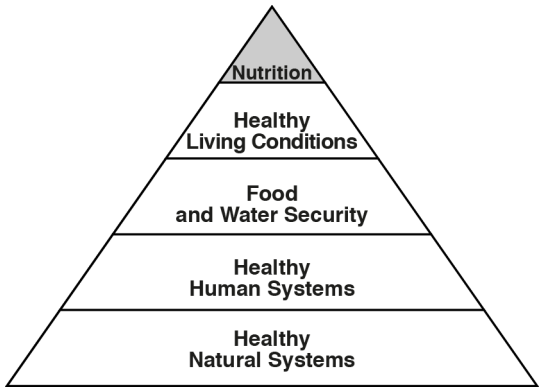
Assessment Procedure

The Site Assessment Forms in Appendix 3 (on page 96) can be used for individual households as well as larger community projects. Assessments and evaluations need to be tailored for each individual situation and site, but the basic, blank form here will make sure all the information needed will be gathered to estimate yields, water usage, food amounts etc.

The assessment looks at all these things in detail. You need to be as accurate as possible when filling it in. Accurate information will help when making decisions and deciding on further action for sustainable nutrition.

- **Site Details**
- **Names and Addresses**
- **Size of Area**
- **Time, Money and Labour Inputs**
- **Household Health**
- **Dietary Diversity Information**
- **Soil Health and Conservation**
- **Water Management and Conservation**
- **Plant and Animal Health and Diversity Information**
- **Under-used Resources and Significant Change**

Congratulations!



You have reached the end of the book and have learned a huge amount. You know now what it takes to achieve Sustainable Nutrition, and you know that it is possible for you to do it.

Start small, start with yourself, your friends and family, and then let ideas grow.

Use the book, your own designs and your notes. Discuss things with friends, neighbours and family. Share your learning, and your vision for a better, more sustainable future, in which everyone has enough good food to eat and can live healthy and happy lives.

Summary of part 3:

Step 1: Mapping

- Map it as it is now
- Make resource lists

Step 2: Create your design

- Imagine what is possible!
- What goes where? Why?
- See the whole picture.
- See solutions not problems
- Draw your vision; your design

Step 3: Implementing

- Action planning
- Put plans into practice
- Conserve energy!
- Nature always has diversity

Step 4: Maintaining

- Think ahead! Make a calendar of activities
- Harvest, store, use (eat, heal, share, sell, etc.)
- Everything works together
- Be efficient! Use everything to its fullest potential!

Step 5: Monitoring & adapting

- Site assessments
- Observe, learn, and share!

Knowledge and understanding

Your journey towards sustainable nutrition is well underway! If you understand that caring for the Earth, caring for people and sharing resources fairly are important for achieving sustainable nutrition you have started off well. If you can see how all the topics we have looked at are connected, you can make plans and designs to improve all of them, in your life and in the environment. You and others will need to co-operate and communicate to achieve your vision of the future.

The problems Malawians are facing are similar for other people in the world, too, but these problems have solutions! Malawi is blessed with resources that can be utilized to make Sustainable Nutrition a reality. Malawians could lead the world in showing how communities can achieve sustainable nutrition!

Why not Malawi? Why not you?

The best time to start is now!

Appendices

What follows now are the Appendices which you can consult when you need more details of foods in Malawi, meal ideas and menu planning, or monitoring and assessment tools. There are tables of information and blank forms to fill out as well as sample forms filled in to show you how. There are also links to resources for deeper understanding and further reading, or to connect with others practicing Sustainable Nutrition in Malawi so you can share knowledge and information.

Appendix 1 Guide to Common Foods in Malawi

More than 600 foods are listed by the Six Food Groups. That's a lot of diversity for your agriculture, businesses and diet! Even more foods have been added to this edition of the manual including many more animal foods. The list provides names in English and Chichewa, and gives the scientific name too. Scientific names are the same in all countries, which helps global communication.

As your author, I must confess that I haven't eaten every single one of the foods listed, but I have eaten a great many of them! At home in Chitedze we have about 250 different foods, which we eat and share with others. That is why we called our home **Never Ending Food**. See how many more new and different foods you can start using. Older generations are often the best source of information about local foods. They know how to find, identify and prepare them. When you learn about new foods, share your knowledge with others. Remember to let Nature be your guide and teacher. Learning about all the different species is fun, and you will be rewarded with dietary diversity, good health, more leisure time and a beautiful and healthy environment.

Appendix 2 Food Availability and Meal Planning

This section helps you to plan meals for yourself, your family or large groups. There is a simple summary of the food groups including: amounts needed for an adult, the main nutrients in each group and examples of foods for each group. There are blank food availability sheets to help you work out what foods are available from each food group and what knowledge there is about using those foods. Examples are provided for workshop menus, which can be used with kitchen staff as well as menu item suggestions and blank menu sheets, by food group, for a week or for a day.

Appendix 3 Site Assessment Forms

To develop your site, you need to monitor and assess what happens over time. There is a blank site assessment form to adapt or fill in as it is. We include a sample form already filled in to give you an idea of what progress might look like as the months or years pass.

Appendix 4 Further Reading

Still want to learn more? Here are some our favourite books that are available in Malawi and a list of other references that were useful for us as we wrote this manual. There is a list of places to visit in Malawi to learn from people who are great role models for Sustainable Nutrition, along with a few communication channels that we use to stay connected, and a short list of acronyms.

Appendix 1: Guide to Common Foods in Malawi

This list has 528 foods:

50 Staples, 148 Fruits, 218 Vegetables, 28 Legumes and Nuts, 36 Animal foods and 48 Fats and Oils.

The list does not detail the varieties. Tomatoes for example are listed once but there are many varieties of tomatoes. The type of any food (whether plant or animal) depends on your situation. The season, climate, soil types, your tastes, and family size are situations that vary from site to site even within the same community.

Theses lists have been updated, corrected and expanded since we first published this manual. This has been possible through Malawians making corrections to the list and sharing their knowledge. We give here as much information as we have about these foods, but the list is not complete. Please help fill the gaps in the list by sending corrections and additions to:

Ministry of Agriculure Nutrition Unit: AgricNutrition@gmail.com and **NeverEndingFood:** NordinMalawi@gmail.com

The foods are listed by Food Groups, then by different subgroups. Each group is in a table with these headings:

Scientific Name	English Name	Chichewa Name	Edible Parts	Area	Method & Space	# per Adult	Sprout & Harvest	Tips:
• Sp. = Species • How the plant is identified scientifically all over the world (there is only one name)	• What the plant is called commonly in English • (There can be more than one name)	• The Chichewa name in Malawi • (There can be more than one name).	• Which parts can be eaten? • Leaves, roots, stem, flowers, seeds, etc.	• Best climate or soil type	• Planting methods • How deep to plant the seeds • How much space the plant needs	• # = Number suggested to grow or raise, considering yield	• Time till sprouting • Time till harvest • Annual or perennial plant	• Helpful hints • Tips about growing the plant • Other notes

- How many of a species you need depends on how many people you feed and what else you are growing. The number suggested assumes that you will be using other foods from that food group too.
- Times given for germination will be slower in the cold seasons / areas.
- Most seed species are planted about 3 times deeper than the size of the seed. Tiny seeds can be broadcast or very lightly covered. Larger seeds (1-2 cm) can be planted 3-6 cm deep.
- Distances between species don't need to be exact. Measure and learn the length of your own foot, and the span of your hand (the distance between the tip of your thumb to your little finger) to have an easy, general guide.
- If the notes say **CARE** make sure you know how to process it - some foods are harmful, and can even kill, if they are not prepared properly.

1. Staples (50)

Staples should only be 40% of our diets and about 40% of our food system (Part 1: Topic 5: Planning Food Amounts). They should not be the main focus but should be diverse. There is a lot of variety in the Staples food group and the list has been organised into three groups:

1) **Grains**, including traditional grains (millet, sorghum) and introduced grains from other countries (rice, wheat, maize, etc.)
2) **Tree staples** where either the immature fruit or the roots can be eaten (baobab, green banana, etc.)
3) **Tubers** are climbers, ground cover or herbaceous plants (air potato, yam, sweet potato, coco, etc.) There is a group of tubers in this section that are rarely seen (except in really old books) and we would love to fill the gaps in our knowledge about these foods! Do they still exist? Can you help preserve these foods and knowledge about them?

STAPLES (50)				Preferences for Growth				
Scientific Name	English	Chichewa	Edible Parts	Area	Method & Space	# per Adult	Sprout & Harvest	Tips:
I. Grains								
• ***Native grains***								
1. Eleusine coracana	Millet, Finger	Mawere, Lipoko	Seed	sun dry	direct 0-1 cm 20 cm	200	7-14 d 100 d	• Very hardy, small seeds can be broadcast • Some varieties are short plants (finger millet), others tall and can be supporters
2. Panicum miliaceum	Millet, Common							
3. Pennisetum glaucum	Millet, Pearl	Mchewere						
4. Oryza sativa	Rice	Mpunga		sun wet/dry	direct or nursery 1-2 cm 15 cm	200	7-14 d 100-130d	• There are many varieties • There are some rice land races, too that do well in dry, normal zone 3 areas
5. Sorghum bicolor	Sorghum	Mapila		sun dry	direct 1-2 cm 25 cm	200	7-14 d 85 d perennial	• Perennial for several years if you let it • Will grow into clumps good for 3-4 years • Several different varieties / colours

STAPLES (50)				Preferences for Growth				
Scientific Name	**English**	**Chichewa**	**Edible Parts**	**Area**	**Method & Space**	**# per Adult**	**Sprout & Harvest**	**Tips:**
6. *Eragrostis tef*	Tef	Chimanganga		sun		200	7-14 d 100 d	• Ethiopian, not sure if it is in Malawian agriculture • It is in restaurants
• ***Introduced grains***								
7. *Triticum aestivum*	Wheat	Tirigu	seed	sun moist	direct 2 cm 15-25 cm	200	7-14 d 90-140d	• Light climbers ok • Many different varieties have different needs
8. *Zea Mays*	Maize	Chimanga				200		
II. Trees (roots / fruits)								
9. *Musa paradisiaca*	Banana	Nthochi	fruit (young)	wet	direct 2-3 m	5	7-14 d 1 - 1.5 yr. perennial	• Great for water harvesting, boreholes
10. *Ensete ventricosum*	False Banana	Chizuzu	roots			1		• Possibly not in Malawi anymore?
11. *Manihot sp*	Cassava, Tree	Mpira	roots	dry	cuttings 25 cm 1-5 m	1	7-14 d 1+ yr.? perennial	• Zone 1 fence line • Zone 2 orchards • Zone 3 hedgerows • Zone 4 forests • Can be a starch source
12. *Adansonia digitata*	Baobab	Mlambe	roots bark	dry	direct or nursery 5 cm 10 m	1 per house	7-21 d 10-25 yr. perennial	• Can be a starch source
13. *Carissa edulis*	Plum, Wild	Mpambulu	roots					
14. *Ficus sur*	Fig, Cape	Mkuyu-pasi	roots	many				• Attracts water. Can be grown with cuttings
15. *Mangifera indica*	Mango	Mango awisi	fruit (young)	many				• Immature fruit can be made into flour

STAPLES (50)				Preferences for Growth				
Scientific Name	**English**	**Chichewa**	**Edible Parts**	**Area**	**Method & Space**	**# per Adult**	**Sprout & Harvest**	**Tips:**
III. Tubers								
• ***Ground Cover tubers***								
16. *Ipomoea batatas*	Sweet Potato	Mbatata	roots	many	cuttings 10 cm 30 cm	50	7 d 150 d	• Store seeds (vine cuttings) in zone 1 and eat as veg until rains, then plant in zones 2 and 3 for root crop
• ***climbing tubers***								
17. *Dioscorea bulbifera*	Air Potato	Fikengere, Chinkhowe	roots	shade	direct 5 cm 60 cm	5	10 d 120-200d perennial	• Favourites, but underused
18. *Dioscorea sp.2*	Yam	Chilazi mpama	roots	shade		1		
19. *Sechium edule*	Chayote	Ngowe	roots	climber	direct 5 cm 25-50 cm	2		• Known more as a Vegetable (fruit & leaves)
20. *Sphenostylis stenocarpa*	African Yam Bean	Chinkhoma	roots	climber		5		• Not wide spread in Malawi • Reported in the north
• ***Plants (herbaceous) tubers***								
21. *Colocasia esculenta*	Coco Yam	Coco	roots	wet marsh ponds	direct 5 cm 40-60 cm	20	10 d 120 d perennial	• Favourite, many varieties, underused • In some areas just planted as flowers
22. *Nymphaea caerulea*	Water Lily	Chikolowa				20		• Found but not eaten
23. *Typha sp.*	Bulrush	Kanjeza				50	2 yrs. perennial	• Under-used but known. • Can also eat seeds and pollen as starch / veg (young)
24. *Plectranthus esculentus*	Kaffir Potato	Buye	roots	many	direct 10 cm 30 cm	50	10-15 d 100 d	• Does well in cool elevations
25. *Solanum tuberosum*	Potato, Irish	Kachewere	roots	many		50		
26. *Manihot esculenta*	Cassava	Chinangwa	roots	dry	cutting 15 cm 60 cm	20	14 d 6-18 m	• Likes soft soil • Supporter for small climbers

STAPLES (50)				Preferences for Growth				
Scientific Name	**English**	**Chichewa**	**Edible Parts**	**Area**	**Method & Space**	**# per Adult**	**Sprout & Harvest**	**Tips:**
• ***Lesser known tubers***								
27. *Abrus precatorius*	Crab's Eyes	Ntimbua						
28. *Anthericum*		Sawawa						
29. *Carica papaya*	Pawpaw	Papaya		sun		1		• Not well known as a starch source
30. *Cyperus esculentus*	Tiger nut	Kauju						
31. *Cyphostemma buchananii*		Namwaliche-che						
32. *Dioscorea sp. 3*		Mpama wam'thengo						
33. *Dioscorea sp. 4*		Dzinyanya						
34. *Eriosema nutans*		Chinkwisi						
35. *Eriosema shirense*		Kabomola	roots					
36. *Eriosema sp. 3*		Kambumkire						
37. *Euphorbia sp*		Chikhawo						
38. *Lightfootia abyssinica*								
39. *Lotus sp.*		Mpeta						
40. *Margaretta rosea*		Nchenche						
41. *Oxalis sp.*		Shawawa						
42. *Polygonum senegalense*		Nkonkho						
43. *Ranunculus multifidus*	Buttercup	Khobedi						
44. *Vigna fischeri*		Mukho						
• ***Tubers that need CARE in processing!***								
45. *Coccinia adoensis*		Fwifwi	roots CARE!	dry				• Known more as a vegetable?
46. *Disa sp.*		Chinaka, Chikande	roots CARE!					• Underused but known in some areas in Malawi

STAPLES (50)				Preferences for Growth				
Scientific Name	**English**	**Chichewa**	**Edible Parts**	**Area**	**Method & Space**	**# per Adult**	**Sprout & Harvest**	**Tips:**
47. *Habenaria walleri*		Chinaka, Chikande	roots CARE!					• Underused but known in some areas in Malawi
48. *Satyrium sp.*		Chinaka, chikande						
49. *Tacca leontopetaloides*	African Arrowroot	Dinde						
50. *Thylachium africanum*		Mkalachulu						

Staples Notes:

2. Fruits (148)

Many of these fruits are native to Malawi; some are introduced from other countries. There are some fruits listed here which we only know about from old books (and the internet) but we have not found them yet. Do you know them? Can you help us improve the next edition of this manual? If they still exist we need to find these fruits, nurture them, propagate them and learn how to use them. It is information about the Malawian plants that we need the most!

FRUITS (148)				Preferences for Growth				
Scientific Name	**English**	**Chichewa**	**Edible Parts**	**Area**	**Method & Space**	**# per Adult**	**Sprout & Harvest**	**Tips:**
I. Vines								
• ***Native vines***								
1. *Citrullus lanatus*	Watermelon	Vwende	fruit	moist	direct 3 cm 1-3 m	3	7-14 d 100-130d	• Vine can crawl 3 m • Local varieties have more white flesh
2. *Cucumis melo*	Melon	Kayimbe	fruit	dry		3		• Does well in low laying / sandy areas
3. *Coccinia adoensis*		Fwifwi	fruit	dry		3		• Also a vegetable
• ***Introduced vines***								
4. *Fragaria ananassa*	Strawberry	Sitobele	fruit	moist	cuttings 30 cm	20	7d 100 d perennial	• Vine will spread over a large area if allowed
5. *Passiflora edulis*	Passion Fruit	Magalagadeya	fruit	many	seed 1 cm 50 cm	2	14-28d 1-2 yr perennial	• Heavy climber best on walls or large trees
6. *Rubus spp.*	Blackberry	Mpandankhuku Mulunguzi	fruit	many	runners 5-10 cm 1 m	1-2	7d 1-2 yr perennial	• Protector, great in hedges, live fences • Best in zone 2 or 4, root system can be aggressive in its spread
7. *Rhus natalensis*	Raspberry	Mapirankukute, mpandankhuku	fruit			1-2		

FRUITS (148)				Preferences for Growth				
Scientific Name	**English**	**Chichewa**	**Edible Parts**	**Area**	**Method & Space**	**# per Adult**	**Sprout & Harvest**	**Tips:**
II. Herbaceous Fruits								
• ***Native herbaceous fruits***								
8. *Hibiscus sabdariffa*	Roselle	Chidede	fruit	many	direct 1 cm 30 cm	30	100 d	• Eat leaves while waiting for fruit (calyx)
9. *Sorghum bicolor*	Sorghum	Misale	stem shoot	many		20	100 d	• Can support small annual climbers
10. *Saccharum officinarum*	Sugar Cane	Mzimbe	stem	wet		10	220 d	
11. *Opuntia ficus-indica*	Prickly Pear	Kaloga	fruit	dry	cutting or root	3		• Protector, thorny • Red/yellow fruits are eaten after carefully removing small soft thorns. Many other uses
12. *Aframomum angustifolium*	Cardamom, Wild	Nthungula	fruit	plant		20	1 yr	• Digger, tangy red/yellow fruit, common in Viphya forest where forest still exists
13. *Anthophilia*	Honey	Uchi	honey	many	20 m	1	120 d	• Pollinator & Protector – great to include in areas you don't want people to enter
• ***Introduced***								
14. *Physalis peruviana L.*	Gooseberry	Jamu	fruit	many	seed 1 cm 50 cm	10	7-14 d 120 d perennial	• Grows into a perennial shrub • Does well as understory or in full sun • Can grow from cuttings as well

FRUITS (148)				Preferences for Growth				
Scientific Name	**English**	**Chichewa**	**Edible Parts**	**Area**	**Method & Space**	**# per Adult**	**Sprout & Harvest**	**Tips:**
15. *Ananas comosus*	Pineapple	Nanasi	fruit	many	suckers 5-10 cm 1 m	20	1-2 yr perennial	• Tastes best at altitudes below 1200m • Pineapple tops can also be planted but it takes longer to fruit, 2-3 years
III. Small Trees								
• ***Native small trees, 5-9 years to maturity***								
16. *Annona sp.*	Custard Apple	Mphosa	fruit	many dry	direct or nursery most need 5 m area	1 per house		• Each of these are well-known fruits but more agricultural is information needed • Information here is based on the author's own experience and will be built on in future updates
17. *Annona senegalensis*	Custard Apple, Wild	Mposa	fruit					
18. *Antidesma venosum*		Mpungulira	fruit					
19. *Azanza garkeana*	Snot Apple	Matowo	fruit					
20. *Borassus aethiopum*	Palm, Fan	Magwede, Ngwanlangwa	fruit, sap					
21. *Bridelia micrantha*		Mpasa	fruit					
22. *Carissa edulis*	Plum, Wild	Mpambulu	fruit					
23. *Dovyalis abyssinica*			fruit					
24. *Dovyalis caffra*	Kei Apple	Ng'amba	fruit					
25. *Garcinia livingstonei*	Low veld mangosteen	Mphimbi	fruit					
26. *Hyphaene species*	Palm, Doum	Mgwalangwa	sap					
27. *Phoenix dactylifera*	Palm, Date		fruit					
28. *Salvadora persica*	Toothbrush Tree	Mswache	fruit					
29. *Ximenia caffra*	Sour Plum	Mpinji	fruit					
30. *Vangueria infausta*	Wild Medlar	Msilu	fruit					

FRUITS (148)				Preferences for Growth				
Scientific Name	**English**	**Chichewa**	**Edible Parts**	**Area**	**Method & Space**	**# per Adult**	**Sprout & Harvest**	**Tips:**
• ***Introduced small trees, 1-2 years to maturity***								
31. *Carica papaya*	Pawpaw	Papaya	fruit	many	seed 1 cm 1 m	2	14-21 d 1-2 yr perennial 5-20 yr	• Grows a long time but only productive for 5+ years, so plant continually • Grows straight up and can be integrated easy in zone 1-4
32. *Cyphomandra betacea*	Tree Tomato; Tamarillo		fruit	many	seed 1 cm 1 m	1		• Fruits for 4-5 months each year in zone 1 • Integrate in any zone but yields more in zone 1 with more care
33. *Musa paradisiaca L*	Banana	Nthochi	fruit	wet	suckers 50 cm 2 m	5	1 yr	• Grow several varieties to avoid diseases • Keep each planting station to 3: adult bearing, teenager and child sucker • Cut out adult after first fruiting, move extra suckers to new planting stations
34. *Morus alba*	Mulberry, white	Mabulosi	fruit	many	cuttings 10 cm 2-3 m	1	1 yr	• Many different colours and varieties, small white/pink and large purple/black are most common • Great in fence lines planted as 2 m poles • Also grows from seed
35. *Morus nigra*	Mulberry, purple	Mapulesi	fruit			1		
36. *Prunus persica*	Peach	Pichesi	fruit			1	2 yr	
37. *Punica granatum*	Pomegranate	Chimanga chachizungu	fruit			1		

FRUITS (148)				Preferences for Growth				
Scientific Name	**English**	**Chichewa**	**Edible Parts**	**Area**	**Method & Space**	**# per Adult**	**Sprout & Harvest**	**Tips:**
• ***Introduced small trees, 5-9 years to maturity***								
38. *Citrus aurantifolia*	Key Lime	Ndimu	fruit	sun wet	seed grafting budding layering 5m	1 per house	14-28 d 3 yr perennial	• Attracts aphids, especially when tree is undernourished i.e., lacking food & water • Allow a good amount of space between other citrus • Include lots of smelly protectors and ground cover in the guild
39. *Citrus aurantium*	Sour Orange		fruit					
40. *Citrus limon*	Lemon	Mandimu	fruit					
41. *Citrus paradisi*	Grapefruit		fruit					
42. *Citrus reticullata*	Mandarin (Tangerine)	Nachi	fruit					
43. *Citrus sinensis*	Orange	Malalanje	fruit					
44. *Litchi chinensis*	Litchi		fruit	many	Seed 5 m		14-21d 2-5 yrs perennial 30-40 yr	• Apples need to be multiplied vegetatively (graft, air layering, truncheon) to be true to its variety.
45. *Malus domestica*	Apple	Apulo	fruit					
46. *Prunus armeniaca*	Apricot	Epulokoti	fruit					
47. *Psidium guajava*	Guava	Gwafa	fruit					
IV. Tall Trees								
• ***Native tall trees, 5-9 years to maturity***								
48. *Berchemia discolor*	Plum, Bird	Mtata	fruit	many	seed	1 per house		• Excellent integrated in agriculture systems for future generations. • Many other uses while waiting for fruit: supporter for larger climbers; medicinal uses, mulch, shade, etc. • Well-known fruits but more agricultural is information needed • Each are under-used
49. *Pappea capenisis*	Plum, Wild	Mkungula	fruit					
50. *Piliostigma thonningii*	Camel-foot	Chitimbe	fruit					
51. *Strychnos innocua*	Monkey Orange	Mkaye, Maye	fruit					
52. *Strychnos spinosa*	Kaffir Orange	Mateme	fruit					
53. *Uapaca kirkiana*	Loquat, local	Msuku	fruit					
54. *Vitex doniana*		Mpindimbi	fruit					
55. *Vitex mombassae*	Smelly berry vitex	Msipsya	fruit					

FRUITS (148)				Preferences for Growth				
Scientific Name	**English**	**Chichewa**	**Edible Parts**	**Area**	**Method & Space**	**# per Adult**	**Sprout & Harvest**	**Tips:**
• ***Introduced tall trees, 5-9 years to maturity***								
56. *Anacardium occidentale*	Cashew Fruit	Mbibu Zipatso	fruit	dry + many	seed cuttings 10 m	1 per house	7-21 d 5-9 yr perennial 50-150 yr	• Cashews are also a nut • Mango seeds & unripe fruits eaten. • Tamarind leaves eaten • Almond also eaten • Grafting reduces time to harvest.
57. *Cassamoris edulis*	Sapote, white	Msuku cha chizungu	fruit					
58. *Mangifera indica*	Mango	Mango okwima	fruit					
59. *Tamarindus indicus*	Tamarind	Bwemba	fruit					
60. *Terminalia catappa*	Indian Almond	Mkungu	fruit					
• ***Native tall trees, 10-20 years to maturity***								
61. *Acacia albida*	White Thorn	Nsangu	fruit	dry does well in many areas	seed cutting large trees often need 5-10 m each. many can be stacked	1 per house or share	7-28 d 10-20 yr. perennial 50 yr – 3,000 yr (baobab)	• Excellent species to integrate into agriculture systems for many future generations • Other uses too; supporter for climbers, medicinal uses, mulch, shade, etc. • Well-known fruits but more agricultural is information needed • These are underused
62. *Acacia karroo*	Sweet Thorn	Mfungu	gum					
63. *Acacia polyacantha*	African Cachechu Tree	Mtete	gum					
64. *Adansonia digitata*	Baobab	Mlambe	fruit					
65. *Cordyla africana*	Wild Mango,	Mtondo	fruit					
66. *Flacourtia indica*	Plum, Indian	Nthudja	fruit					
67. *Parinari curatellifolia*	Hissing Tree	Mbula	fruit					
68. *Parinari excelsa*	Plum, Rough-skinned	Muula	fruit					
69. *Parkia filicoidea*	Bean, African Locust	Mkundi	fruit					
70. *Sclerocarya caffra*	Marula	Mufula	fruit					
71. *Syzygium cordatum*	Water Boom	Nyowe	fruit					
72. *Syzygium guineense*	Water Berry	Mbunguzi	fruit					
73. *Trichilia emetica*	Natal Mahogany	Msikitsi	fruit					
74. *Ziziphus mauritiana*	Jujube	Masawo	fruit					
75. *Ziziphus mucronata*	Buffalo Thorn	Kankhande	fruit					

FRUITS (148)				Preferences for Growth				
Scientific Name	**English**	**Chichewa**	**Edible Parts**	**Area**	**Method & Space**	**# per Adult**	**Sprout & Harvest**	**Tips:**
76. *Ficus carica*	Fig, Common	Mkuyu	fruit					
77. *Ficus sp.*	Fig, Wild	Nkhuvu	fruit					
78. *Ficus sur*	Fig, Cape	Mkuyu-pasi	fruit					
79. *Ficus sycomorus*	Fig, Sycamore	Chikujumba	fruit					
V. Trees we need more information about								
• ***Native vines***								
80.		Mpinjipinji	fruit					
81. *Allophylus africanus*		Kandula	fruit					
82. *Ampelocissus sp.*		Mbeleshya	fruit					
83. *Anisophyllea pomifera*		Machilikiti	fruit					
84. *Balanites aegyptiaca*	Desert Date		fruit					
85. *Boscia salicifolia*		Mtakataka	fruit young					
86. *Boscia senegalensis*	Aisen	Mpetu	fruit (young)					
87. *Cadaba kirkii*		Nswadji	fruit					
88. *Canthium crassum*		Mnonga	Fruit					
89. *Englerophytum magalismontanum*	Wild Plum	Chiyera	Fruit					• Chrysophyllum magalismontanum?
90. *Cissus cornifolia*	Water Root	Mbulunbunji	fruit					
91. *Cissus integrifolia*		Mtambe	fruit					
92. *Cleistochlamys kirkii*		Nkalango	fruit					
93. *Conopharyngia elegans*	Toad Tree	Kakope	fruit					
94. *Cordia abyssinica*		Mwabwa	fruit					
95. *Cucumis hirsutus*		Mkuwikuwi	fruit					
96. *Cucumis metuliferus*		Kangamkhwani	fruit					

FRUITS (148)				Preferences for Growth				
Scientific Name	**English**	**Chichewa**	**Edible Parts**	**Area**	**Method & Space**	**# per Adult**	**Sprout & Harvest**	**Tips:**
97. *Cussonia kirkii*	Deadman's Fingers	Mbwabwa	fruit					
98. *Cussonia spicata*	Umbrella Tree	Chandimbo	fruit					
99. *Cyphostemma buchananii*		Namwalicheche	fruit sap					
100. *Detarium senegalense*	Sweet Dattock		fruit					
101. *Diospyros mespiliformis*	Monkey Guava	Msumwa	fruit					
102. *Dombeya rotundifolia*	Pear Tree, wild	Naduwa	fruit					
103. *Ehretia species*	Cape Lilac	Ng'amba	fruit					
104. *Ekebergia benguelensis*		Mabere ya ng'nombe	fruit					
105. *Fadogia odorata*		Mlumbakumba	fruit					
106. *Fagara sp.*	Fagara	Mlunguchulu	fruit					
107. *Friesodielsis obovata*		Mfulafula	fruit					
108. *Grewia inaequilatera*	Bastard Silver Raisin		fruit					
109. *Grewia micrantha*	Golden Raisin	Tensa	fruit					
110. *Hirtella bangweolensis*		Mphungumutu	fruit					
111. *Hoslundia opposita*		Chanzi	fruit					
112. *Landolphia kirkii*	Rubber Vine	Mpila	fruit					
113. *Landolphia parvifolia*		Kapwati	fruit					
114. *Landolphia petersiana*		Matutungwa	fruit					
115. *Landolphia sp.*		Makombe	fruit					
116. *Lannea discolor*	Livelong	Sidyatungo	fruit					
117. *Lannea edulis*	Grape, Wild	Mdyakamba	fruit					
118. *Lannea sp.*		Kitongomilo	fruit					
119. *Lannea stuhlmanni*		Chirusa	fruit					

FRUITS (148)				Preferences for Growth				
Scientific Name	**English**	**Chichewa**	**Edible Parts**	**Area**	**Method & Space**	**# per Adult**	**Sprout & Harvest**	**Tips:**
120. *Lantana trifolia*		Nakasonde	fruit					
121. *Maclura africana*		Mkolonsato	fruit					
122. *Mimusops zeyhera*	Red Milkwood	Mterekezi	fruit					
123. *Myianthus hostii*		Chiwele	fruit					
124. *Olea africana*	Olive, wild	Nakatimba	fruit					
125. *Oxalis acetosella*	Sorrel	Katakula	fruit					
126. *Pachystela brevipes*		Mpimbi	fruit					
127. *Parinari capensis*	Plum, Wild	Mungungajati	fruit					
128. *Pseudolachnostylis maprouneifolia*		Msolo	fruit					
129. *Pyrenacantha sp.*		Mchende	fruit					
130. *Rhoicissus tridentata*		Mpeza	fruit					
131. *Rothmannia manganjae*		Mfukula	fruit					
132. *Securinega virosa*		Mpombona	fruit					
133. *Solanum scabrum*	Sunberry		?fruit (wild)					
134. *Sorindeia madagascariensis*		Sasola	fruit					
135. *Syzygium owariense*		Mafuwa	fruit					
136. *Tacca leontopetaloides*	African Arrowroot	Dinde	fruit					• Fruit or just tuber?
137. *Temnocalyx obovatus*	,	Maso a ng'ombe	fruit					• Same as Fadogia ancylantha Schweinf?
138. *Toddalia asiatica*	Cockspur Orange	Msangalusi	fruit					
139. *Tribulus terrestris*	Devil's Thorn	Ncheso	? fruit					
140. *Turraea nilotica*		Msindila	fruit					
141. *Uapaca nitida*		Kasokolowe	fruit					
142. *Uapaca sansibarica*		Mtoto	fruit					

FRUITS (148)				Preferences for Growth				
Scientific Name	**English**	**Chichewa**	**Edible Parts**	**Area**	**Method & Space**	**# per Adult**	**Sprout & Harvest**	**Tips:**
143. *Uvaria sp.*		Ukonde	fruit					
144. *Vangueria sp.*		Matembela	fruit					
145. *Vitex sp.*		Msungututu	fruit					
146. *Ximenia americanna*	Plum, sour	Mtengere	fruit					
147. *Xymalos monospora*	Lemon Wood	Nakaswaga	fruit					
148. *Zanha golungensis*		Mkwidio	fruit					

Fruits Notes:

3. Vegetables (218)

There are just SO many vegetables! Such a huge variety of fungi, root, herbs, leaves, flowers and fruit vegetables that it is hard to believe anyone could lack diversity (and vitamin and minerals) in their diet! Many of these species you'll see on other lists as well as fruits, nuts, legumes or staples. Isn't Nature wonderful that it gives us so much? This list is organised by: growth style, function, and whether the foods are native to Malawi or come from abroad.

VEGETABLES (218)				Preferences for Growth				
Scientific Name	English	Chichewa	Edible Parts	Area	Method & Space	# per Adult	Sprout & Harvest	Tips:
I. Fungus								
1. Various scientific names	Mushroom	Bowa	fungus	shade moist	spores	100	varied on type	• Collect edible mushrooms and some of the soil around them (e.g. in forests) • Sprinkle them in shady moist areas in zone 1
II. Herbaceous Native Vegetables								
2. *Amaranthus hybridus*	Amaranth	Bonongwe	leaves	sun to part shade	seed 0-1 cm 30 cm	5	7 - 14 d 30 - 90 d	• All of these are 'weeds', meaning they grow really fast and multiply easily • Pick leaves often • Use your solar dryer or other method of preserving them in season
3. *Amaranthus sp.*	Wild Blite	Bonongwe	leaves					
4. *Amaranthus spinosus*	Spiny Pigweed	Bonongwe wa minga	leaves					
5. *Amaranthus thunbergii*	Poor Man's Spinach	Mberekete	leaves					
6. *Bidens pilosa*	Blackjack	Chisoso	leaves, shoots					
7. *Bidens schimperi*		Mbilidzongwe	leaves					
8. *Ceratotheca sesamoides*		Chewe	leaves					
9. *Cleome gynandra*	Cat's Whiskers	Luni	pods, flowers, leaves, shoots					

VEGETABLES (218)				Preferences for Growth				
Scientific Name	**English**	**Chichewa**	**Edible Parts**	**Area**	**Method & Space**	**# per Adult**	**Sprout & Harvest**	**Tips:**
10. *Cleome monophylla L.*		Njerenjedza	leaves, shoots, flowers					
11. *Commelinia species*	Spiderwort	Kasungwi	leaves, shoots					
12. *Corchorus trilocularis*		Denje	leaves					
13. *Cordeauxia edulis*	Ye-be	Denje	leaves					
14. *Galinsoga parviflora*		Mwamuna aligone	leaves					
15. *Indigofera*		Denje	leaves					
16. *Ocimum canum Sims*	Basil, local	Mpungabwe	leaves, seed					
17. *Portulaca olerncea*	Purslane	Matakoatsanu	leaves, shoots, stems					
18. *Triumfetta annua*		Khatambuzi	leaves					
19. *Eleusine coracana*	Millet, Finger	Mawere	shoots, plant	sun	seed 0-1 cm 20 cm	50	7-14 d 30-60 d	
20. *Hibiscus acetosella*		Limanda	leaves	sun to light shade	seed cuttings 0-1 cm 30 cm	2	14 d 30 d perennial	• Small shrub, light climbers ok like tomatoes • These are two of my favourite vegetable plants, tangy and easy to care for
21. *Hibiscus sabdariffa*	Roselle	Chidede	leaves					
22. *Hibiscus esculentus*	Okra	Thelele lobzyala	fruit					

VEGETABLES (218)				Preferences for Growth				
Scientific Name	**English**	**Chichewa**	**Edible Parts**	**Area**	**Method & Space**	**# per Adult**	**Sprout & Harvest**	**Tips:**
23. *Solanum americanum*	Nightshade	Knadzi, Mnadzi, Msaka	leaves, fruit CARE!	sun to light shade	seed 0-1 cm 50 cm	2	14 d 30 d perennial	• Only eat the correct nightshade and the correct parts. Some nightshade parts are very dangerous… • Many varieties • Sizes from 5 – 25 cm • Shapes oval, oblong, round with ridges, mostly smooth • Colours: yellow, orange, purple • Many different local names: Nthulazazikulu, Mtungwi, Nthulazazing'ono, Makwenda, Malanza, Madwanzi, Nthula, Mbwanyanya, Zimphwa, Matungwi
24. *Solanum macrocarpon*	Eggplant, African	Mabilingani	Fruit CARE!					
25. *Solanum sp. various*		Imphwa	Fruit CARE!					
• ***Native vegetable - digger***								
26. *Aframomum angustifolium*	Cardamom, wild	Nthungula	spice root	shade	root 30 cm	10	7-14 d 90-120 d perennial	• Used like a spice, ginger-like
27. *Colocasia esculenta*	Coco Yam Leaves	Ntembe Masam	leaves, stems	many wet	tuber 60 cm	20	10-14 d 30 d perennial	• Only eat young soft leaves & stems. Best during rains or from an irrigated garden • Tubers can also be eaten. • The plants will spread and clump

VEGETABLES (218)				Preferences for Growth				
Scientific Name	**English**	**Chichewa**	**Edible Parts**	**Area**	**Method & Space**	**# per Adult**	**Sprout & Harvest**	**Tips:**
28. *Oxalis sp.*		Ntedza wa kwangala	leaves	sun	seed bulb 15 cm	20	5-7 d 14 d perennial	• Plants will spread and clump, bulbs also eaten, tangy • Irrigate for non-stop harvest
• ***Native vegetable – leguminous***								
29. *Cassia occidentalis L.*	Coffee senna	Mjoka	pods	sun	seed 0-1 cm nzama is larger ~3 cm depth ~20 cm space	10 - 50+ for other uses (fat)	7-14 d 30-90 d	• Haven't tried, mature seeds are used for hot drinks
30. *Crotalaria ochroleuca*	Rattlebox	Zumba	leaves care!					• Many types • Some are very poisonous, be sure you have the right one! • Great raw in salads.
31. *Sesamum angolense*		Chewe	leaves					• Slimy when water is added
32. *Sesamum indicum*	Sesame	Chitowe	leaves shoots					• Also a fat • Light supporter
33. *Vigna subterranea*	Bambara Groundnut	Nzama	leaves					• Also a digger • Haven't tried the leaves
III. Herbaceous Vegetables, Introduced								
34. *Brassica chinensis*	Chinese Cabbage	Chinesi	leaves	sun to light shade moist	seed 0-1cm 25 cm	50	3 - 7 d 30 -120 d	• Pick leaves often • Lettuce likes cooler weather, and does nicely irrigated in cold season
35. *Brassica juncea*	Mustard, Indian	Mpiru	leaves shoots flowers					
36. *Brassica napus var. oleifera*	Rape	Mpiru wotuwa	leaves					
37. *Brassica oleracea var. acephala*	Kale	Kale	leaves					
38. *Lactuca sativa*	Lettuce	Letesi	leaves					
39. *Spinacia oleracea*	Spinach	Spinichi	leaves					

VEGETABLES (218)				Preferences for Growth				
Scientific Name	**English**	**Chichewa**	**Edible Parts**	**Area**	**Method & Space**	**# per Adult**	**Sprout & Harvest**	**Tips:**
40. *Zea mays*	Maize, Green	Dowe	grain immature	sun moist	seed 3 cm 25 cm	20	3-5 d 80 – 90 d	• Also a supporter
• ***Introduced protectors (herbs)***								
41. *Allium cepa*	Onion / Shallot	Anyezi	roots shoots	sun moist	seed bulb 0-1 cm 10 cm	70	5-10 d 120 d	• Many different varieties
42. *Allium porum*	Leek		roots shoots					
43. *Allium sativum*	Garlic	Adyo	roots shoots					
44. *Allium schoenoprasum*	Chives / Garlic chives		leaves shoots	sun	shoots with roots root cutting	50 cm	perennial	• Chives and fennel go to seed easily in Malawi • Grows in a sprawling patch / clump • Aim for half a metre patch per person for herbs in meals, teas and for medicines.
45. *Foeniculum vulgare*	Fennel		leaves bulbs					
46. *Cymbopogon citratus*	Lemon Grass		leaves shoots					
47. *Mentha sp.*	Mint		leaves					
48. *Origanum majorana*	Marjoram		leaves					
49. *Coriandrum sativum*	Cilantro Coriander	Masala	leaves seed (spice)	sun	seed 1 cm	50	3-5 d 30-90 d	• Can pick continually to keep seed from setting
50. *Trigonella foenum-graecum*	Fenugreek	Methi	leaves shoots					• Also a legume
• ***Introduced, perennial vegetables***								
51. *Asparagus officinalis*	Asparagus	Katsitsimzu-kwa	shoots	sun	shoots	50	perennial	
52. *Curcuma domestica*	Tumeric	Manjanu Kari	roots	shade sun	root	20	7-14 d 100 d-120 d	• Ginger leaves can be eaten, though a bit tough • Good as tea • Both easy to dry for storage
53. *Zingiber officinale*	Ginger							

VEGETABLES (218)				Preferences for Growth				
Scientific Name	**English**	**Chichewa**	**Edible Parts**	**Area**	**Method & Space**	**# per Adult**	**Sprout & Harvest**	**Tips:**
54. *Capsicum annuum*	Chillies	Tsobola	fruit	sun	1 cm 50-60 cm	1-5	7-14 d 90 d perennial	• Many varieties, shapes, sizes • Hot peppers are useful for flavour and health of you and your plants & trees. Plant and use a lot! • Bears for several months
55. *Solanum melongena / aethiopicum*	Eggplant, Foreign	Mabilingani	fruit	sun	1 cm 50-60 cm	1	7-14 d 90 d perennial	• Many varieties, shapes, sizes • Hot peppers are useful for flavour & health. Plant & use a lot! • Bears for several months
• ***Introduced, leguminous vegetables***								
56. *Cicer arietinum*	Chick Pea	Nchana	pods (young)	sun moist	direct 15-30 cm	50	3-7 d 60-80 d	• Eating young pods reduces the amount of protein & carbohydrate in final harvest • Plan for this by planting more for both uses
57. *Lens culinaris*	Lentil	Masar						
58. *Phaseolus vulgaris*	Bean, French pods	Mbwanda						
59. *Phaseolus spp*	Bean, Common Leaves	Khwanya	leaves				3-7-d 30-60 d	• Younger leaves are tastiest
60. *Phaseolus vulgaris*	Bean, French leaves	Mbwanda						
IV. Vines								
61. *Adenia gummier*		Mlozi	leaves	shade	root	1	7-21 d perennial	• Perennial vines that to climb high and bountifully
62. *Basella alba*	Spinach, Ceylon	Mdele	leaves shoots	sun	seed			
63. *Tetragonia expansa*	Spinach, New Zealand	Spinichi	Leaves					

VEGETABLES (218)				Preferences for Growth				
Scientific Name	**English**	**Chichewa**	**Edible Parts**	**Area**	**Method & Space**	**# per Adult**	**Sprout & Harvest**	**Tips:**
64. *Ipomoea aquatica*	Spinach, water, wild	Lilowolowo	leaves	wet moist	cutting 10 cm 30 cm	20	3-5 d 30-100 d perennial	• Easy to grow • Provides continual harvest with irrigation • Sweet potatoes take very little water and are also a seedbed • Can be planted in zone 3 in the rains for tubers
65. *Ipomoea batatas*	Sweet Potato	Kholowa	leaves	many				
• ***Fruiting vines - climbers***								
66. *Coccinia grandis*	Ivy Gourd	Fwifwi ?	fruit	dry many	direct 3 cm 1-3 m	3	?	• Have seen & eaten C. grandis in Indian homes, it is like a very small marrow or zucchini • C. adoenis also a sweet fruit, haven't seen in Malawi
67. *Coccinia adoensis*		Fwifwi	leaves					
68. *Cucumis anguria*	Cucumber, Small Prickly	Chikanyanga	leaves fruit	sun zone 1 & 2	1-3 cm 50 cm	1-2	5-7 d 90 d – 120 d	• Smaller climbers, good integrated in gardens • A great variety of textures shapes and seasons for adding to salads, side dishes or snacks
69. *Cucumis sativus*	Cucumber	Minkhaka	fruit					
70. *Cucumis sp.*	Cucumber, Prickly	Chipwete	fruit					
71. *Luffa aegyptiaca*	Loofa Leaves	Masponge	fruit leaves					
72. *Momordica charantia*	Gourd, Bitter	Karela	fruit					
73. *Sechium edule*	Chayote	Ngowe	fruit leaves shoots					
74. *Citrullus lanatus*	Watermelon	Vwende	leaves flowers	many zone 2, 3, 4	3 cm 100 cm	1-2		• Can take over the garden • When harvesting flowers, don't disturb fruiting process • Pick leaves often
75. *Cucumis melo*	Melon	Kayimbe	leaves					

VEGETABLES (218)				Preferences for Growth				
Scientific Name	**English**	**Chichewa**	**Edible Parts**	**Area**	**Method & Space**	**# per Adult**	**Sprout & Harvest**	**Tips:**
76. *Cucurbita species*	Pumpkin	Dzungu Mnkhwani Chiluwe	fruit leaves flowers shoots					
77. *Lagenaria siceraria*	Gourd	Mphonda	leaves shoots fruit					
78. *Lycopersican esculentum*	Tomato	Matimati	fruit	sun	seed 1 cm 30 cm	12	14 d 90-150d	• Pull off side shoots for larger tomatoes, shoots can be planted as new plants • Many varieties, most like to climb (e.g. on a pigeon pea or other shrub) • Needs protectors for health
• ***Legume vines***								
79. *Canavalia ensiformis*	Bean, Jack	Kalongdoda ?	pods	many zone 2,3,4	direct 3 cm 50 cm	5	7-21 d 120- 160 d perennial	• Large climbers, great with strong trees or in fields
80. *Lablab purpureus*	Bean, Hyacinth	Mkhunguzu Nkhusa Mkhunguzu Mkhunguzu	leaves shoots flowers pods					
81. *Phaseolus aconitifolia*	Bean, Tepary		leaves pods (young)					
82. *Phaseolus lunatus*	Bean, Lima	Kamumpanda	leaves					
83. *Pisum sativum*	Peas, Green	Sawawa osakwima	seeds	sun zone 1,2,3	direct 3 cm 15-30 cm	50	2-7 d 60-90 d	• Smaller climbers, good integrated in gardens • Cowpea can be perennial
84. *Vigna radiata*	Bean, Mung	Mphodza	pods					
85. *Vigna unguiculata*	Pea, Cowpea	Mtambe Khobwe	leaves pods					

VEGETABLES (218)				Preferences for Growth				
Scientific Name	**English**	**Chichewa**	**Edible Parts**	**Area**	**Method & Space**	**# per Adult**	**Sprout & Harvest**	**Tips:**
V. Trees								
• ***Shrubs (each are leguminous, too!)***								
86. *Cajanus cajan*	Pea, Pigeon	Nandolo	leaves pods (young)	Sun	Seed Direct 3 cm 30-60 cm	50	5-10 d 60-120 d Perennial	• C. singueana is prolific, will climb as a shruby vine, great hedge or cover for a wall Leaves and young pods are a family favourite
87. *Cassia occidentalis L.*	Coffee senna	Mjoka	leaves flowers					
88. *Cassia petersiana*	Monkey Pod	Mpatsachokolo	leaves pods (young)					
89. *Cassia singueana*		Mpatsachokolo Kadete	leaves pods (young)					
• ***Small trees***								
90. *Annona senegalensis*	Custard Apple, Wild	Mpoza	leaves flowers	sun light shade	seed direct or nursery 1- 5 m	1-2	varied, see fruits perennial	• Leaves can be eaten as long as you don't strip the whole tree! • When harvesting flowers, don't disturb fruiting process • Cassava is also a staple
91. *Annona sp.*	Custard Apple	Mphosa	leaves flowers					
92. *Bixa orellana*	Annatto	Kari	dye (red powder around seed)					
93. *Borassus aethiopum*	Palm, Fan	Magwede, Ngwanlangwa	leaves					
94. *Carica papaya*	Pawpaw	Papaya	fruit (young) leaves shoots flowers					

VEGETABLES (218)				Preferences for Growth				
Scientific Name	**English**	**Chichewa**	**Edible Parts**	**Area**	**Method & Space**	**# per Adult**	**Sprout & Harvest**	**Tips:**
95. *Hyphaene species*	Palm, Doum	Mgwalangwa	seed sprout					
96. *Manihot esculenta*	Cassava	Chigwada	leaves					
97. *Manihot spp*	Cassava, Tree	Chigwada	leaves		seed or cutting 20 cm 60 cm		14 d 30-90 d perennial	
98. *Moringa oleifera*	Horse Radish Tree	Chamwamba Masamba Maluwa	pods leaves flowers					
99. *Vitex doniana*		Mpindimbi	leaves shoots					
• ***Large trees***								
100. *Adansonia digitata*	Baobab	Mlambe	leaves shoots flowers	many	seed or nursery 5-20 m	1 per house or to share	varied, see fruits perennial	• Baobab and tamarind leaves are two of our favourites • The rest we are less familiar with as vegetables • Mango skin and leaves are good in achaar • When harvesting flowers, don't disturb fruiting process
101. *Afzelia quanzensis*	Pod Mahogany	Msambamfumu	leaves					
102. *Ceiba pentandra*	Kapok	Usufu	pods leaves flowers fruit (young)					
103. *Commiphora africana*		Khobo	leaves					
104. *Mangifera indica*	Mango Leaves	Mango Khungu Osakwima	leaves shoots skin (young)					
105. *Strychnos spinosa*	Kaffir Orange	Mteme (masamba)	leaves					
106. *Ziziphus mauritiana*	Jujube	Masawo	leaves					
107. *Tamarindus indicus*	Tamarind	Bwemba	leaves flowers pods					

VEGETABLES (218)				Preferences for Growth				
Scientific Name	**English**	**Chichewa**	**Edible Parts**	**Area**	**Method & Space**	**# per Adult**	**Sprout & Harvest**	**Tips:**
VI. Vegetables we need more information about								
108. *Abrus precatorius*	Crab's Eyes	Ntimbua	leaves					
109. *Acacia macrothyrsa*		Nafungwe	leaves					
110. *Achyranthes aspera*	Rough Chaff Flower	Ngwirisi ndi kakose	leaves					
111. *Ailanthus Myianthus*		Nine	leaves					
112. *Alternanthera sessilis*		Kandudwa	leaves					
113. *Anthericum*		Kaluwatete	flowers					
114. *Arachis hypogaea*	Groundnuts	Mtedza	leaves					• Legume, digger, unsure about leaf
115. *Area Leuctra*		Chidyonko	leaves					
116. *Argemone mexicana*	Mexican Poppy	Doza	leaves					
117. *Asparagus sp.*	Asparagus, Wild	Katsitsim-zukwa	shoots					
118. *Astragalus atropilosulus*		Nachilare	leaves					
119. *Asystasia gangetica*		Nasungwi	leaves					
120. *Balanites aegyptiaca*	Desert Date		leaves flowers					
121. *Boscia salicifolia*		Mtakataka	leaves					
122. *Boscia senegalensis*	Aisen	Mpetu	leaves					
123. *Byrsocarpus orientalis*		Ntandan-yerere	leaves					
124. *Canna bidentata Bertol.*	Canna, Wild	Gontha	seed (spice)					• Digger, unsure how to use
125. *Canthium sp Canthium huilense*		Chisunkunthu	leaves					
126. *Cardiospermum halicacabum*	Heart Seed	Msendechere	leaves					

VEGETABLES (218)				Preferences for Growth				
Scientific Name	**English**	**Chichewa**	**Edible Parts**	**Area**	**Method & Space**	**# per Adult**	**Sprout & Harvest**	**Tips:**
127. *Cassia mimosoides L.*	Tea senna	Ngwalang-walate	leaves shoots					
128. *Celosia Argentea*	Cock's Comb	Ndangale	leaves shoots					
129. *Celosia trigyna*		Kaphikaulesi	leaves shoots					
130. *Ceratotheca sp.*		Tilingane	leaves					
131. *Ceropegia papillata*		Fwafwalingo	leaves					
132. *Ceropegia sp.*		Chang'ombe	leaves					
133. *Cicer arietinum*	Chick Pea	Nchana	leaves					• Legume, digger, unsure about leaf
134. *Cissus bucanii*		Namwali-cheche	leaves					
135. *Cissus cornifolia*	Water Root	Mbulunbunji	leaves fruit (young)					
136. *Cissus integrifolia*		Mtambe	leaves					
137. *Cissus jatrophoides*		Mnuwake-munda	leaves					
138. *Cissus rubiginosa*		Mpelesi	leaves					
139. *Corchorus aestuans*		Chamalawi	leaves					
140. *Corchorus olitorius*	Jute	Chilenzi	leaves shoots					
141. *Crassocephalum rubens*		Chinusi	leaves shoots					
142. *Crotalaria anthyllopsis*		Chiwasa	leaves					
143. *Crotalaria cephalotes*		Chisunkhuthu	leaves					
144. *Crotalaria natalitia*		Thusya	leaves flowers					

VEGETABLES (218)				Preferences for Growth				
Scientific Name	**English**	**Chichewa**	**Edible Parts**	**Area**	**Method & Space**	**# per Adult**	**Sprout & Harvest**	**Tips:**
145. *Crotalaria sp.*		Bwayaya Mdyakanjobvu Kapuka Chimphako	leaves					
146. *Cucumis hirsutus*		Mkuwikuwi	leaves					
147. *Cucumis metuliferus*		Kangam-khwani	leaves					
148. *Cynanchum schistoglossum*		Mpuludwa	leaves					
149. *Dolichos buchananii*	Bully Beef Plant	Nthupa	flowers					
150. *Dolichos sp.*		Chiluwe cha chitimbwisi	flowers					
151. *Dolichos sp.*		Chitimbwisi	leaves					
152. *Dombeya tanganyikensis*		Mnyangale	shoots stems					
153. *Ectadiopsis oblongifolia*		Bwazi	leaves					
154. *Emilia coccinea*		Chinguwo	leaves					
155. *Ensete ventricosum*	False Banana	Chizuzu	shoots stems flowers corm rhizome					• Can also be a staple • unsure how to use
156. *Fagara sp*	Fagara	Mlunguchulu	leaves					
157. *Ficus sp.4*	Fig, Wild	Nkhuvu	leaves					• Also fruit unsure how to use
158. *Ficus sur*	Fig, Cape	Mkuyu-pasi	leaves					
159. *Ficus sycomorus*	Fig, Sycamore	Chikujumba	leaves					
160. *Glycine wightii*		Yembe	leaves					
161. *Gnidia chrysantha*		Kazinda	leaves					
162. *Hibiscus articulatus*		Chamakande	leaves					

VEGETABLES (218)				Preferences for Growth				
Scientific Name	**English**	**Chichewa**	**Edible Parts**	**Area**	**Method & Space**	**# per Adult**	**Sprout & Harvest**	**Tips:**
163. *Hibiscus cannabinus*	Hemp, Bombay	Sonkhwe	leaves flowers					
164. *Hibiscus diversifolius*		Chatata Katham-phwi?	flowers					
165. *Hibiscus esculentus*	Okra	Chithanda	leaves					
166. *Hibiscus physaloides*		Thelele thengo	flowers					
167. *Hibiscus rosa-sinensis*	Rose of China	Losi	leaves flowers					
168. *Hibiscus sp.*		Chimkakala	leaves					
169. *Ipomoea eriocarpa*		Kholowa thengo	leaves					
170. *Ipomoea sp.*		Chikalan-dembe	leaves					
171. *Jussiaea abyssinica*			leaves					
172. *Justicia sp.*		Kalokola Kangena Kanyelenyezi	leaves shoots flowers					
173. *Kaempferia aethiopica*		Manjanu	roots					
174. *Lagenaria sphaerica*		Chipuzi	leaves					
175. *Lightfootia sp.2*		Chisiso	leaves					
176. *Lupinus*		Kantedza	leaves					
177. *Melochia corchorifolia*		Chipondavu	leaves					
178. *Momordica charantla*	Gourd, Bitter Leaves	Karela	leaves					• Vegetable • unsure about leaf
179. *Momordica foelida*		Tungwi	shoots					
180. *Morus nigra*	Mulberry, purple	Mapulesi	leaves					• Fruit • unsure about leaf
181. *Nesaea sp.*		Kwete	leaves					
182. *Nidorella resdifolia*		Sungubuwa	leaves					
183. *Nymphaea caerulea*	Water Lily	Chikolwa	flowers					

VEGETABLES (218)				Preferences for Growth				
Scientific Name	**English**	**Chichewa**	**Edible Parts**	**Area**	**Method & Space**	**# per Adult**	**Sprout & Harvest**	**Tips:**
184. *Ormocarpum*		Phuluphulu	leaves					
185. *Oxygonum sinuatum*		Kalasaweni	leaves					
186. *Pavonia urens*		Chatata, Thoni	flowers					
187. *Pentanisia schweinfurthii*	Forget-me-not, Rhodesian	Ngulungundi	leaves					
188. *Pentarrhinum insipidum*		Chindewe	leaves fruit					
189. *Pentarrhinum sp.*		Kafungo	leaves					
190. *Polygonum plebeium*		Kasabwe	leaves					
191. *Polygonum salicifolium*		Nsendeka	leaves					
192. *Polygonum setosulum*		Chikungu ufa	leaves					
193. *Psychotria eminiana*		Chisunkunthu	leaves					
194. *Ranunculus multifidus*	Buttercup	Khobedi	leaves					
195. *Rumex bequaertii*	? Sorrel, Dock	Gakazea	leaves					
196. *Salvadora persica*	Toothbrush Tree	Mswache	leaves					
197. *Secamone sp.*		Bwazi	leaves					
198. *Securidace longepedunculata*	Tree Violet	Bwazi	leaves					
199. *Sida alba*			leaves					
200. *Smithia elliotii*		Kadzulo	leaves					
201. *Solanum sp. 12*		Malanza	leaves					
202. *Sonchus oleraceus*	Sow Thistle	Chinguwo	leaves					
203. *Sphenostylis marginate*		Nkhunga Mlali	leaves flowers					
204. *Sterculia appendiculata*		Njale	leaves					

VEGETABLES (218)				Preferences for Growth				
Scientific Name	**English**	**Chichewa**	**Edible Parts**	**Area**	**Method & Space**	**# per Adult**	**Sprout & Harvest**	**Tips:**
205. *Sterculia sp.2*		Chiwawani	leaves					
206. *Talinum caffrum*		Mlelamvula	leaves					
207. *Thunbergia lancifolia*		Mwanaluni	leaves					
208. *Thunbergia oblongifolia*		Mwanakazi	leaves					
209. *Trichodesma zeylanicum*		Dungum-wamba	leaves					
210. *Tulbaghia cameronii*		Katsopi	leaves flowers					
211. *Tylosema fassoglensis*		Mphand-wapansi	pods					
212. *Urena lobata*	Bun Ochra	Msapatonje	flowers					
213. *Vernonia sp.*		Dambwe	leaves					
214. *Vigna reticulata*		Chamaweya	leaves					
215. *Vigna sp.6*		Mtambe thengo	leaves					
216. *Viola abyssinica*		Katongolola	leaves					
217. *Wormskioldia longepedunculata*	Pimpernel, Rhodesian	Katambala	leaves					
218. *Zornia pratensi*		Kandudwa	leaves					

Vegetables Notes:

4. Legumes and Nuts (28)

It can be helpful to have a significant part, anywhere from 20-50%, of all your zones and guilds planted up to leguminous species so that there is plenty of protein harvest for you (when you include edible legumes) and a good contribution of nitrogen to the soil, the plants and trees growing in the soil, and for the animals who are consuming the products generated (humans being just one of them!).

The leguminous species are listed first and are grouped into: Climbers, Diggers, Plants (herbaceous layer), Shrubs and finally trees covering all heights up through the canopy, both legume species and nut species.

LEGUMES & NUTS (28)				Preferences for Growth				
Scientific Name	English	Chichewa	Edible Parts	Area	Method & Space	# per Adult	Sprout & Harvest	Tips:
I. Legume Climbers								
• ***Small climbers***								
1. *Phaseolus spp*	Bean, Common	Nyemba	legumes leaves	sun	direct 3 cm 15-30 cm	50	2-7 d 60-90 d	• Cowpea can be perennial • Can climb grains or other small supporters • Can be irrigated or rain fed. • Best in zones 1, 2 or 3
2. *Pisum sativum*	Peas, Mature	Sawawa						
3. *Vigna radiata*	Bean, Mung	Mphodza						
4. *Vigna unguiculata*	Pea, Cowpea	Khobwe						
• ***Medium climbers***								
5. *Lablab purpureus*	Bean, Hyacinth	Mkhunguzu	legumes leaves	any	direct 3 cm 50 cm	5	7-21 d 120-160d perennial	• Does best climbing a medium supporter: shrub or garden fence • Will bear longer when watered • Consider in zone 1 on fence or zone 2, 3 with agro-forestry or zone 4
6. *Phaseolus lunatus (?)*	Bean, Lima, local	Kamumpanda, chimbamba						

LEGUMES & NUTS (28)				Preferences for Growth				
Scientific Name	**English**	**Chichewa**	**Edible Parts**	**Area**	**Method & Space**	**# per Adult**	**Sprout & Harvest**	**Tips:**
• ***Heavy climbers***								
7. *Canavalia ensiformis*	Bean, Jack	Kalongdoda (?)	seed CARE!	any	direct 60 cm	5	7-21 d 120-160d perennial	• POISONOUS unless processed carefully • Large amount of biomass • Use strong supporters as it can cover small plants • Consider in zone 1 on fence or zone 2, 3 with agro-forestry or 4
8. *Lupinus sp.*	Lupinus	Kantedza				5		
9. *Mucuna pruriens*	Bean, Buffalo	Kalongonda				5		
10. *Stizolobium aterrimum*	Bean, Velvet	Kalongonda (?)				5		
II. Legume Diggers								
11. *Arachis hypogaea*	Groundnuts	Mtedza	legumes	sun	direct 45 cm	50	7-21 d 130 d	• Best as rotation / interplant in zone 3 • Can do in zone1
12. *Vigna subterranea*	Bambara Groundnut	Nzama				50		
III. Legume Plants								
13. *Cicer arietinum*	Chick Pea	Nchana	Legumes	sun	Direct 15-30 cm	50	3-7 d 60-90 d	• Best as rotation / interplant in zone 3 • Can do in zone 1
14. *Glycine max*	Bean, Soy	Soya						
15. *Lens culinaris*	Lentil	Masar						
16. *Phaseolus aconitifolia*	Bean, Tepary							
17. *Sphenostylis marginate*		Nkhunga						
IV. Legume Shrub								
18. *Cajanus cajan*	Pea, Pigeon	Nandolo	Legume (young or mature)	many	Seed Direct 3 cm 30-60 cm	50	5-10 d 60-120 d Perennial	• Super just about anywhere, so versatile • Zone 1 as a sparse intercrop for nitrogen, digging, support. • Zones 2, 3, 4 as intercrop • Trim annually for fuel or fodder for animals

LEGUMES & NUTS (28)				Preferences for Growth				
Scientific Name	**English**	**Chichewa**	**Edible Parts**	**Area**	**Method & Space**	**# per Adult**	**Sprout & Harvest**	**Tips:**
V. Legume Trees								
19. *Acacia albida*	White Thorn	Nsangu	seeds, care!	many	scaring 20+ m	1-5 per house	bears in 10-20 yr perennial	• Zone 3 inter-plant with agroforestry, zone 4 or wild in zone 5 for the rest of nature to enjoy • Strong supporters for heavy climbers
20. *Parkia filicoidea*	Bean, African Locust	Mkundi	legumes					
VI. Nut Trees								
21. *Adansonia digitata*	Baobab	Mlambe	seed (mature)	varied	direct or nursery scaring for some varied spacing	1 per house	bears in 5-30 yr can bear fruit for 50-2,000 years! perennial	• Zone 2 or 4 for most of these species • Most of these are high yielding and long lasting. 1 tree can serve several households • Strong supporters for heavy climbers
22. *Anacardium occidentale*	Cashew Nut	Mbibu						
23. *Borassus aethiopum*	Palm, Fan	Magwede, Ngwanlangwa						
24. *Macadamia*	Queensland Nut							
25. *Parinari curatellifolia*	Hissing Tree	Mbula						
26. *Prunus dulcis*	Almond							
27. *Telfaria pedata*	Oysternut	Matandu						
28. *Terminalia catappa*	Indian Almond	Mkungu						

Legumes & Nuts Notes:

5. Animal Foods (36)

Animal foods are important in agricultural systems for their protein (nitrogen), both for people and for the earth. They can provide us with a lot of useful work energy too if we think about their natural behaviour, care for them properly, and let them do work for us. Chickens like scratching around, for example, and can harm small seeds and seedlings in zone 1 beds, but they can also help scratch up compost and eat up insects in fallen fruit in zone 2 or 4, so we must design carefully and thoughtfully to avoid harmful effects of natural behaviours and harness the good ones.

ANIMAL FOODS (36)				Preferences for Growth		
Scientific Name	**English**	**Chichewa**	**Edible Parts**	**Area**	**# per Adult**	**Tips:**
I. Domesticated Animals						
• ***Fowl***						
1. *Columbidae Colombiformes*	Pigeons, Doves	Nkhunda, Mazira	meat eggs	zone 1	3	• Use the manure of birds and small mammals • Chickens keep pests down and prepare soil for planting
2. *Gallus gallus domesticus*	Chickens	Nkhuku, Mazira				
3. *Numididae*	Guinea Fowl	Nkhanga, Mazira				
4. *Anatidae*	Ducks, Geese	Baka, Mazira		pond river zone 1 or 2		
• ***Small mammals***						
5. *Cavia porcellus*	Guinea Pig	Mbira	meat	zone 1 & 2	2-3	• The smaller the animal the stronger the manure!
6. *Leporidae Lagomorpha*	Rabbits	Kalulu				
• ***Large mammals***						
7. *Bovinae Bos*	Cow	N'gombe, Mkaka	meat milk	zone 2 & 3	1	• Tether animals, or use pens to avoid damage • Use the habits of different animals to care for the area • Use the manure to improve yields • Prepare ground with animal tractors
8. *Capra aegagrus*	Goat	Mbuzi, Mkaka				
9. *Ovis aries*	Sheep	Nkhosa				
10. *Sus*	Pig	Nkhumba	meat			

ANIMAL FOODS (36)				Preferences for Growth		
Scientific Name	**English**	**Chichewa**	**Edible Parts**	**Area**	**# per Adult**	**Tips:**
II. Fish						
11. Various	Fish	Nsomba, Chambo Matemba, Mcheni, Mlamba, Utaka	Fish		20	• Ducks enrich fishponds and eat pests too
III. Insects						
12. *Anthophila*	Bees	Njuchi, Uchi	larvae honey	zones 2, 3, 4	1-2 per house	• Great in all zones, especially 2 or 4 with perennials • Bees need flowers & water to make honey
13. *Brachytrupes membranaceus*	Crickets	Nzerenzere Bwamnoni, Nkhululu	insect	all zones	• 5-10	• Insects are very high in protein • Insects are readily available everywhere • Ask your grandparents and elders what insects people used to eat • Insects are human food in 80% of the world's nations • Beetles are the most widely eaten insects. About 344 species are known to be used as food • Stopping the use of pesticides and chemicals that harm insects would allow these edible, beneficial, insects to thrive for us to harvest and use • These insects are pollinators, protectors and food. • With many insects simply remove the wings and any sharp bits and fry them in hot oil with salt for a tasty and nutritious snack! • Insects can also be added to soups and stews to make them more nutritious
14. *Gryllidae*						
15. *Homorocoryphus vicinus*						
16. *Acantahacris ruficornis* ***17.*** *Cyrtacanthacris aeriginosa*	Grasshopper	Dziwala				
18. *Caelifera*		Tsokonombwe Sadyamchere Gomphanthiko Mkhwiyo				
19. *Nomadacris septemfasciata*	Red Locust	Dzombe				
20. *Various*	Cicadas	Nyenje				
21. *Carebara vidua* ***22.*** *Isoptera*	Termites	Mafulufute				
		Inswa, Mbulika				
		Ngumbi				
23. *Chironomidae*	Lake Flies	Nkhungu				

ANIMAL FOODS (36)				Preferences for Growth		
Scientific Name	**English**	**Chichewa**	**Edible Parts**	**Area**	**# per Adult**	**Tips:**
24. *Lepidoptera*	Caterpillars	Dzinthondo				• Also in Chichewa: mphalabungu, mapala, mofa, kawichi, mbwabwa, katondo
25. *Coleoptera*	Beetle	Chikumbu				
26. *Nezara robusta* ***27.*** *Sphaerocoris*	Shield bug	Nkunguni Nsensenya				
IV. Molluscs						
28. *Mollusca*	Snails	Nkhono	meat	many	5-10	• Not eaten much in Malawi except by foreigners • Available at a few restaurants and grocery stores.
V. Wild Animals						
29. *Aves*	Birds	Mbalame, Mazira	meat eggs	zone 4-5	shared with several people	• A few examples that could be hunted sustainably but only if zones 4 and 5 are healthy • Zone 4 can be used for sustainably managed hunting • Zone 5 should be a sanctuary, ideally with no hunting or interference • In a large, healthy zone 5 there may be hunting, depending on local law
30. *Bovidae*	Antelope	Nyiska	meat			
31. *Syncerus caffer or Bubalus*	Buffalo	Njati				
32. *Hippopotamus amphibius*	Hippopotamus	Mvuu				
33. *Sus scrofa*	Wild pig	Ngulube				
VI. Rodents						
34. *Mus*	Mice, mouse	Mbewa	meat	zone 3-5		• Avoid lighting fires to catch mice and other small animals. It damages soil fertility and the environment. Find another way! Be clever!
35. *Hystricomorpha*	Porcupine	Kanungu				
36. *Rattus*	Rats	Mbira				

Animal Food Notes:

6. Fats & Oils (48)

The best way to get fat into your diet is from eating seeds or fatty fruits – not by pressing oil out of these things and eating the fat by itself. Most foods in the fats & oils food group are also found in other food groups (vegetables, fruits or legumes). Only the first 4 are new species.

FATS & OILS (48)				Preferences for Growth				
Scientific Name	English	Chichewa	Edible Parts	Area	Method & Space	# per Adult	Sprout & Harvest	Tips:
1. *Helianthus annus*	Sunflower	Sanifulawa	seeds	zones 1, 2, 3	seed 20 cm	50	5-10 d 90-120d	
2. *Sesamum indicum*	Sesame	Chitowe	seed oil					• Also a vegetable
3. *Cocos nucifera*	Coconut	Nkoko	fruit	dry sandy	seed 1-2 m	1-2	perennial	
4. *Persea americans*	Avocado Pear	Mapeyala	fruit, seed oil	many	seed 10-20m	1 or less	7-14 d 5-10 yr perennial	
I. Seeds from the Vegetable food group								
• ***Herbaceous vegetable seeds***								
5. *Amaranthus hybridus*	Amaranth Seed	Bonongwe Mbewu	seeds	many	seed 0-1 cm 15-20cm	50	5-10 d 90-120 d	• Most of these are small 1 cm seeds • Many can be crushed into a powder and integrated into dishes for extra nutrition
6. *Amaranthus sp.4*	Wild Blite Seed	Bonongwe Mbewu	seeds					
7. *Amaranthus spinosus*	Spiny Pigweed	Bonongwe wa minga Mbewu	seeds					
8. *Amaranthus thunbergii*	Poor Man's Spinach Seed	Mberekete Mbewu	seeds					
9. *Brassica juncea*	Mustard Mbewu	Mpiru Mbewu	seeds					
10. *Cleome gynandra*	Cat's Whiskers	Luni	seed oil					
11. *Foeniculum vulgare*	Fennel		seed oil					
12. *Hibiscus sabdariffa*	Roselle	Chidede	seed oil					
13. *Portulaca oleracea*	Purslane	Matakoatsanu	seeds					

FATS & OILS (48)				Preferences for Growth				
Scientific Name	**English**	**Chichewa**	**Edible Parts**	**Area**	**Method & Space**	**# per Adult**	**Sprout & Harvest**	**Tips:**
14. *Trigonella foenum-graecum*	Fenugreek	Methi	seed oil					
• ***Vine vegetable seeds***								
15. *Cucumis anguria*	Cucumber, Small Prickly	Chikanyanga	seeds	many	seed 3 cm 1 m	5-10	5-10 d 90-120 d	• Most can be eaten with the vegetable • I've seen gourd and pumpkin oil in villages in Malawi– very rare, could be used more and promoted
16. *Cucumis sativus*	Cucumber	Minkhaka	seeds					
17. *Cucurbita species*	Pumpkin	Mthanga za msungu	seeds					
18. *Lagenaria siceraria*	Gourd	Mphonda	seeds					
19. *Momordica charantla*	Gourd, Bitter	Karela	seeds					
20. *Sechium edule*	Chayote	Ngowe	seed kernel					
• ***Tree vegetable seeds***								
21. *Moringa oleifera*	Horse Radish Tree	Chamwamba	seed oil	many	seed cutting	5	7-14 d 1 yr. seed	• Well-known outside Malawi. Promoted as vegetable in Malawi • .Could eat pods with seeds
II. Seeds from the Legumes & Nuts food group								
22. *Cajanus cajan*	Pea, Pigeon	Nandolo Mafuta	seed oil	many	seed 3 cm 30-60cm	50	5-10 d 60-120 d perennial	
III. Seeds from the Fruit Food group								
• ***Vine fruit seeds***								
23. *Citrullus lanatus*	Watermelon	Vwende	seeds	many	seed 3 cm 1 m	5-10	7-14 d 90-12 d	• Seeds are good roasted
24. *Cucumis melo*	Melon	Kayimbe	Seeds					

FATS & OILS (48)				Preferences for Growth				
Scientific Name	**English**	**Chichewa**	**Edible Parts**	**Area**	**Method & Space**	**# per Adult**	**Sprout & Harvest**	**Tips:**
• ***Tree Fruit***								
25. *Adansonia digitata*	Baobab	Mlambe Mafuta	seed oil	many	seed 5-20 m	1 or less	varied perennial	• Baobab oil is made in Malawi, haven't seen the others… yet!
26. *Hyphaene species*	Palm, Doum	Mgwalangwa	seeds					
27. *Mangifera indica*	Mango	Mango	seeds					
28. *Sclerocarya caffra*		Mufula	seed oil					
29. *Tamarindus indicus*	Tamarind	Bwemba	seeds					
30. *Treculia africana*	Breadfruit, African	Njaya	seeds					
31. *Trichilia emetica*	Natal Mahogany	Msikitsi	seed oil					
32. *Ziziphus mauritiana*	Jujube	Masawo	seed kernel					
IV. Seeds we need more information about:								
33. *Abrus precatorius*	Crab's Eyes	Ntimbua	seeds CARE!					
34. *Aleurites moluccana*	Candle Nut Tree		seed kernel					
35. *Balanites aegyptiaca*	Desert Date		seed oil					
36. *Boscia salicifolia*		Mtakataka	seeds					
37. *Boscia senegalensis*	Aisen	Mpetu	seeds					
38. *Ceiba pentandra*	Kapok	Usufu	seeds					• Found in Malawi - not used?
39. *Celosia Argentea*	Cock's Comb	Ndangale	seed oil					
40. *Celosia trigyna*		Kaphikaulesi	seeds					
41. *Cyperus esculentus*	Tiger nut	Kauju	root oil					• Found & used in Zambia
42. *Diospyros mespiliformis*	Monkey Guava	Msumwa	seeds					
43. *Elaeis guineensis*	Wild Oil Palm	Kanjindo	seed oil					
44. *Guizotia abyssinica*	Niger Seed		seed oil					• Found in Malawi - not used?
45. *Nymphaea caerulea*	Water Lily	Chikolwa	seeds					• Vegetable?
46. *Oxytenanthera abyssinica*	Bamboo, Common	Nsungwi	seeds					• Found in Malawi - not used?

FATS & OILS (48)				Preferences for Growth				
Scientific Name	**English**	**Chichewa**	**Edible Parts**	**Area**	**Method & Space**	**# per Adult**	**Sprout & Harvest**	**Tips:**
47. *Papaver somniferum*	Poppy Seed		seed oil					• Found in Malawi?
48. *Salvadora persica*	Toothbrush Tree	Mswache	seed oil					• Used as toothbrush

Fats & Oils Notes:

Index for the Guide to Common Foods of Malawi

This index is only for the Guide to Common Foods of Malawi. Use the Glossaries in Parts 1 and 2 to find information on other topics.

Appendix 2: Menu planning

Malawi Food Group Summary

chipande / zipande = serving spoon/s. **Tbsp.** = tablespoon. **tsp.** = teaspoon.

Food Group Amount	**High Nutrients** *Some Nutrients*	• **Examples of Foods** ✓ **Hints for choosing the highest nutrients**
Staples 5-6 zipande	**carbohydrates** **including fibre** *proteins* *minerals* *vitamins*	• **Grains**: rice, wheat, sorghum, millet, maize. ✓ Whole grains with bran (*gaga* or *madeya*) and germ (*mtima*). Germinated / fermented grains. • **Starchy Roots:** yams (*chilazi*, viyao), sweet potatoes, Irish potatoes, cassava ✓ Edible skins of starchy roots
Fruits 3 zipande	**vitamins** *water* *carbohydrates* *including fibre*	• **All Fruits** except for those in fat or vegetable group. Sweet or tangy fruits that are often eaten raw: papaya, guava, tangerine, banana, mchisu, granadilla, sugar cane ✓ Brightest colours, choose a variety of colours ✓ Tangiest tastes
Vegetables 3-4 zipande	**fibre** **minerals** **vitamins** *proteins*	• **Greens:** *bonongwe, chisoso, luni* • **Fruits:** pumpkin, tomatoes, peppers • **Roots:** onion, garlic • Mushrooms and other fungi • **Flowers:** Pumpkin flowers ✓ Darkest, brightest, variety of colours
Legumes & Nuts 1½ zipande	**proteins** **carbohydrate** **including fibre** **minerals** **vitamins** *fat*	• **Legumes:** hyacinth bean (*khungudzu*), ground beans (*nzama*), soybeans, pigeon pea (*nandolo*), peas (*nsawawa*), mucuna (*kalongonda*), groundnuts • **Tree Nuts**: *mbula, maula,* cashew, ✓ High fat: nuts and soy ✓ Sprouted (use only legumes that are edible raw)
Animal Foods 1 chipande	**proteins** **fat** **minerals** **vitamins**	• **Flesh:** mice, chicken, pigeon, pig, goat, fish, • **Insects**: *ngumbi* (termites), caterpillars • eggs, milk, *chambiko* (yoghurt), cheese
Fats 3 Tbsp. seed or 3 tsp. oil	**fat** *proteins* *minerals* *vitamins* *fibre*	Foods that feel “fatty” in your mouth: • **Oilseeds**: from pumpkin, sesame, sunflower • **Cooking Oils** pressed from seeds • **Fruits**: avocado pear, coconut • **Animal Fats:** butter, lard ✓ Whole seeds, avocado, coconut, sprouted seeds
Water 8-12 cups	**water** *minerals*	• Water, juices (fresh, 100% juices), and other drinks. ✓ Limit / avoid refined sugars, alcohol and caffeine drinks.

Foods Available by Group and Season

Food Groups	Foods Available	Hot & Wet	Cool	Hot & Dry
		Dec–Mar	Apr–Jul	Aug–Nov
1 Staples	**1.**			
	2.			
	3.			
	4.			
	5.			
	6.			
2 Fruits	**1.**			
	2.			
	3.			
	4.			
	5.			
	6.			
	7.			
3 Vegetables	**1.**			
	2.			
	3.			
	4.			
	5.			
	6.			
	7.			
4 Legumes & Nuts	**1.**			
	2.			
	3.			
	4.			
	5.			
	6.			
5 Animal Foods	**1.**			
	2.			
	3.			
	4.			
	5.			
6 Fats & Oils	**1.**			
	2.			
	3.			
	4.			
	5.			

Workshop Menu Guide

This guide is to help kitchen staff to plan ahead so they can serve the most diverse, local menu. Start your planning well in advance of the workshop, ideally, but it can be used any time. The goal of our workshops is to have diverse meals and snacks that demonstrate what the Sustainable Nutrition manual teaches.

Basic Menu Plan for an Adult

The amount needed for each adult can be put together in very many different ways, but a basic plan, balanced across the day, could look like this table below. (Breakfast, Snack, Lunch, Snack and Supper are abbreviated as single letters)

Food Group	Total Zipande	B	Sn	L	Sn	S	Hints, try to:
1. Staple	6	2	½	1 ½	½	1 ½	Spread out evenly through the day
2. Fruit **3. Vegetable**	3 4	1	 1	1 1	 1	1 1	Include a fruit and/or vegetable every time you eat
4. Legumes & Nuts **5. Animal**	1½ 1	1	 ½	½		½	Include a high protein food with most meals and snacks
6. Fat and Oil	3 Tbsp.	½	½	½	½	1	No need to include fat with a high fat legume, nut or animal food
Water	12 cups	2	3	2	3	2	Drink 2-3 cups every few hours

Making food choices

In order to have the most diversity, we need to know what is available locally: from markets, stores, farms or naturally.

The tables on the following pages will help you document what is available in the area, what the staff know how to prepare, and what quantities are available, to know if you have enough for 1 snack or meal or several.

As you select food concentrate on:

- **Healthiest** choices from each food group: Dark and bright colours, as much diversity as you can find, whole-grains that are minimally processed, keeping as much of the edible skins and seeds as possible.
- **Minimize 'extras'** like sugar, sweets, alcohol, high salt / fat snacks, etc.
- **Locally available** items to support local economies, reduce transport and have the freshest tastiest foods possible. If there isn't enough variety available locally you will need to know in advance so you can plan how to fill the gaps.

Food Availability for Menu Planning (partially filled)

1. Staples	Amount Available	Can prepare?	Cost
Yams – *coco* or other local edible yam			
Buye, air potatoes, other local potatoes			
Cassava			
Sweet potato			
Rice – whole with husk (un-milled)			
Maize – whole grain			
Sorghum or millet			
Green bananas			
Thobwa			
Chikondamoyo / chigumo			
Wheat breads – preferably whole wheat			

2. Fruits	Amount Available	Can prepare?	Cost
Citrus			
Baobab			
Tamarind			
Soursop			
Masuku			
Bananas			
Figs			
Melons			
Berries			
Plums			
Chidede fruits (red part)			
Sugar cane			
Honey			

3. Vegetables	Amount Available	Can prepare?	Cost
Green leaves			
Peppers – any hot peppers			
Onions			
Tomatoes, small *pwerekete* best			
Garlic			
Ginger – local *thungula* best			
Eggplants, local *mabunzo / zimphwa*			
Sponge / loofa			
Okra			
Chipwete			
Khanyanga (prickly cucumber)			
Cucumber foreign			
Pumpkin			
Mphonda (gourd)			
Mushrooms			
Flowers (pumpkin, nasturtium, etc.)			
Local tea leaves (medicinal or drinking)			

4. Legumes and Nuts	Amount Available	Can prepare?	Cost
Kamumpanda / chimbamba			
Khungudzu			
Kabaifa			
Soya or soya meat pieces			
Soya milk or other soy products			
Nzama			
Kalongonda			
Nseula / khobwe			
Common beans or various colours			
Muula / mbula / maula / mfula nuts			
Groundnuts or other nuts			
Chiponde from nuts			

5. Animal Foods	Amount Available	Can prepare?	Cost
Eggs chicken or duck			
Cow's or goat's milk			
Chambiko			
Insects			
Wild meats (legally caught!)			
Fish			
Chicken			
Guinea fowl			
Ducks			
Goat			
Beef			
Rabbit			
Guinea pig			

6. Fats and Oils	Amount Available	Can prepare?	Cost
Pumpkin seed			
Sunflower Seed			
Coconut			
Avocado			

Menu Suggestions

This doesn't list all the choices, just some of the many possibilities!

Food Group	Breakfast / Breaks	Lunch / Supper
1. Staples	• **Tubers**: *Futali*, Irish potatoes, sweet potatoes, cassava, yam, *chikhande*, cocoyam • **Grains**: *phala* (rice, *mgaiwa*, oats, etc.) *thobwa*, bread, chapatti, crackers, *chikondamoyo* • **Fruits**: green bananas, plantains	• **Tubers**: *Futali*, Irish potatoes, sweet potatoes, cassava, yam, *chikhande*, *cocoyam* • **Grains**: *mgaiwa, ufa woyera,* rice, millet, sorghum, pasta, bread, chapatti • **Fruits**: green bananas, plantains
2. Fruits	• **Trees**: baobab, *chitimbe*, tamarind, apple, *masawo, mposa, mkuyu,* peaches, *nthudza, masuku*, guava, banana, papaya, lemon, lime, oranges, *nachis, maso ang'ombe, matowo, mbula,* cashew fruit, Indian almond, *mpungulira* • **Vines**: *kayimbe*, watermelon, *magalagadeya*, *mulunguzi* • **Plants**: pineapple, *chidede* fruit, sugar cane, *jamu*	
3. Vegetables	• **Greens**: *bononGwe, nkwanya, chisoso*, cabbage, Chinese cabbage, *chigwada, luni,* lettuce, *mpiru, chidede, kholowa, mdele, chamalawi, chewe, denje, limanda, kalokola, amunaligone, mbilidzongwe, mlozi, mtambe, zumba* • **Fruits**: okra, tomato, pumpkin, asparagus, chillies, green peppers, cucumber, *chipwete*, eggplant, *mphonda, chinkhupule (young), impwa* • **Mushrooms** • **Roots:** onions, garlic, carrots, turnips, beets	
4. Legumes & Nuts	• Nsinjiro added to *phala*, groundnuts, roasted soya, cashews, macadamia, almonds, *chiponde, chipere*	• *Nzama, nandolo*, soya pieces, *nyemba, nsinjiro,* any nuts, *kabaifa, nseula, khobwe, chipere*
5. Animal Foods	• Breakfast meats, *ngumbi*, other insects • Milk, yogurt / *chambiko*, eggs, cheese	• Beef, fish, chicken, duck, goat, pork, birds, insects • Milk, yogurt / *chambiko*, eggs, cheese
6. Fats	• Butter, avocado, coconuts, oils / seed of: *mlambe*, sunflower, pumpkin, *kayimbe, bononGwe*, sesame • Seeds baked into breads; made into flour, added to porridge, baked goods, side dishes; spreads for breads, etc.	

Menu Plan for the Week (example)

If people are new to healthy eating, start with food they recognise. As the workshop progresses, slowly introduce new foods. On the last day of the workshop really eat differently, then finish with a well-planned extra special menu that people will remember, talk about and be inspired by!

Every food group is included every day in the balance recommended.

	Arrival	Day 1	Day 2	Day 3	Day 4	Day 5
Break-fast		• Sweet potato *futali* • Banana • Milk, nut flour in *futali* • Fat in nut flour • Healthy teas, honey	• Brown bread • Papaya • Nut butter, milk • Avocado • Healthy teas, honey	• Chips with skins • Tangerine • Boiled egg, milk • Coconut pieces • Healthy teas, honey	• Millet porridge • Papaya • Nut / legume flour, milk • Fat in nut flour • Healthy teas, honey	• Brown bread • Fruit salad • Egg, sausages, milk • Avocado • Healthy teas, honey
Snack		• Banana *chikondamoyo* • Peanut butter, milk • Healthy teas, honey	• Sugar cane • Groundnuts, milk • Healthy teas, honey	• Thobwa, Cucumber • Milk, Pumpkin seeds • Healthy teas, honey	• Brown bread, Fruit • Boiled eggs, milk • Healthy teas, honey	• Groundnuts, milk • Healthy teas and honey
Lunch		• Mixed nsima, cassava • Tangerine • Greens tomato, onion, garlic, etc. • Beef stew (tuber, veg) • Fat in beef	• Mixed flour nsima • Pineapple • Greens tomato, onion, garlic, etc. • *Nzama* stew (& veg) • Little oil in stew	• Rice / millet • Baobab • Pumpkin tomato, onion, garlic, etc. • Fried fish • Oil for frying	• Baked/boiled yam/tuber • Custard apple • Fried okra, onion, garlic, • *Nyama ya soya* meat • Sesame seeds on veg	• Nsima and brown rice • Pineapple • Yogurt salad: cucumber tomato, onion, garlic • Fried chicken, yogurt • Oil for frying, chocolate
Snack	• Fruit juice, fruit • Groundnuts • Water	• Fruit juice, popcorn • Soy nuts, milk • Healthy teas, honey	• Cassava *futali* • Milk, nuts in *futali* • Healthy teas, honey	• Papaya • Chambiko, milk • Healthy teas, honey	• Banana *chikondamoyo* • Milk • Healthy teas, honey	Travel Pack: • Popcorn, Peanuts • Water
Supper	• Nsima, potatoes • Papaya • Greens, tomato, onion, garlic, etc. • Chicken stew (veg & starchy root) • Little oil in stew	• Rice and sorghum • Banana • Salad, tomato, onion, garlic, etc. • Beans stew • Avocado	• Green banana • Tamarind • Eggplant, tomato, onion, garlic, etc. • *Nyama ya soya* meat • Little oil	• Cassava • Banana • Mushrooms, tomato, onion, garlic, etc. • Pigeon pea stew • Little oil	• Nsima • Tangerine • Greens, tomato, onion, garlic, etc. • Eggs stew peanut flour • Avocado • Party drinks & snacks	• Hopefully everyone will continue to eat at home, as better planners of nutritious meals and snacks, and as inspired cooks and eaters!

Appendix 3: Useful Forms

Action Plan

Date		**Season**		**Name**	
Week					
Action	**Outcome**	**Who?**	**When?**	**What is needed?**	

Calendar of Activities

Calendar of Activities by zone:	Rains Hot			Harvest Cool			Dry Cold			Dry Hot Winds		
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Zone 0 – House												
Zone 1 – Gardens												
Zone 2 – Orchards												
Zone 3 – Fields												
Zone 4 – Managed Forests												
Zone 5 – Wild Natural Areas												

Site Assessment Form *(Filled example)*

Date Started	2013 August
Name of Site	Never Ending Food, www.NeverEndingFood.org
Site Address (with brief directions)	Chitedze Trading Centre, Lilongwe, Malawi 15 km west on Mchinji Road. Continue 1 km west past Chitedze Agriculture Research Station Turn right onto first road, after the research station. Travel 1.5 km, ask at market.
Contact Details (Names, numbers, email addresses)	Kristof Nordin, owner, NeverEndingFood@gmail.com Stacia Nordin, owner, NordinMalawi@gmail.com, 0999-333-073
Type of Site	Family home
Household Members	2 adults and 1 child, 3 staff (Also frequent visitors and lots of children from the neighbourhood.)

A	**Site Details**	1st Month	18 months
Date of Evaluation		2013 Aug	2014 Feb
Season of the Year		Cool and Dry	Hot and Rainy
1	Size of total site Include all the land you own / care for, including buildings, roads, etc.	1 acre	2 acres (Bought new land)
2	Size of the area Permaculture designed Hopefully all ☺. Anything can be designed or revised sustainably	1 acre	2 acres
3	Size of the Permaculture area implemented Include all areas that you've started improving	¼ acre	½ acre

B	**Time and Labour Inputs**		
4	Number of people working at the site / day Include any hired labour, teaching time	2	3 (1 hired)
5	Number of hours spent working per day Add together work of all people there each day	8	8
6	How many people benefit from what the site produces?	3 Just family	4 Family and staff
7	Have new ideas spread to other sites? List new sites that have started since you've been using sustainable designs	no	1 church 1 school

C	**Income**		
8	Job outside the home Any paid work as employee for an organization	40,000 mk	40,000 mk
9	Teaching / advising / sessions / speaking, etc. Any paid work as yourself / consultant	0	0
10	Selling surplus foods / medicines Fresh or processed	0	10,000 mk
11	Selling Surplus agricultural inputs Labour, seed, tools, irrigation, etc.	0	0
12	Selling surplus energy Firewood, solar, etc.	0	0
13	Other sources	0	0
TOTAL INCOME		40,000 mk	50,000 mk

D	Costs		
14	Agricultural Inputs Labour, seed, tools, irrigation, etc.	3,000 mk	3,000 mk
15	Artificial Input Inorganic fertilizers, chemicals, hybrid seeds, etc.	1,000 mk	1,000 mk
16	Food For meals and snacks	5,000 mk	4,000 mk
17	Food processing For storage / sale	500 mk	500 mk
18	Water For drinking, washing, etc. (non-agriculture)	1,000 mk	1,000 mk
19	Energy For cooking, running electrical items, etc.	1,000 mk	1,000 mk
20	Free sessions / speaking / awareness This time cost that can be converted into money (hours spent times your usual fee)	0 mk	0 mk
21	Other Site Costs		
TOTAL COSTS =		11,500 mk	10,500 mk

E	Financial Balance		
	TOTAL INCOME =	40,000 mk	50,000 mk
	Minus TOTAL COSTS =	11,500 mk	10,500 mk
	FINIANCIAL BALANCE =	28,500 mk	39,500 mk
Notes Feb 2014: Less external input, more hired labour, sold fresh veg			

F	**Human Health**		
22	How many people were sick in last 6 months?	3	0
23	What were the illnesses?		
	Diarrhoea	3	
	Malaria		
	Respiratory (flu, cold, pneumonia)		
	Under-nutrition		
	Other illnesses?		
24	Enough clean water for human health?	No	Yes
Notes	2014 Using grey water so more drinking water is available (Diarrhoea reduced with improved water supplies)		

G	**Dietary Diversity**		
Keep records in a book and transfer the totals here			
25	Foods – number of TYPES available		
	Staples	1	3
	Fruits	0	2
	Vegetables	3	6
	Legumes / nuts	0	3
	Animals	0	1
	Fats	1	3
26	Foods – total AMOUTNTS available in kg / day		

	Staples	1 kg	3 kg
	Fruits	0	2 kg
	Vegetables	1 kg	3 kg
	Legumes / nuts	0	2 kg
	Animals	0	½ kg
	Fats	1 kg	3 kg
27	Foods – number of TYPES eaten daily		
	Staples	1	3
	Fruits	0	2
	Vegetables	1	3
	Legumes / nuts	1	1
	Animals	0	1
	Fats	1	2
Notes			

H	**Soil Health and Conservation**		
28	How much of the site is protected with soil conservation measures?	1/4 acre	1/2 acre
	Mulching	1/4 acre	1/2 acre
	Reduced sweeping	1/4 acre	1/2 acre
	No burning	1/4 acre	1/2 acre
	Reduced tillage	1/4 acre	1/2 acre
	Swales or other permanent structures	0	3
	Trees / plants (non-legume)	1/8 acre	1/4 acre

	Other		
29	Is there any soil erosion on the site? If yes, list types of erosion. (use notes area if needed)	Yes pathways, road, roofs	Yes but less, Still issues on some paths
30	How much of the site is benefiting from natural soil fertility methods?	1/8 acre	1/4 acre
	Legumes (plants / trees)	1/8 acre	1/4 acre
	Compost	0	1/10 acre
	Animal manure	0	1/10 acre
	Manure teas	0	1/10 acre
	Other		
31	Are chemicals used for soil fertility? If yes, what and why? (Put in notes)	Yes	No
Notes 2014 - Chemical products were used before but we chose to use sustainable methods and to grow different species			

I	**Water Management**		
32	Is all used grey water re-used?	No	Yes
33	Is all rainwater harvested?	No	Yes
34	Is irrigation used? What methods?	Watering cans	Watering cans, drip irrigation
35	Water amount used at site for irrigation per day	200 L	0 (Rainy season)
36	Water input times, am, noon, pm ?	Noon	Pm until rains in Dec

Notes

Watering at noon is too hot.

We changed our habits to conserve water.

J	**Plant and Animal Health**		
For this section you'll want to keep records in a book and transfer the totals here.			
37	Number of species raised on site over past 6 months.		
	Staples	1	3
	Fruits	0	2
	Vegetables	3	6
	Legumes / nuts	0	3
	Animals	0	1
	Fats	1	3
	Medicines	0	3
	Energy / building supplies	0	2
38	Yields over past 6 months, in kg		
	Staples	100 kg	100 kg
	Fruits	0	20 kg
	Vegetables	20 kg	60 kg
	Legumes / nuts	0	30 kg
	Animals	0	3 kg
	Fats	1 kg	2 kg
	Medicines	0	3 kg
	Energy / building supplies	0	20 kg
39	Damage to plants / trees? If yes, what?	Yes insect	Some Fewer insects

40	Animal illnesses? If yes, what?	No animals	No
41	Are synthetic products used on plants / animals? If yes, what, why and is it working?	Not any more	No
42	Are natural remedies used on plants / animals? If yes, what, why and is it working?	Yes Just started, garlic, chillies, soap	Yes Yes, garlic, chillies soap, inter-planting
Notes			

K	**Under-used Resources**		
43	Under-used resources Note organic matter, food, water, space, wind, sun etc.	A lot!	Space, wind, sun, foods, water
44	Note significant differences since last assessment.	Just started	Already seeing better soil, Less watering Increasing diversity
Notes			

Site Assessment Form *(blank)*

Date Started	
Name of Site	
Site Address (with brief directions)	
Contact Details (Names, numbers or email addresses)	
Type of Site	
Household Members	

A	**Site Details**	Month 0	Month 6
Date of Evaluation			
Season of the Year			
1	Size of total site Include all the land you own / care for, including buildings, roads, etc.		
2	Size of the area Permaculture designed Hopefully all ☺. Anything can be designed or revised sustainably		
3	Size of the Permaculture area implemented Include all areas that you've started improving.		

B	**Time and Labour Inputs**		
4	Number of people working at the site / day Include any hired labour, teaching time		
5	Number of hours spent working per day Add together work of all people there each day		
6	How many people benefit from what the site produces?		
7	Have new ideas spread to other sites in the area? List new sites that have started because of you		

C	**Income**		
8	Jobs outside the home Any paid work as employee for an organization		
9	Teaching / advising / sessions / speaking, etc. Any paid work as yourself / consultant		
10	Selling surplus foods / medicines Fresh or processed		
11	Selling surplus agricultural inputs Labour, seed, tools, irrigation, etc.		
12	Selling surplus energy Firewood, solar, etc.		
13	Other sources		
TOTAL INCOME			

D	Costs		
14	Agricultural Inputs Labour, seed, tools, irrigation, etc.		
15	Artificial Inputs Inorganic fertilizers, chemicals, hybrid seeds, etc.		
16	Food For meals and snacks		
17	Food processing For storage / sale		
18	Water For drinking, washing, etc. (non-agriculture)		
19	Energy For cooking, running electrical items, etc.		
20	Free sessions / speaking / awareness This time cost that can be converted into money (hours spent times your usual fee)		
21	Other site costs		
TOTAL COSTS =			

E	Financial Balance	
TOTAL INCOME =		
Minus TOTAL COSTS =		
FINIANCIAL BALANCE =		
Notes		

F	**Human Health**		
22	How many people were sick in last 6 months?		
23	What were the illnesses?		
	Diarrhoea		
	Malaria		
	Respiratory (flu, cold, pneumonia)		
	Under-nutrition		
	Other illnesses?		
24	Enough clean water for human health?		
Notes			

G	**Dietary Diversity**		
Keep records in a book and transfer the totals here			
25	Foods – number of TYPES available		
	Staples		
	Fruits		
	Vegetables		
	Legumes / nuts		
	Animals		
	Fats		
26	Foods – total AMOUTNTS available in kg / day		
	Staples		

	Fruits		
	Vegetables		
	Legumes / nuts		
	Animals		
	Fats		
27	Foods – number of TYPES eaten daily		
	Staples		
	Fruits		
	Vegetables		
	Legumes / nuts		
	Animals		
	Fats		
Notes			

H	**Soil Health and Conservation**		
28	How much of the site is protected with soil conservation measures?		
	Mulching		
	Reduced sweeping		
	No burning		
	Reduced tillage		
	Swales or other permanent structures		
	Trees / Plants (non-legume)		
	Other		

29	Is there any soil erosion on the site? If yes, list types of erosion. (use notes area if needed)		
30	How much of the site is benefiting from natural soil fertility methods?		
	Legumes (plants / trees)		
	Compost		
	Animal manure		
	Manure teas		
	Other		
31	Are chemicals used for soil fertility? If yes, what and why? (Put in notes)		
Notes			

I	**Water Management**		
32	Is all used grey water re-used?		
33	Is all rainwater harvested?		
34	Is irrigation used? What methods?		
35	Water amount used at site for irrigation per day		
36	Water input times, am, noon, pm ?		
Notes			

J	**Plant and Animal Health**		
For this section you'll want to keep records in a book and transfer the totals here.			
37	Number of species raised on site over past 6 months.		
	Staples		
	Fruits		
	Vegetables		
	Legumes / nuts		
	Animals		
	Fats		
	Medicines		
	Energy / building supplies		
38	Yields over past 6 months, in kg		
	Staples		
	Fruits		
	Vegetables		
	Legumes / nuts		
	Animals		
	Fats		
	Medicines		
	Energy / building supplies		
39	Damage to plants / tees? If yes, what?		
40	Animal Illnesses? If yes, what?		
41	Are synthetic products used on plants / animals? If yes, what, why and is it working?		

42	Are natural remedies used on plants / animals? If yes, what, why and is it working?		
Notes			

K	**Under-used Resources**		
43	Under-used resources Note organic matter, food, water, space, wind, sun etc.		
44	Note significant differences since last assessment.		
Notes			

Guild Planning Tables

Plan your guilds and work out what functions each element will support.

	1 Human Needs	2 Soil Food	3 Soil Cover	4 Dig	5 Climb	6 Support	7 Protect

	1 Human Needs	2 Soil Food	3 Soil Cover	4 Dig	5 Climb	6 Support	7 Protect

	1 Human Needs	2 Soil Food	3 Soil Cover	4 Dig	5 Climb	6 Support	7 Protect

	1 Human Needs	2 Soil Food	3 Soil Cover	4 Dig	5 Climb	6 Support	7 Protect

Appendix 4: More Information

We have gathered as much information as we can to help as you develop your plan for sustainable nutrition, and there are many other places you can find information! Get involved and make requests for the types of information that you want, or start your own community library.

Print Materials

There are bookstores in most districts now, selling used or new books but it is still hard to access printed materials. Make the best use of what there is, and improve the situation by sharing your knowledge.

Most districts have a library, and sometimes even community libraries. The National Library Service has a revolving book programme and will bring books to you if your community sets up a space for it and manages it well. Many sectors have a resource centre: Agriculture, Education, Universities, Research Stations and the National Initiative for Civic Education (NICE)

Committees

It is important to stay in touch with the development system to create, find, and share information. There are committees at every level that you can get involved with. All government sectors, community leaders, businesses, religions and other organizations are represented at these committees. Add your voice!

Every sector has their own committees at every level, and each committee is supposed to feed into that level's Development Committees:

- District Executive Committee (District Commissioner)
- Area Development Committees (Traditional Authority)
- Village Development Committee (Village Headmen)

Agriculture extension works with groups or volunteers (lead farmers, nutrition groups) and agricultural stakeholder panels at all levels; village, area, district.

Education has the Parent Teachers Association, School Management Committee and Teacher Development Centres.

Health has Community Health Volunteers.

Nutrition has Community Nutrition promoters, Community Leaders for Action on Nutrition (CLANS) and Nutrition Coordinating Committees at all levels.

Internet

If you get good at 'surfing the net' you can find lots of free information and we list many websites in the following pages for you to explore.

People

All people are a great source of information. Older and younger people's views are often undervalued are often discounted, but it is a very big waste of a very important resource! It's good to become friends with a wide group and have meaningful conversations with everyone about what they know, how they live, how they see the future for themselves, their families and their communities. You can share and grow stronger and healthier together!

Books

If the following books are not available in your local bookstores, be sure to ask for them to be stocked. Stores often will stock what people want to buy.

Action for Natural Medicine (ANAMED)

Materials are available from www.anamed.net for 2-10 USD or locally from the National ANAMED Coordinator (see Sustainable Nutrition Sites in Malawi, Dedza). The national coordinator tries to find people in Malawi to become ANAMED trainers and dealers. “Baobab Book Shop” in Area 3 in Lilongwe sometimes has stock.

- Natural Medicine in the Tropics (176 pages)
- Natural Medicine in the Tropics: II Treatments (48 pages)
- Natural Medicine in the Tropics: IV AIDS (48 pages)
- Medicinal Plants in the Tropics (poster)

Where There Is No Doctor / Pamene Palibe Dokotala

A health-care guide that has been translated into more than 70 languages. It covers staying healthy, diagnosing illnesses, treatment and prevention, maternal and child health, family planning, HIV, first aid, good hygiene etc. Available in some bookstores in Malawi and electronically at: http://hesperian.org/books-and-resources/resources-in-Chichewa/

Malawi’s Traditional & Modern Cooking

Originally published in 1992 by *Chitukuko Cha Amayi m’Malawi* (Development of Women in Malawi). It is full of information on how to use local species and includes many practical ideas. The original version is out of print, but Blantyre Printing and Publishing Company Limited put out a smaller version.

The Malawi Cookbook

A 150-page soft cover book printed by Blantyre Printing and Publishing in 1974 revised in 1985. Seen in many bookstores in Malawi.

Useful Plants of Malawi

By Jessie Williamson. Information on hundreds of useful species for food, soap, medicine, building, firewood, fibres and plants of cultural significance. First published in 1955 and revised most recently in 2005. This book provided information for hundreds of the food plants listed in Appendix 1.

Sustainable Nutrition Sites in Malawi

The following sites are worth visiting to gain experience and ideas. The sites are listed roughly from Northern to Southern Malawi.

Two major areas of growth in Sustainable Nutrition have been through School Health and Nutrition's Permaculture pilot that started in 2006 and secondly, with the Malawian Permaculture movement which began in 1994.

There is a certificate course in Permaculture Design and about 1,000 people in Malawi have earned their Permaculture Design Certificate (PDC). To connect with others in Malawi who are utilizing permauclture, join any/all of the following groups or contact anyone on this list for more information.

- Permaculture Malawi yahoogroup PermaCulture-Malawi@yahoogroups.com to join send an email to: PermaCulture-Malawi-SUBSCRIBE@yahoogroups.com.
- Permaculture Malawi Facebook group www.facebook.com/groups/PermacultureMalawi.
- Permaculture in Network in Malawi database: MalawiPermacultureTrail@gmail.com This project is mapping the Permaculture people, sites, organisations, projects and knowledge in Malawi, one by one. The aim is to find a way to share this information with as many Malawians as possible, so that they can connect with their local Permaculture.

NORTHERN MALAWI

1. Karonga

1 - Karonga District Education Office

- Scotch Kondowe, District Education Manager, 0888-512-597, 0999-923-711, DEMKaronga@gmail.com
- Several excellent Permaculture SHN schools started in 2006. Even the DEM's office has a bit of sustainable design to it!
- Mwimba School, Head: Benson Kiyongo, Teacher: Mr Mwambungu 0993-023-578, supported by SCOPE

2 - Anglican Church, Love's Harvest, Karonga

- Founder, John Springer (in USA) js@JohnSpringerArchitect.com, www.LovesHarvest.org
- About 20 Permaculture projects in 4 dioceses: Southern Malawi, Upper Shire, Lake Malawi, and Northern Malawi. Love's Harvest works with a village for a year to build up all food groups and provides a Permaculture facilitator, some targeted organic inputs and coordination support (for mother's union and Episcopal Relief and Development).

3 - Kasoba Village

- Kenneth Mwakasungula, 0995-660-843, KMwakasungula@yahoo.com
- North of Karonga town
- Certified in Permaculture in 2007 through SHN (School Health and Nutrition) working as a community SHN facilitator and trainer since 2009.

2. Rumphi

4 - Rumphi District Education Office

- Manchewe School, supported by Lukwe and SCOPE Malawi

5 - Lukwe EcoCamp and Forest Gardens

- Owners, Lieza and Auke Swennen, Lieza.Swennen@gmail.com, 0995-752-839, www.Lukwe.com
- Livingstonia
- Lieza is a Permaculture Diploma holder and Trainer. Started in 1996. Soil regeneration, water management, fruit and fodder, herbs and horticulture as well as small animals and fish ponds. Off the main grid, powered by solar and lead designers in ecosanitation in Malawi – private and institutional designs. Lukwe serves Malawi's people through tailor made workshops and on site design consultancies to private, government and non government organisations. Ecotourism with amazing views and wonderful food & lodging.

6 - Slow Food Malawi, Nchenachena Convivium

- National Coordinator, Manvester Ackson Khoza, Yezgani Community Trust, PO Box 8, Livingstonia, Rumphi, 0888-720-691, 0999-516-385, ManvesterAckson@yahoo.co.uk www.SlowFood.com
- A global grassroots organization, which wants a world in which all people can enjoy food that is good for them, good for producers and good for the planet. There are millions of people around the world involved in the movement. The Malawi Chapter was running informally over the past few years, and in 2014 it was formally born.

3. Mzimba

7 - Mzimba District Education Offices (North, Urban, South)

- Kazomba School, Head: Mr Botha 0884-567-933. Teacher: Vincent Sichinga 0999-520-809. Supported by SCOPE Malawi.

8 - Empower Malawi

- Manager, Jones Cecil Ntaukira, 0995-278-060, jntaukira@yahoo.com, jones@empowerprojects.org www.EmpowerProjects.org
- Office in Lilongwe, works in Mzimba
- Worked with Northern region Permaculture teams to include Permaculture in their support to school health and nutrition and community designs.

9 - Slow Food Malawi, Mzuzu Convivium

- Convivium Leader: Chimwemwe Soko, Mzuzu, 0882-070-718, cksoko44@gmail.com
- See Rumphi for description of Slow Food

10 - Soils, Food and Healthy Communities

- Project Coordinator sfhc@gmx.com, Ekwendeni, www.SoilAndFood.org
- Not Permaculture designed, but uses sustainable soil and food principles. Aims to improve health, food security and soil fertility. Does research on legume systems with an ecosystem approach to understand links through experimental agricultural farm trials, nutrition and agricultural education, community activities and farmer exchanges.

11 - Walusungu CBO

- Helen Munthali, 0992-362-759, C/o Mbanasi Guest House
- A Community Based Organization assist in communities to become self-reliant and promote responsibilities. It has a Permaculture demonstration garden which it uses to demonstrate to the community sustainable ecological practices. SCOPE Malawi partner.

4. Nkhata Bay

12 - Butterfly Space

- Josie Redmonds, Josie.Redmonds@gmail.com, www.ButterflySpaceMalawi.com, 0999-156-335, 0997-449-397
- Butterfly Space is a lodge and a non-profit, volunteer community project which brings international volunteers and the community together working on health, agriculture, water, sanitation, education and social welfare. Butterfly Space has hosted a few Permaculture design courses with Permaculture trainers. SCOPE Malawi partner.

13 - Chilala Permaculture Scholarship programme & Sustainable Energy

- Gilbert T.E. Kaunda, Permaculture Scholarship programme, 0991-420-476, GilbertKaunda@ymail.com. Supported by Gail Swithenbank who met Chilala during IPC9 in Malawi: GailSwithenbank@hotmail.com
- A Permaculture Scholarship programme running in Nkhata Bay selects promising primary school students who are practicing Permaculture for full secondary school scholarships. The Permaculture Scholars then help their school and community learn about sustainable living. The Sustainable Energy vocational school is still developing.

14 - Nkhata Bay District Education Office

- Mzondi Moyo, District Education Manager, 0888-363-712, DEMnkhata@yahoo.com, MzondiMoyo@yahoo.com,
- Several SHN schools with excellent Permaculture designs since 2006.
- Mkondezi, Head: Mary Nyirenda 0881-194-326, SCOPE Malawi Partner.

15 - Food for Life

- Richman Mwasie, richman.mwasie@gmail.com 0999-070-665, 0885-088-114
- The food for life lies at a distance of about 900m from Sanga trading centre.
- The purposes are to acquaint communities with sustainable measures of growing and keeping food basing nutrition, to enhance resilient methods to curb the devastating climate change, centre for local seeds etc.

16 - Ganet's Adventure School

- Gertrude Banda, Co-founder and Head, gertrudebanda1966@yahoo.com Located in Mkondezi village, 5km west of Nkhata Bay, Steve McInerny, trustee, steve@ganetsadventureschool.org www.ganetsadventureschool.org
- The school was established in 2004 and started using Permaculture, learning from other schools that were part of the 2006 pilot in Nkhata Bay. In 2010 JICA supported short course in Permaculture for School Health and Nutrition and exchange visits with other schools.

17 - Healthy Malawi

- Sandra Ver baan, Director, info@HealthyMalawi.nl, www.HealthyMalawi.nl,
- 10km south of Chintheche, Near Kande Beach.
- Designed by Permaculture Principles by Lukwe EcoCamp (in Rumphi). T he site has a nursery and primary school, which supports vulnerable children in the community with education, nutrition and healthcare.

CENTRAL MALAWI

5. Dowa

18 - DAPP Teacher Training College (Chilangoma)

- Charlotte Danckert, Partner Manager, 0999-546-754, cdanckert@africa-online.net, http://www.dapp-malawi.org/welcome-to-dapp-malawi
- Located across from refugee camp, before boma on left from Lumbadzi.
- TTCs are working towards becoming role models for Schools Health and Nutrition (SHN), based on sustainability. Colleges have different levels of gardens, orchards, wood-lots, water harvesting, kitchen recycling, meals based on food groups, education, sharing. Some have composting toilets.

19 - E-3 Worldwide

- Director, Sam Kawale, 0999-600-345, skawale@gmail.com, e3.Malawi@gmail.com, www.e3worldwide.org www.e3worldwide.net
- In Mponela, just after MEDI, past DOWA Secondary School about 20 min drive towards Chibanzi and Msakambewa
- Educate Empower Employ. E-3 is developing Permaculture with existing school as well as building a health facility and community centre on about 10 acres. Elements include solar for electricity and water pumping, composting toilets, biogas, aquaponics, agroforestry, orchards and gardens. (Several people have their Permaculture Design Certificates.)

20 - Kusamala Institute of Agriculture and Ecology (Kusamala), Dowa (Mponela) office

- Chisomo Kamchacha, chisomo@kusamala.org, 0888-577-279, www.kusamala.org/projects-partners/climate-smart-agriculture;
- Working with 1,500 households by providing training and support. Combining a strong focus on monitoring and evaluation using film, mapping, and community storytelling as well as increased collaboration among stakeholders, this project works on many levels.

21 - Tikondwe Freedom Gardens

- Christine Chinkuntha, 0999-931-265, Daniel Chinkuntha, 0999-749-614, 0995-595-623 DanielChinkhuntha@gmail.com, www.facebook.com/TikondweFreedomGardens
- Coming from Lumbadzi about half way to Dowa boma on the right. No sign, road is just before the hill where the road curves left.
- Started as an organic farm in the late 80's and awarded Permaculture certificate in 2009. The operation has expanded to help lift the surrounding area out of poverty, and feed its population nutritious food using environmentally sound methods that set the groundwork for sustainable growth. Education and women's empowerment are a top priority, and they are well known for their gravity fed irrigation scheme.

22 - Speedlink Organic Fertilizers

- Owner, Iain Phiri, Owner, 0888-305-250, IainPFarmCenter@yahoo.com
- Lumbadzi, at Dowa Turnoff
- Produces, packages and sells all-organic fertilizers.

23 - United Methodist Church

- Project Coor., Hugo Ngwira, ngwirahugo30@gmail.com, 0992-301-277
- Farm manager, Joseph Kaipa, joseph.kaipa@yahoo.com, 0884-874-873
- UMC recognizes the need to focus on food security as a means of eliminating poverty among the church members and surrounding communities. Focusing on Permaculture methods of farming the UMC hopes to make a positive impact on Malawian's access to food. They are developing into a training and demonstration site.

6. Salima

24 - Kuti Wildlife

- Manager: 0997-334-683, info@kuti-Malawi.org, www.kuti-Malawi.org, https://www.facebook.com/kuti.Malawi
- Located just east of Salima Boma
- Kuti is a 2000-hectare wildlife reserve running responsible tourism and sustainable wildlife conservation, environmental education and community programmes. Kuti aims to protect the reserve for the benefit of both people and wildlife. Projects include environmental education clubs in schools, tree donations, fuel-efficient stove production, fish-farming development, bee-keeping and the use of alternative fuel sources.

25 - Malawi Mangoes

- Louise Bleach, louise@Malawimangoes.com;
- https://www.growafrica.com/organizations/malawi-mangoes
- Fruit processing business that supports many community members. Working on improving nutrition locally and abroad through their business. Working with Kusamala to apply Permaculture design into their staff meal programme, called Garden to Mouth.

26 - Ndimoyo

- Owners: Lucy: 0999-201-412, ndimoyo.lucy@gmail.com Tony: 0999-964-875, tony@ndimoyo.org, Salima Boma
- Integrates ANAMED and nutrition with medical treatments for chronic illness. They are role models of sustainable design at the clinic.

7. Lilongwe

27 - Lilongwe District Education Offices (East, Urban, West)

- Adzwia School Kauma. Ishmael Hollege, 0882-182-897. Supported by Four Seasons (also in Lilongwe) Permaculture designs started a few years ago as an integral part of school life and learning.
- Chata School, Head: 0999-147-684. Supported by SCOPE Malawi.
- Tsokankanansi School, Teacher Mrs Ludaka 0995-300-596, SCOPE Malawi.
- Kang'oma School, Head: Mabel Chinyama, 0999-484-716, SCOPE Malawi.
- Mbang'ombe School, Head: 0994-209-165. Supported by Africa Vision and SCOPE Malawi.

28 - African Vision Malawi (Landirani Trust)

- Country Manager, Ida Mwangala, 01-759-005, 0992-239-712 Ida.mwangala@landirani.org; www.landirani.org
- African Vision Malawi in UK, www.africanvision.org.uk. CEO, Heather Palmer, heather.palmer@africanvision.org.uk
- Current office in Area 3. Building a new office in Njewa. Works between the airport and Nambuma. 400km² area.
- An NGO that supports health, agriculture, education and community based childcare centres. They are experts in rammed earth and thatch buildings and working on using Permaculture designs at their sites and in their programmes. Building a Training Village is natural materials. Includes composting toilets, orchards, gardens and farms. SCOPE Malawi Permaculture programme at M'bang'ombe Teacher Development Centre and further introduction at Chitsime and M'teza schools.

29 - Anglican Church, Love's Harvest, Lilongwe

- Founder, John Springer (in USA) js@JohnSpringerArchitect.com, www.LovesHarvest.org
- About 20 Permaculture projects in 4 dioceses: Southern Malawi, Upper Shire, Lake Malawi, and Northern Malawi. Love's Harvest works with a village for a year to build up all food groups and provides a Permaculture facilitator, some targeted organic inputs and coordination support (for mother's union and Episcopal Relief and Development).

30 - Child Legacy International

- Director, Jeff Rogers www.childlegacy.org ; Permaculture Designer, Afshan Omar, 0993-437-625 afshan_omar@hotmail.com
- Near Mpingu about 20 km west of Lilongwe off Mchinji Road.
- Provides healthcare and vocational training for an under-served rural area outside of the capital city. Teaches and practices sustainable agriculture methods around the health centre, in both small and large-scale designs. Uses renewable energy.

31 - Cultural, Environmental Restoration and Fight Hunger Trust

- Director, Joseph Chawawa, Kanengo, 0999-371-627, josephchawawa@yahoo.com.
- At Mchenzi, near Kanengo on Salima Road
- Certified in Permaculture in 2007 when working with the SHN programme. Provides training in Permaculture for Churches, communities, CBO's, schools; teachers, learners, small scale farmers. Works with the Anglican Church's Love's Harvest Programme. Offers tours with his family at their home in Kanengo.

32 - Emmanuel TTC

- The Principal, Mr Silas Kathyole, 0993-201-505. Mrs Ivy Mkandawire (SCOPE Malawi Board) 0884-407-594, Area 43
- A Christian Teacher Training College, training primary school teachers. Because of their strong Christian beliefs, they offer Discipleship courses (How did Christ look at the environment, how should we?) and courses on Action for Natural Medicines (ANAMED), Energy and Conservation and Permaculture.

33 - Environmental Industries

- Owner, Goodfellow Tsilizani Phiri, 0999-365-245, licusociety@gmail.com;
- Area 25A Lilongwe at Bvunguti Primary School.
- Produces Natural Herbal Medicines (which provide nutrients and other health properties) and Bionitrate Fertilizers from human urine. With Nanfunga community scheme, he runs demonstration gardens on crop production with organic fertilizers only. Conducts consultancy assignments on making nitrogen fertilizers from urine.

34 - Four Seasons Nursery

- Owners, Lesley and John Sprowson, lesley@fourseasonsmw.com, sprowson@gmail.com, sprowson@broadbandmw.com,
- On Presidential Way, about 1 km on right before reaching the statehouse.
- Several Permaculture Design Certificate holders, integrates Permaculture design into their business of land-scaping, gift shop and nursery, and educational outreach.

35 - Gardens Gate

- Michelle Clark, 0888-167-616, michelleliberia@aol.com
- Njewa, off Mchinji Road behind Sol Farm
- Personal home designs, supports community and integrates into work with Action International Ministries in Lilongwe and Ntcheu.

36 - Kusamala Institute of Agriculture and Ecology

- Director@Kusamala.org, 0993-655-468, www.Kusamala.org;
- PDC trainer, Luwayo Biswick, Luwayo@kusamala.org; 0998-690-443, 0884-404-703
- Project Coor, Chisomo Kamchacha, Chisomo@kusamala.org; 0888-577-279
- Board Director, Stacia Nordin, NordinMalawi@gmail.com; 0999-333-073
- On premises of Nature's Gift (Kumbali Lodge), past Statehouse entrance.
- Founded in 2009, Kusamala is Malawi's largest Permaculture demonstration site. Kusamala educates individuals and communities on improving nutrition, income generation, and environmental health. Through grants and programs, Kusamala aims to show the viability of Permaculture as a local and national agricultural strategy.

37 - Lilongwe Wildlife Centre Trust & Centre

- Programmes Director, Lilongwe Wildlife Trust, Kate Moore, 0993-800-289, kate@LilongweWildlife.org, www.LilongweWildlife.org
- City Centre Lilongwe, across the street from the Nature Sanctuary
- Lilongwe Wildlife Trust is the Species Survival Network representative for Malawi and a founding member of Malawi's Conservation Council. Permaculture design is used at the Wildlife Centre and integrated into their work with Schools and Community groups.

38 - Never Ending Food

- Owners, Kristof 0999-926-153, NeverEndingFood@gmail.com; Stacia 0999-333-073, NordinMalawi@gmail.com; Khalidwe; www.neverendingfood.org
- Located behind Chitedze Agricultural Research Station.
- Never Ending Food is the author's home where we live as sustainably as we can; sharing resources, providing tours and advocating for sustainable designs for human living inside and out of Malawi. And we really want to know if you can fill any of the gaps in our knowledge and in our list of Malawian Food Plants, so get in touch if you can!

39 - Partners in Hope

- Director, Dr Perry Jansen, Director@pihMalawi.com ; Administrator, John admin@pihMalawi.com ;
- Few km south of Lilongwe, just before Bunda Turnoff.
- Clinic with a strong HIV treatment programme. Permaculture demonstration on site for healthy living. They've built a small model home near the entrance that is easy to mimic with seeds, teaching aids and samples of foods. A sustainable gardener works with clients at the clinic and in their homes to eat better with improved food security.

40 - Schools and Colleges Permaculture Programme (Scope)

- Chifundo Nhokwa, Malawi Scope coordinator, 0995-211-551, chifundo@seedingschools.org
- Rescope, Regional Schools and Colleges Permaculture Programme (Southern and Eastern Africa), Mugove Walter Nyika, Regional Facilitator, 01-831-373, F: 01-831-363, 0999-788-373, skype: Mugove.habitats info@seedingschools.org rescope@seedingschools.org zipscope@yahoo.co.uk www.seedingschools.org
- Works with partners to promote Permaculture in school and college communities in Malawi / Africa. Provides technical support and training to organizations in 7 countries that are working to demonstrate and promote sustainable environmental management.

41 - Salama Shield

- Cynthia Mauldi, 0991-364-599, cmauldi@salama.org
- NGO supporting several sectors in Malawi that integrates Permaculture into their work.

42 - Slow Food Malawi, Lilongwe Convivium

- Lilongwe Coordinator, Zilanie Gondwe Nyundo, 0994-068-833, blackmorecreatives@yahoo.com, zilanie@yahoo.com
- See Rumphi for description of Slow Food

8. Dedza

43 - Dedza District Education Office

- Coordinating Primary Education Advisor, Caxton P. Chiphaka 0888-506-479, cchiphaka@yahoo.com
- District SHN Coordinator, MacDevex Kadya, 0999-036-006, m.kadya@yahoo.com
- Part of 2006 SHN Permaculture pilots with several schools using Permaculture design. CPEA Caxton is a trainer and was part of the Teacher Training College training team. MacDevex was involved in the review of this manual.

44 - Action for Natural Medicine

- National Coordinator, Nelson Moyo, 0881-355-613, 0992-320-269, 0111-580-382
- AnamedMalawi@gmail.com

- Lives in Linthipe and is a great role model for ANAMED and Nutrition there. Well worth visiting! ANAMED demonstration site also at Chongoni CCAP. Trainings, demonstration, and print resources on well-researched natural medicines easily found in Malawi. For an overview of the materials and trainings visit: www.malawi.anamed.org, http://www.anamed.net/current/English_Home/english_home.html

9. Ntcheu

45 - Lipangwe Organic Manure Demonstration Farm

- Thomics Lupenga 0999-294-636
- Ntonda, about (15-20 kms from Manjawira)
- An organic manure demonstration farm that provides training and extension services to their local community in manure making and organic farming.

46 - Ntcheu District Education Office

- Ntonda School, Head teacher: Margaret Yonasi 0999-661-018, supported by SCOPE Malawi.

47 - Zisinthe Farm and Community Gardens

- Geoffrey Mlongoti, gmlongoti@gmail.com, 0994-473-566 https://web.facebook.com/zisinthefarm/timeline
- Mlangeni
- The Zisinthe Farm and Community Gardens works with Malawian farmers on low-input techniques, benefitting the environment and building healthy communities.

10. Mchinji

48 - Paradise On Earth Farm

- Director Grace Biswick, GraceLuwayo@gmail.com, 0998-933-909
- Dep. Director, Luwayo Biswick LuwayoBiswick@gmail.com, 0998-690-443, 0884-404-703
- Menyani Village
- Established in 2012 Paradise On Earth farm (POE) is a Permaculture staple field special model, demonstrating specific zone 3 designs, techniques and strategies on how to grow all the Malawian main crops in a sustainable way to help mitigate and adapt to issues of climate change, eradicate malnutrition and hunger, poverty alleviation and simple farming ways for the elderly and those who are HIV positive.

EASTERN MALAWI

11. Mangochi

49 - Mangochi District Education Office

- Mtonda Teacher: Ephraim Mvula 0888-581-003, 0994-471-331, supported by SCOPE Malawi

50 - Masophenya Permaculture Project

- Chimwemwe and Sam Baluti, 0995-825-527, 0881-866-721, sambaluti@gmail.com
- Pierre Moorsome, 0996266282, pierre.moorsom@gmail.com
- Monkey Bay. Sam and Chimwemwe are working on starting up an EcoVillage. Pierre supporting the areas with Food Forests in Permaculture Design.

51 - Mangochi Orphan Education and Training (MOET)

- Founder and Director, Patterson Majonanga, 0888-873-270, 0999-873-270, MoetMalawiCharity@yahoo.co.uk www.fomoe.org
- North of Mangochi Boma about 20 km between Nkopola and Club Makokola
- Non-profit school providing elementary education and secondary school sponsorship program for orphans, doing training in Permaculture and Natural Medicine, aquaculture, irrigation, volunteer program and promoting environmental conservation

52 - Namizimu Forest Retreat

- Owner, Taherer Hakimi, starytary@gmail.com, www.namizimu.com, www.facebook.com/groups/192152874141800/members/
- Located in Chowe.
- Based on Permaculture designs, Namizimu Forest Retreat is a private woodland sanctuary just half an hour from Mangochi. They have 8 rooms, 2 campsites and a cabin in the woods.

53 - Thanthwe

- Permaculture Malawi co-Founder and Matron, June Walker, Thanthwe, Box 46, Monkey Bay, jwthanthwe@gmail.com, 0991-111-880
- Two km east of tarmac road where Cape Maclear and Monkey Bay roads join at One Stop.
- This is a family home and Food Forest with an acre of indigenous forest and an acre of demonstration gardens designed and managed on Permaculture principles. Works with youth in communities and anyone wanting to share and learn about sustainable living.

SOUTHERN MALAWI

12. Balaka

54 - HELP Malawi

- Wells Sakala, wells@helpchildren.org
- Located just near the Ulongwe gate to Liwondwe National Park / Mvuu Camp and Lodge entrance
- Integrates Permaculture into their primary schools and hospitals.

13. Zomba

55 - Anglican Church, Love's Harvest, Zomba

- www.LovesHarvest.org
- Permaculture projects in 4 dioceses, details on page **Error! Bookmark not defined.**, under Karonga

56 - Emmanuel International

- Helen and Paul Jones, P/bag 12, Zomba, 01-524-391, 0888-832-658, helen@ei-Malawi.org
- Timothy Chikalipo, 0999-219-878, 0888-479-611, TimothyChikalipo@gmail.com
- Zomba Boma offices, sites all over Zomba, Machinga and Mangochi
- Very involved with both versions of this manual. An excellent NGO example of support to Sustainable Nutrition

14. Blantyre

57 - 4H organization

- Director: Judith Mtelera 0999-955-370, 0881-150-833
- The 4H organization's values lie in our four H's: Head, Hands, Heart and Heath. It is a youth development organisation, which aims its activities at young people aged between 6 and 28 years old living in both rural and urban areas. The youth work carried out by the 4H organization has an educational purpose with long-term goals to endorse entrepreneurship, employability and active citizenship in young people.

58 - Anglican Church, Love's Harvest, Blantyre

- Founder, John Springer (in USA) js@JohnSpringerArchitect.com, www.LovesHarvest.org
- About 20 Permaculture projects in 4 dioceses: Southern Malawi, Upper Shire, Lake Malawi, and Northern Malawi. Love's Harvest works with a village for a year to build up all food groups and provides a Permaculture facilitator, some targeted organic inputs and coordination support (for mother's union and Episcopal Relief and Development).

59 - DAPP Teacher Training College (Lunzu)

- Iben Brandt-Pedersen, Principal, dappttc@africa-online.net 0999-968-445
- Timothy Chadzandiyani, Operations Manager 0999.442.805
- http://www.dapp-malawi.org/welcome-to-dapp-malawi
- About 10 km from Lunzu. 2 routes:
  Route A) - from roundabout as you leave BT towards LL head towards airport. Near airport take dirt road at a market off to the right, there is a sign there for TTC. Take the dirt road another 8 km to the TTC.
  Route B) – from Lunzu market there is a dirt road heading west to TTC. There is a sign but in crowded area and a rough road. After about 10 km you'll reach the TTC.
- Teacher Training Colleges working on becoming role models, based on sustainability principles. Colleges have different levels of: gardens, orchards, wood-lots, some compost toilets, water harvesting, kitchen recycling, meals based on food groups, education, sharing.

60 - Blantyre District Education Office

- Zingwangwa Primary School, Headteacher: Mr Hastings Kumbemba 0999-435-728 Teacher: Bernadina Nthachi. Supported by SCOPE Malawi.

61 - Perma-outreach

- Founder and Trainer, Matthews Shaba Mpofu, 0888-595-231, permaoutreach2@gmail.com, mmpofu2000@yahoo.co.uk
- Supports organizations in Blantyre and around Malawi and region with Permaculture designs. Anamed trainer.

62 - Glass House Sustainability Centre

- Director and Trainer Chris Walker, 0888-201-867, panthunzi@africa-online.net
- Behind Four Square Church, Zalewa Road, Chemusa, Blantyre
- Landscaping business supporting Permaculture and ANAMED with Companies, schools, individuals and communities.

63 - The Samaritan Trust

- SamaritanTrust@africa-online.net, 0999-970-956, www.SamaritanTrust.org, Director: Margaret Mukwenha, 0884-326-000.
- Joseph Mnima 0888-381-818, Edwin Mwepola 0886-92294
- Green Corner, Off Chikwawa Road
- Site for Street Children, started using Permaculture designs a few years ago, supported by several Permaculturalists in Blantyre.

15. Mulanje

64 - Mulanje Mission Hospital, Nutritional Rehabilitation Unit

- Matron, Jane Mweziwina, 0999/888-843-909, MweziwinaJane@yahoo.com
- Garden and Outreach, Felix Mkwate, 0999-481-146,0884-531-788, FMkwate@yahoo.com
- At Mulanje Mission hospital about 5 km west of the boma. http://www.mmh.mw
- In 2004 Felix worked with me and he 'got' the idea of living sustainably. He also got the support needed from management. The site has grown and has an outreach programme, a large organic garden providing food, learning and seeds. Felix was very involved in both of the versions of this manual and he took his PDC in 2013. Their website has a really nice video of Felix and his work around the gardens.

16. Thyolo

65 - DAPP Teacher Training college (Amalika)

- Charlotte Danckert, Thyolo Principal and Partner Mgr in LL, 0999-546-754, CDanckert@africa-online.net, Moses Bokosi, Operations Manager, MosesBokosi@rocketmail.com, 0888-188-894. Arams Phiri 0884-581-912
- http://www.dapp-malawi.org/welcome-to-dapp-malawi
- Turn south at Thunga market and follow the signs, about 10 km.
- Teacher Training Colleges working on becoming role models, based on sustainability principles. Colleges have different levels of: gardens, orchards, woodlots, some compost toilets, water harvesting, kitchen recycling, meals based on food groups, education, sharing.

66 - Thyolo District Education Office

- District Education Manager, Charles Sakwata, DEMthyolo@yahoo.com
- Several PDCs and schools, part of 2006 SHN pilots. TTCs and homes designed with Permaculture principles.
- Nachipere School, Head teacher: 0999-337-837, supported by SCOPE Malawi

67 - CARD

- Project Officer: Chifundo Macheka 0997-432-318
- Provides emergency relief assistance and rehabilitation support to victims of natural and man-made disasters. CARD emphasizes on disaster mitigation, prevention and livelihood recovery of victims in its development support initiatives.

17. Nsanje

68 - Nsanje District Education Office

- Mphatso private school, Head teacher: McDonald Mpiyasi 0884-498-587, supported by SCOPE Malawi

69 - Tikweze

- Jamestar Langwani 0888-531-284
- Masenjere, Muona, Nsanje
- A community based organisation made up of local volunteers dedicated to improving the lives of the people in their community.

18. Chikwawa

70 - Anglican Church, Love's Harvest, Chikwawa

- www.LovesHarvest.org
- Permaculture projects in 4 dioceses, details on page under Karonga.

71 - Chikwawa District Education Office

- Changoima School, Headteacher: Ronnex Tsamba 0881-280-466
  Teacher: Ephraim Feremu 0999-764-122, supported by SCOPE Malawi

72 - Maziko Amoyo Wabwino Organization (MAWO)

- Mcjustice Betha, Director, 0999-214-823, 0888-005-476, mcjusticebetha@yahoo.co.uk
- Chang'omia, Chapananga, Chikwawa. About 1-hour south of Mwanza on the Mozambique border, but in Chikwawa.
- Literally means a foundation for a better life of self-reliance is a community organization established in the year 1992. Part of the first group certified in Permaculture in Malawi (1994). Its main goal is to assist the communities to become self-reliant and promote community responsibilities. Provides training in Permaculture, teaching communities in sustainable farming methods, promote conservation of the environment, training in natural medicine and nutrition and preservation of indigenous knowledge by facilitating transfer of knowledge from the elderly to the younger generation.

Abbreviations

The following is a short list of abbreviations you may hear when discussing some of the subjects covered in the manual.

Abbreviation	Meaning
AIDS	Acquired Immunodeficiency Syndrome (a stage of HIV with many symptoms)
CAN	Communities for Action on Nutrition
CBCCs	Community Based Childcare Centres
CBOs	Community Based Organizations
CLAN	Community Leaders for Action on Nutrition
CMAM	Community Management of Acute Malnutrition
DNHA	Department of Nutrition, HIV and AIDS
FISP	Farm Input Subsidy Programme
GMO	Genetically Modified Organism
HGSM	Home Grown School Meals
HIV	Human Immunodeficiency Virus (the virus that causes AIDS)
IPM	Integrated Pest Management
MCH	Maternal and Child Health
MoAIWD	Ministry of Agriculture, Irrigation and Water Development
MoEST	Ministry of Education, Science and Technology
MoGCDSW	Ministry of Gender, Children, Disability and Social Welfare
MoH	Ministry of Health
MoLGRD	Ministry of Local Government and Rural Development
PDC	Permaculture Design Course
PLHIV	People Living with HIV
PLW	Pregnant and Lactating Women
SFP	Supplementary Feeding Programme
SHN	School Health and Nutrition
SMC	School Management Committee
SMP	School Meals Programme
TB	Tuberculosis
TNP	Targeted Nutrition Programme
UN	United Nations
WASH	Water Sanitation and Hygiene
WFP	World Food Program
WHO	World Health Organization

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- Nutritionist, Sam Kamangadazi Chambalo
- Total Land Care, the late Brand Mbale

References

The author is indebted to a number of publications that provided or guided content in the manual:

Topic 7: Healthy Eating Habits

Adapted from www.choosemyplate.gov/preschoolers/healthy-habits.html

Topic 10: Water Purification And Storage

SODIS, Adapted from www.cawst.org

Moringa seed water purification, adapted from http://miracletrees.org/moringa_water_purification.html#.Ub3RhPk3BqU

Topic 12: Energy Use In The Kitchen

Improved Cook Stoves Manual
www.bioenergylists.org Peace Corps Bolivia, Nov 2008

Paper Briquettes adapted from:
http://tilz.tearfund.org/en/resources/publications/footsteps/

Insulated Basket Cookers / Coolers – Food and Fuel

Solar Cookers International: http://solarcookers.org/basics/how.html and http://solarcooking.wikia.com/wiki/Category:Solar_cooker_plans

Bio-gas Systems, adapted from:
http://akvopedia.org/wiki/Anaerobic_Biogas_Reactor

Solar drying, adapted from “How to Process & Preserve Fruits through Drying”, A. Schomburg, SADC-ICRAF AF Project, Zomba, Malawi, ~1999.

Topic 15: Sustainable Natural Systems

Biodegradable and non-biodegradable ‘waste’
http://www.hoaxorfact.com/Science/how-long-does-it-take-to-decompose.html with sources from: http://en.wikipedia.org/wiki/Biodegradation

Plastic bags, http://www.motherearthliving.com/green-homes/plastic-packaging-send-it-packing.aspx and http://www.permaculture.co.uk/ for potato starch magazine wrapping

Topic 16: Permaculture

Permaculture Design Manual, free download:
https://archive.org/details/PermacultureADesignersManual_306

Permaculture Poster Series, free download:
http://www.sarahbeare.com/page16.htm

Topic 18: Soil Fertility

Soil Nutrients: https://www.ces.ncsu.edu/categories/soil-water-air/

Topic 19: Animals For Soil Fertility

www.batconservation.org/

Topic 21: Composting Toilets

The Humanure Handbook: http://humanurehandbook.com

Topic 22: Water Management

Water on Planet Earth, www.Water.org

The Water Table: "Water Conservation for Everyone", Agricultural Communications Branch. Lilongwe, Malawi: JN 12-6000-111-76. (no date, appears to be in 1990s?)

Topic 23: Water Harvesting

Brad Lancaster, http://www.harvestingrainwater.com

Topic 24: Irrigation & Water Sources

Rope and washer pumps, developed by Skat for the Rural Water Supply Network (RWSN) www.RWSN.ch, accessed from www.AkvoPedia.org

Treadle pumps, www.WikiWater.fr

Topic 25: Species Health

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

Food and Agriculture Organization of the United Nations. The state of the world's plant genetic resources for food and agriculture. 1996. http://www.fao.org/agriculture/crops/thematic-sitemap/theme/seeds-pgr/sow/en/

World Resources Institute. Millennium Ecosystem Assessment: Ecosystems and Human Well-being: Biodiversity. Washington, DC: World Resources Institute; 2005. http://www.millenniumassessment.org/en/Synthesis.html

Boa, E. 2004. Wild edible fungi. A global overview of their use and importance to people. Non-wood forest products 17. Rome, FAO. http://www.fao.org/docrep/007/y5489e/y5489e00.htm

Global Plan of Action for Animal Genetic Resources and the Interlaken Declaration: Adopted by the International Technical Conference on Animal Genetic Resources for Food and Agriculture, Interlaken, Switzerland, 3-7 September 2007. http://www.fao.org/docrep/010/a1404e/a1404e00.htm

Food and Agriculture Organization of the United Nations (2013) Edible insects: Future prospects for food and feed security. http://www.fao.org/docrep/018/i3253e/i3253e00.htm

Topic 29: Zones In Permaculture

Zone 1: Gardens: Food Garden Foundation, Johannesburg South Africa. http://www.foodgardensfoundation.org.za

Appendix 1: Guide To Common Foods In Malawi

Useful Plants of Malawi, free download: https://ia600201.us.archive.org/14/items/usefulplantsofny00willuoft/usefulplantsofny00willuoft.pdf

Composition of Foods Commonly Eaten in Eastern Africa - Published by CTA & ESC (ISBN 90-72407-105) "What people eat reveals more than just their diet and its effect on health: it tells the story of their agriculture and culture" Copies and further information available from: Dr E.C. West, Wageningen Agricultural University, the Netherlands, or Dr T.N Maletulema, Tanzanian Food and Nutrition Centre, PO Box 977, Dar es Salaam, Tanzania CTA.

Grow Biointensive: http://www.johnjeavons.info

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 heath, 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.* 2nd ed. Ed. Sarah Beare. Lilongwe: World Food Programme Malawi, 2016.

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Low Input Food and Nutrition Security: Growing and Eating More for Less (2005)