

INTRODUCTION TO PERMACULTURE MANUAL

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PERMACULTURE

Permaculture is about creating real independence, starting at home. Our homes are probably one of the most important parts of our lives. In modern life it is quite difficult to feel secure in our homes because of high electricity, water and food bills, as well as all the other challenges we may have. In informal settlements we face challenges of lack of sanitation, flooding, very hot and very cold buildings and many more.

Permaculture design assists us in designing in and around our homes so that we use energy more efficiently, and improve our environments, leading to better health all around. And it can help us save money, while teaching others the same skills.

Basic human needs

Humans need food, shelter, clothing, energy, love and a meaningful life in order to truly reach their potential. For most of the world, many of these needs are not met. We increasingly look to government, parastatals and industry to provide these needs. And those institutions are battling to meet basic human needs. If we take charge of what we need, we really can make sense of our lives.

We have also seen the impact of increased electricity prices, water shortages and food and fuel prices rising at an incredible rate. All of these factors affect our independence and security.

At the moment, very few of us have any control over where our food comes from, how it is produced; nor over our sources of electricity, heat and water. This keeps us dependent on outside forces. We need to take control of some aspects of our lives so that we are ready for financial and climate changes that we will face in the future.

What does sustainability mean?

“Sustainable” is a buzz word that is used very loosely by people to describe many things. In the context of this course we are talking about sustainable human lifestyles, and we look at sustainability as asking not only ‘can we sustain ourselves and thrive as human beings today?’ but ‘will our children’s children be about to sustain themselves far into the future?’. Sustainability is a long-term, future-thinking strategy, considering what will happen in the future as a result of the choices we make today.

One understanding of sustainability is to look forward seven generations -- This means that the way we live now, how we use natural resources, land, and fossil fuels, should be done in such a way that our grandchildren 7 generations from now can live in the same way, or better. This simple explanation of sustainability asks us to look at the consequences of our actions, and the fruits of our labour. It urges humans to change their behaviour and consumer patterns quite radically to ensure that there will be enough resources 140 years from now, for everyone.

We sit with very real challenges in terms of the cost of living. The cost of living has increased because resources like oil, used in fuel, have become extremely expensive due to the fact that there is not so much of it as before, and therefore extracting these fossil fuels has become more difficult. Because food is now transported around the world to support a global economy, the actual costs of food transport have increased. And that is not even looking at the environmental and social costs of food production.

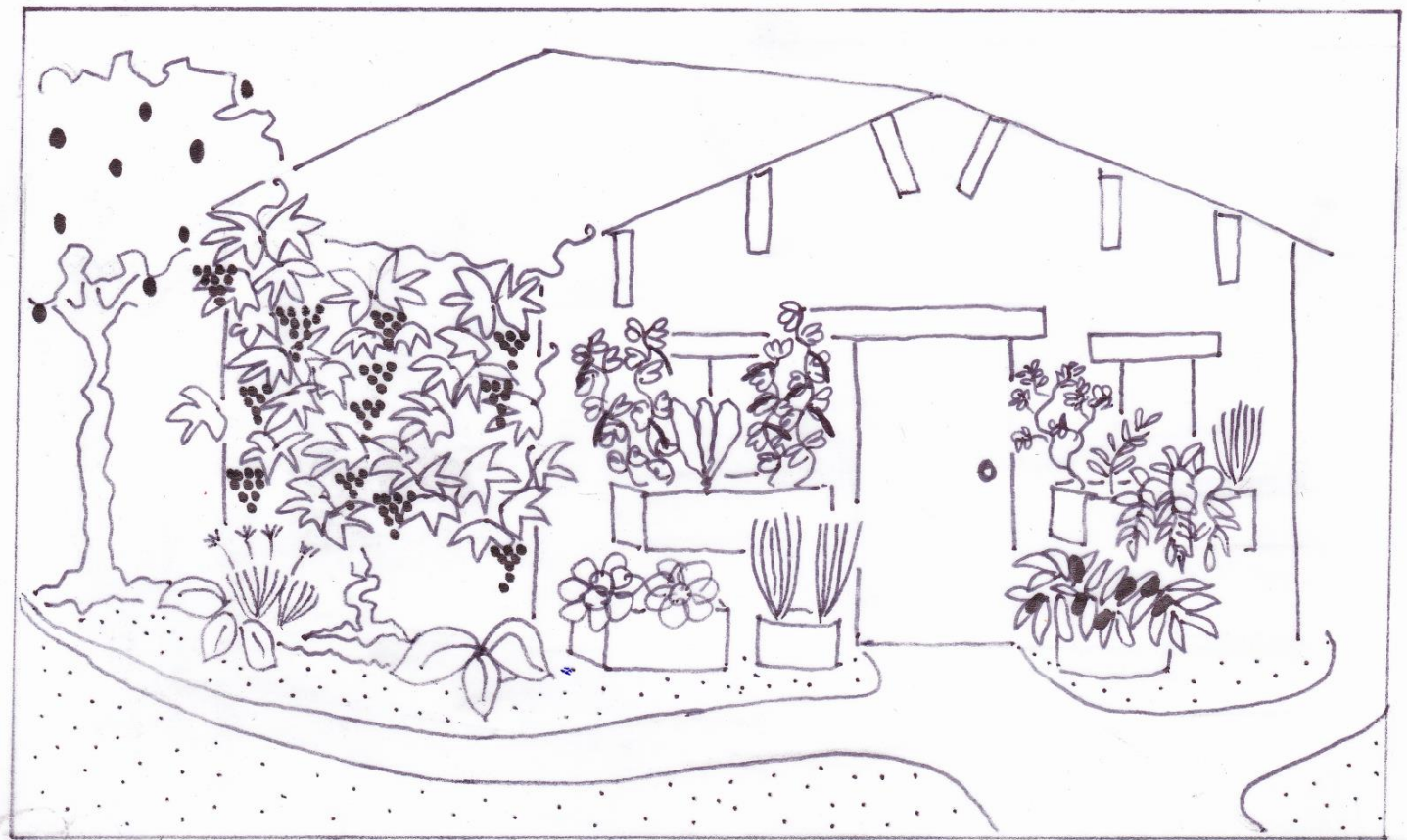
Thinking and designing *sustainably* means that we take into account the impact our actions today will have on the future. If we plant a fruit tree today, perhaps our children and grandchildren will have fruit to eat. If we pollute our nearby river, then perhaps our children and grandchildren will struggle to find clean water to drink. Sustainability asks us to create a better world for our children than the one we have today.

How can this course help us?

We will learn about practical things we can do to heat and cool our homes, to save money on electricity bills in a number of ways, to save and re-use water in our homes and on our gardens and to grow food and medicine for ourselves. These are skills we can easily share with neighbours and community groups we are involved in.

Saving money frees up cash for other needs, and greening our spaces productively has a very positive effect on our health and our society. Studies show that suburbs with more greenery have less crime, and less disease related to lack of exercise or poor diet, and that people are generally happier in green neighbourhoods. Children also gain learning skills if they are surrounded by green spaces.

We can all create a bit of Eden in our backyard! Or on our walls....



House with fruit tree, grape trellis, window boxes and containers all growing food. Life looks GOOD.

What is Permaculture?

Definition

Permaculture is a design approach to creating sustainable human habitats, without impacting negatively on the natural environment around us, as well as as far from us.

If we carefully observe our climate, our buildings, our social environment, and our available plants and animals, we can design our home spaces into a productive, useful and abundant support system for people.

The originators of Permaculture put together an approach to human livelihoods, culture and economy that would ensure that no harm came to the Earth, that people were respected and supported, and asks in turn that we give back surplus (extra) time, energy and resources to the Earth and to care of People.

The intention in Permaculture is for people to reclaim their rights and abilities to be self-sufficient without damaging the resources we have wherever possible. This starts at home, and spreads out into our communities, cities and farms.

Permaculture systems are based on natural systems- what we call ecosystems – natural habitats around the world. The breakthrough in Permaculture was realising that we needed to create human habitats that were similar to natural ones. More of this comes later in the manual.

Permaculture Basics

Ethics

Permaculture has ethics which are values that guide our thinking and decision making. We need shared or common values in order to make decisions together. Incidentally, most religions and cultures around the world have ethics or values that mirror the ethics of permaculture which are: earth care, people care, and surplus share.

Earth care

All our actions must avoid harming the earth, and we also need to actively regenerate and heal damaged ecosystems. All forms of life have a right to live as they play a critical role in the global ecosystem.

People care

All peoples should be respected and cared for. This ethic also relates to caring for ourselves, our health and our mental/emotional wellbeing. It is also about reaching out to other people in a positive way.

Surplus share

This ethic is about giving back. It essentially teaches not to hoard, and only to use what we really need! When we do have extra time, energy, knowledge or even money, we should dedicate them towards the first two ethics so that the world around us continually improves.

In some ways the society around us no longer upholds these values, and encourages us to value external things, like money, status and objects. Permaculture asks us to come back to the basic values that really matter and create a society more positive than the one we live in now. Another aspect of Permaculture is that we create a global nation which values the same ethics – this means we can create a global family that has nothing to do with political, economic or religious boundaries.

Permaculture has been described as the fastest growing grassroots movement in the world – it has practitioners around the world.

Principles of permaculture

These principles help us to think about how we are going to act and implement our designs. Each principle guides us in making decisions about our homes, our gardens, our society and even our economic systems.

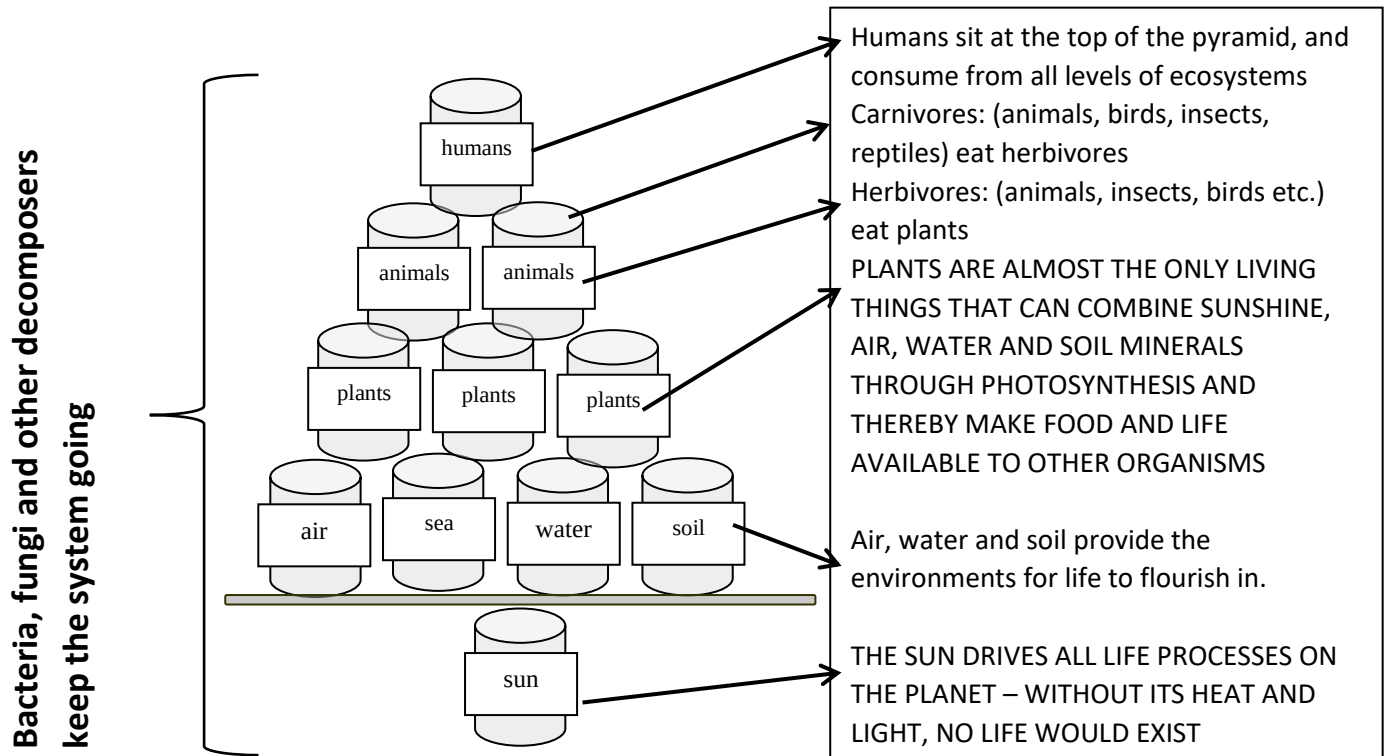
OBSERVE AND INTERACT Beauty is in the eye of the beholder Your perceptions will influence what you see	People tend to think along the same thinking patterns. This principle asks us to change the way we look at the world. It also says that the attitude with which we look at the world will shape what we see. If we really observe what is happening around us, we will be able to assess our situations more clearly. Through a deeper understanding of processes and patterns around us we can really make positive changes.
CATCH AND STORE ENERGY Make hay while the sun shines	All energy – wind, water, sunlight and nutrients must be used as many times as possible before it leaves the system. If we miss the incoming energy, we have lost an opportunity. The house is a good example of catching and storing energy. This principle asks us to be wide awake to opportunities, and to use them positively.
OBTAIN A YIELD You can't work on an empty stomach	Self-sufficiency is the first step. Make sure that your system yields products. These can be food, harvested water, and medicines. Obtaining yields also keeps us motivated. Our understanding of yields has also changed, so we incorporate social and environmental benefits too in the category of yield.
APPLY SELF REGULATION AND ACCEPT FEEDBACK The sins of the fathers are visited on the children unto the seventh generation Your actions follow you	Know the difference between needs and wants and limit unnecessary wants. Accepting feedback is about listening to the feedback or results you get from permaculture systems (and humans), and adapting accordingly. On a broader scale, we always need to think about the impacts of our actions on the world now, and into the future. This principle emphasises sustainability and the need to set up systems that can provide for themselves.
USE AND VALUE RENEWABLE RESOURCES AND SERVICES Let nature take its course	Use biological resources rather than non-renewable. In terms of gardens – this is about using compost and natural sources of fertility instead of chemicals. We also start to understand that nature provides services, and need to plan those into the designs too. Some natural services we can utilise are pest management, pollination and the cleaning of water through plants and wetland systems.
PRODUCE NO WASTE A stitch in time saves nine Deal with problems as they arise so that they don't get worse.	Absolutely every resource that can be, should be recycled into your system. Waste is any resource that is not being utilised, and therefore becomes pollution. Careful planning also means that energy (work, time and thought) is also not wasted.

DESIGN FROM PATTERNS TO DETAILS Can't see the wood for the trees. Take a step back to get an overview.	Don't get lost in the details. Start with the big picture and patterns you can see around you. Often your landscape and climate will dictate the larger pattern – this idea is also informed by the sector analysis. After these observations are in place, you can then move closer towards filling in the details. This is a fundamental design principle.
INTEGRATE RATHER THAN SEGREGATE Many hands make light work	The systems we design need to be interdependent. We look at every important function that needs to happen in our system and make sure that 3 elements perform that function. We also make sure that every element we put into our system does 3 jobs! This way, even if we lose an element, the system does not fall apart. Permaculture is about cultivated ecologies which behave like natural ecologies. This principle also emphasises the power of teams and groups – we are much more powerful together.
USE SMALL AND SLOW SOLUTIONS The bigger they are the harder they fall Slow and steady wins the race	Throwing money, time and effort at a 'problem' does not ensure that it will be fixed. Make the smallest change for the greatest effect. Take time to observe and carefully respond. A simple solution to a problem is often the best. Analyse the weak links in your system, and strengthen those before you take any further action.
USE AND VALUE DIVERSITY Don't put all your eggs in one basket	Our systems need to aim for the kind of diversity we see in nature. This allows us to be able to respond to changes that come. An example is not to focus on only one crop for cash, but many crops for both food and income. If we have a failure with some, we still can rely on others. Diversity But diversity also is about the people, cultures, landscape and more. This principle also means that we are risk-spreading and utilising diverse elements to support us.
USE EDGES AND VALUE THE MARGINAL Don't think you are on the right track just because it is a well beaten track	The edges between two environments are the most productive and dynamic. All major human settlements have been situated on an edge. So in our designs we try and incorporate this principle to improve yield. Another important aspect is that of the new ideas – we should look at them as there may be great value in them. Don't dismiss them just because they are unfamiliar. A useful application of this in cities is to use the vertical edges of walls to produce food on, as well as the roof edge to collect solar power and water.
CREATIVELY USE AND RESPOND TO CHANGE Vision is not seeing things as they are but as they will be	Change is all around us whether it be climate change, social or economic change. We need to be ready for it. Our personal and broader systems need to be able to handle change. It is also really important to be able to imagine and make happen the positive changes we would like to see in our lives.

Ecosystems

Eco is from the Greek word meaning “home”, so when we talk about ecosystems we are talking about the entire planet as our home. Natural ecosystems provide the perfect model for basing our human living designs on. Ecosystems work efficiently, always creating more opportunity for life and producing no waste in the process.

THE BUILDING BLOCKS OF ECOLOGY



We have also explored the Web of Life on this course – looking at how all the players in an ecosystem are linked. We can see from the diagram above that if we remove or damage any one of the building blocks, that we weaken the ecosystem. Our work as human is now to restore and heal what we can of already very damaged ecosystems.

We are working with ‘cultivated ecologies’ for human beings, in Permaculture.– essentially, an ecosystem that we create to have maximum benefit for humans and any other life forms. We need to make sure that we do not stress any part of the ecosystem.

Back to basics:

Plants convert the sun’s energy (through photosynthesis), in combination with soil, water and air, to plant material that can then be consumed by herbivores. The herbivores, in turn, provide food (energy) for carnivores. Other life forms, such as bacteria and fungi live off the wastes produced by these organisms. This is the life cycle and food web we are a part of.

Basically both terrestrial (on land) and aquatic (in the water) ecosystems function along these broad principles.

It is important to understand ecosystems and how efficient natural systems are at harvesting solar (sun) energy, and redistributing it, as well as recycling this energy so that it is available for much longer. This helps us design more efficient human systems. We need to think about how we interact with all the living and non-living parts of our systems so that we can tap into them appropriately.

After having looked at a simple model of ecosystems, and seeing that the sun is the source of energy that drives them, we need to look at how sun energy is translated and concentrated in natural ecosystems.

Resources like plants have low embodied energy and can replace themselves rapidly – think of grasses, weeds and trees that sprout every year, or are useable every five years. These types of resources are known as **renewable resources**. Resources like coal have very high embodied energy because they are basically fossilised trees formed over millions of years. They take a very, very long to form (most of our coal that we use today was formed 300 million years ago!!) so cannot be rapidly replaced – these are known as **non-renewable resources**. To contrast, firewood is renewable – as we can regrow a tree or a tree-limb in a relatively short period of time. About 5 years, instead of 300 million years.

A large part of our work in Permaculture is about working out how humans can support themselves from the RENEWABLE section of the resources we have been working with. Some of the questions we ask ourselves are:

- Can we save on our use of energy beyond what we already do?
- Can we build most of our homes from sand, clay, straw, wood, stone and urban building waste?
- Do we only use metal for roofs, cement for floors when we have no other options?
- Can we heat our homes from solar energy? In what form? Do we use wood, solar heating, solar electricity?
- Can we power our homes through wind power or Hydro (water-driven electricity)?

The house as an ecosystem

If we can redesign our home spaces and lives to function more like an ecosystem, we will create a situation where there is very little waste, and much abundance produced. Through the Permaculture design process we will be able to achieve this. This means that our homes will use as many renewable resources as possible, heat and cool itself, and that we will be able to produce for human needs in the space around the home. By the end of this course you will be able to make your home an ecosystem for supporting human life!

PERMACULTURE DESIGN

There are simple steps in the Permaculture Design process that will lead us to creating a home environment that is suited to the people living in it, and to the environment around it. This can then also lead us to create suburbs, cities, farms and nations that are truly sustainable.

Observation and design

A good understanding of the people, landscape and socio-economic factors we are dealing with is really important for good design.

Social observation involves collecting enough information from the people we are working with in order to understand their needs and dreams. A questionnaire is only one way of going about it. Time spent in conversation with people and their families is very important. Another aspect is to understand the local community that people live in as well as their links to further communities. A good understanding of current economic systems as well as alternative local economies is important too.

Land observation is crucial: what are the climate and landscape factors that people are dealing with in order to live and provide for themselves. Often this falls out of the picture because so few of us produce the things we need to live, and therefore do not need to worry about local conditions unless they impact negatively on us.

Base maps of the site we are dealing with are important as we can communicate through maps to other people about our circumstances.

Sector maps make clear what the challenges on site are.

A Zone map is a realistic map of what is possible on the site.

The design is a map of possibilities, and allows us to communicate vision as well as the practical steps to achieving the vision. It shows how we create the human ecology on site.

Social Data

We need to understand the people living in our homes, their abilities, likes, dislikes, the resources they can access, and also what they like to eat, and how they want to feel at home. A few questions to people in the household can help us paint a picture of the human needs and opportunities more clearly. This is known as social data collection.

How many people live in the home, and how old are they?	
How do people want to FEEL in their home environment? Please write down everybody's information.	
What are peoples' dreams of the future? Please write down everybody's information.	
Who is employed, and what do they do?	
What do unemployed people do with their time?	
Are any of the households involved in an organisation, volunteer work or outreach work? In what way?	
How much time do people in the household have to develop their home space and gardens? How often can people make time for this?	
What kind of income does the household work with on a monthly basis?	
What are the hobbies and interests of the people living in the house? Please list the names and the hobbies next to each one.	
What kinds of pets do you have? How many?	
Do you have a car that needs to be parked in a driveway?	
Do you need to park bicycles in the yard? How many?	
What is most of your electricity bill spent on?	
What kind of stoves do you have in the house?	
Do you use a heater in winter?	
What is most of your water bill spent on?	
What are the favourite vegetables and fruit of the people in the house?	
Does anyone in the house hold know where to find manure or grass for mulch?	
What kinds of local waste materials have you identified that you could use in your home? Where can you find them?	
Do you have access to transport for these materials? Who would be able to assist you?	
What do you currently do with your bathwater, laundry water and kitchen sink water?	
Do you do your laundry inside or outside of the house?	
Do you have any water leaks in your house? Please explain if you do.	

What kinds of plants have you grown in the garden in the past, and what are you growing now?	
How much sunny space do you have for planting in your yard?	
Any other information that you think is important?	

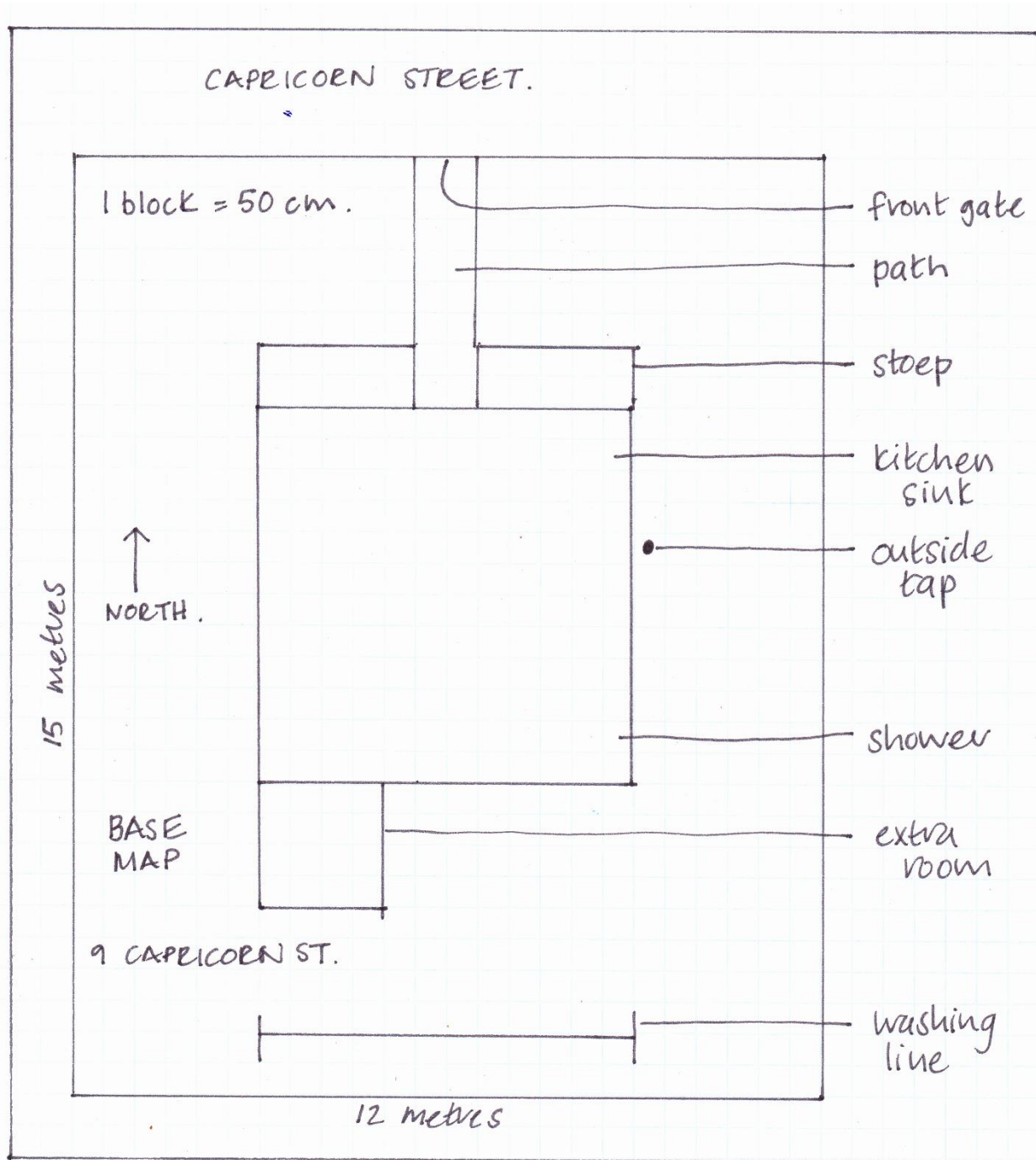
When you collect this information about your household, or other peoples, you can start to design so that everybody's needs are included.

And especially if you are working with neighbours in your area to upgrade their plots and homes, you need to spend time getting to know people so that the design suggestions you make, really help them.

Base Map

It is a really good idea to be able to draw a simple map of your home and yard. This allows us to plan our designs and to communicate them to other people.

We start with a simple Base Map which is the fence line of the yard, and the buildings and fixed features inside the yard. You will need a tape measure to measure up distances of fences, building size and also the distances between fences, buildings and store-rooms. Below is a simple base map, with an arrow indicating North. You will learn how to find North using a watch on this course. You can also indicate where the bathroom and kitchen are as this will help us with planning what to do with the waste water from the house. Also indicate washing lines, play areas and car parking spaces if necessary.



BASIC PERMACULTURE SITE OBSERVATION

Observation

How big is the plot? Can you measure it?

Where does the house sit on the plot? If possible do a drawing of the plot and house, and other buildings. Or you can make a model.

Put North, South East and West on the drawing. Or on the model.

Do try to make a sector map on paper so that you can look at it later when you are planning.

SECTORS

Sun angles

- Where does the summer sun path travel?
- Where does the winter sun path travel?
- Where is the most shade?
- Is the house shaded by anything on the North Side?
- Is the house shaded on the west side?
- Draw the summer and winter sun sectors.

Slope and aspect

- Is slope very steep or not really?
- Which way does the slope face? (aspect)
- What are the conditions in terms of temperature, sunlight and wind on the slope?
- What kind of soil do you have? Is it sandy, clay, rocky? Is there a solid rock layer anywhere?
- Draw an arrow for the general slope on the map.
- Mark the areas with rocky layers.

Wind

- From what direction do the summer winds come? What do they bring?
- From what direction do the winter winds come? What do they bring?
- Are there breezes or soft winds during the day? Where do they come from?
- Draw the different wind sectors on the map.

Roads and infrastructure

- Is there a road passing the site?
- Mark big and small roads on the sector map.

Climate

- What is the average rainfall for the area?
- When does the rain fall?
- When are there big storms, and when is there light rain?
- What are the highest temperatures in summer?
- What are the lowest temperatures in winter?
- Do you get frost in winter?
- Do you have any big storms that damage property?
- Show frost areas.

Water

- Is the building near an area that floods?
- Is there a stream passing the building? When does it flow?
- Draw the water flow on the map.

Pollution

- If there is pollution in the area, please explain where it comes from, and what it is.
- Also, is there a time of year when the pollution happens?
- Draw the pollution sector on the map.

People

- Are people passing through the site? Draw their pathways on the map.
- Is there a big settlement nearby?
- Are there any problems with people? Are there any opportunities with people?
- Mark the sectors where people are living.

Animals

- Which animals move through the site?
- Which ones can be a problem?
- Mark the animal paths or sector on the map.

Fire

- Is there a fire threat?
- When does it happen and from which direction?
- Mark the fire sector on the map.

View

- Is there a view you want to block out?
- Is there a beautiful view you want to see?
- Mark them on the sector map , and check against other sectors.

HOW TO USE OUR SECTOR INFORMATION FOR DESIGN

Sun angles

- Where do we need evergreen shade near the building?
- Where do we need deciduous shade near the building?
- Where do we need vines overhead? On the North and South sides.
- What can we place in the very shady areas?
- Have we planned for a solar cooker area?
- Where is a good place for a garden?
- Check that your building shade does not cause problems for neighbours of the garden.

Slope and aspect

- Do we need extra shading because we are on a west facing slope?
- Do we have windows on the north of the building to let in sunlight?
- Are there windows on the west we need to make reed screens for?

Slope and aspect continued.

- Do we need to make swales to prevent flooding?
- Do we need to move water away and around pit toilets, and houses?
- Where can we collect water in swales, pit beds and boomerangs to feed plants with water?
- Is our water harvesting going to help our neighbours?

Wind

- Where do we need to plant windbreaks? Check that the windbreaks also help with shading.
- Are we making use of any cool breezes to cool the house down?

Roads and infrastructure

- Do we need to block a noisy road?
- Can we harvest runoff water from the road? Where can we use this water?

Climate

- Are we planning to catch all the rainfall when it rains? How are we planning to catch it?
- Make sure your summer shading will also let the winter light in.
- If you have frost areas, only plant plants that can tolerate frost.
- Did you design for big storms or strong winds?

Water

- Check that your building is out of the flood line.
- If a seasonal stream flows near or past your site, can you make use of it? How can you make use of it?
- Do we need to worry about pollution in the water?

Pollution

- What can we do about pollution? Is it a local government process, or can we protect ourselves?
- Is there any waste that we can use to improve our buildings?
- Can we plant trees or hedges to prevent pollution affecting us? Or to catch dust to feed the trees.

People

- What opportunities can we see because of people passing by our site?
- How can we be creative and resolve issues of crime in our neighbourhood?

Animals

- Do we need to build or plant fences to deal with problem animals?
- Are there any animal manures we can use?
- If we plant trees and shrubs, can we attract birds to manure in our garden?
- Do we have enough diversity designed in to manage our pests?

Fire

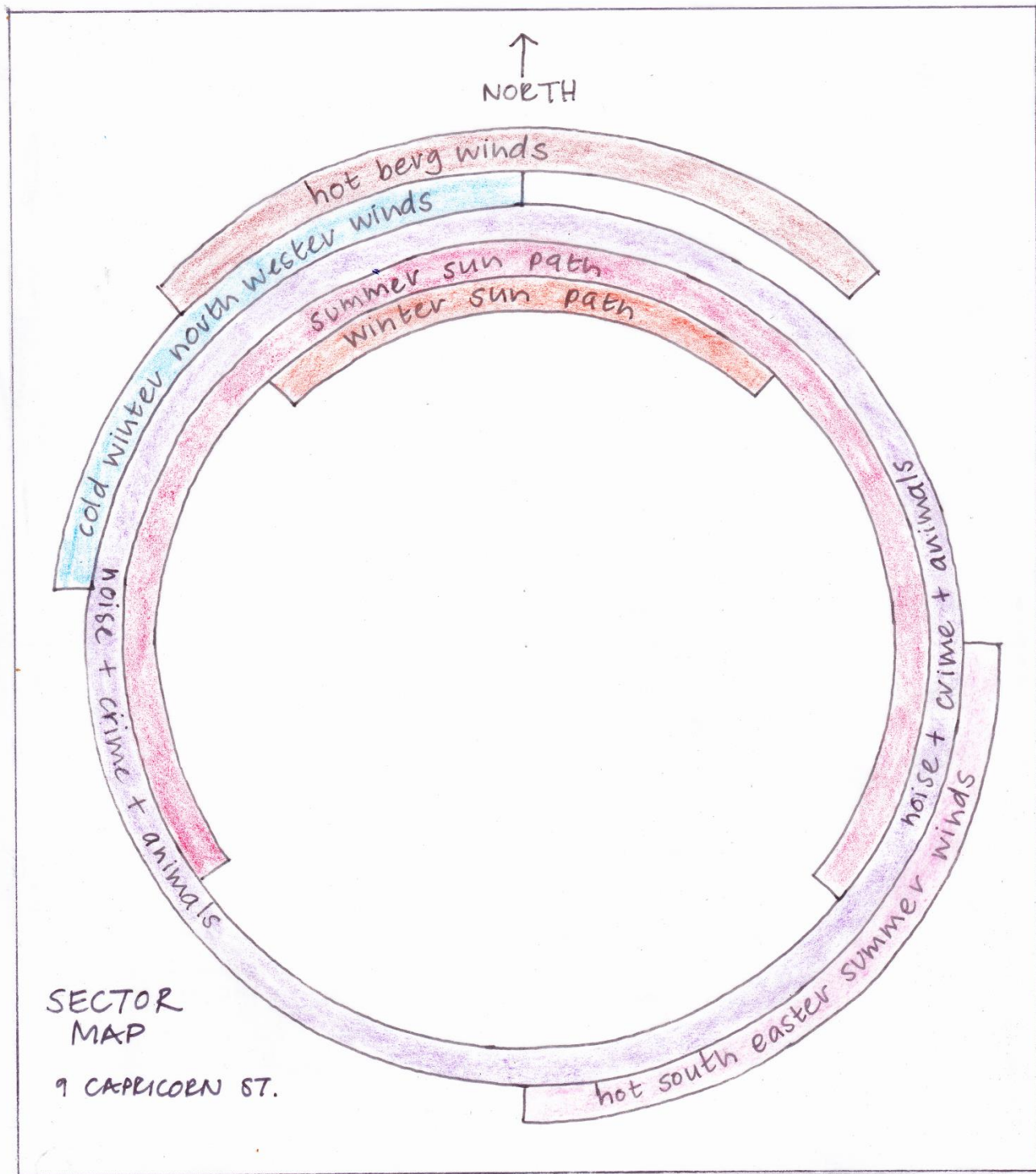
- Do we have a fire plan?
- If we are in an area of wild fires, has the fire department made a big firebreak around the settlement?
- Do we have fire safety practices in our homes? What do we do?

View

- If we screen a horrible view, we need to check for shading other parts of our site or plot.
- If we stay open for a view make sure that we are not inviting in the wind or too much sun.

Sector Map

Here is a basic sector map for a suburb in Cape Town. The sectors in Namibia will be different from place to place.



Zones

A zone describes an area of usage: for example an industrial zone is for industry and an agricultural zone is for growing crops.

Zoning our activities is all about being energy-efficient. Placing elements and functions in different zones is defined by how much energy they require. For example, something that requires daily work – such as feeding chickens, or emptying food scraps into a compost system, should not be so far from the house that the work is neglected. Similarly, something that only requires occasional maintenance, like a fruit tree, can be placed where it is not visited so much – like at the back of the house, or the other side of a property.

The following charts look in detail at the zones. Remember that the concept of Zones is a theory, and how the zones are arranged will be affected by sectors and other considerations. Most urban homesteads will only utilize Zones 0-2, and maybe 5, due to the size of the plots. Zones 3 and 4 are more applicable to larger land areas or rural homesteads.

ZONE 0: The home, This is the centre of human activity, where people live and work. Zone 0 consumes the most resources, but also provides the main source of work and knowledge.

ZONE 1: The home garden that produces the majority of our food needs. Small fruit species and quiet animals live here too, as well as household water management systems, home-scale waste and water recycling, and energy production.

ZONE 2: Orchards, food forests, poultry, main-crop beds, chickens, bees and other less intensive elements. Generally on an urban homestead, the Zone 2 is not very large.

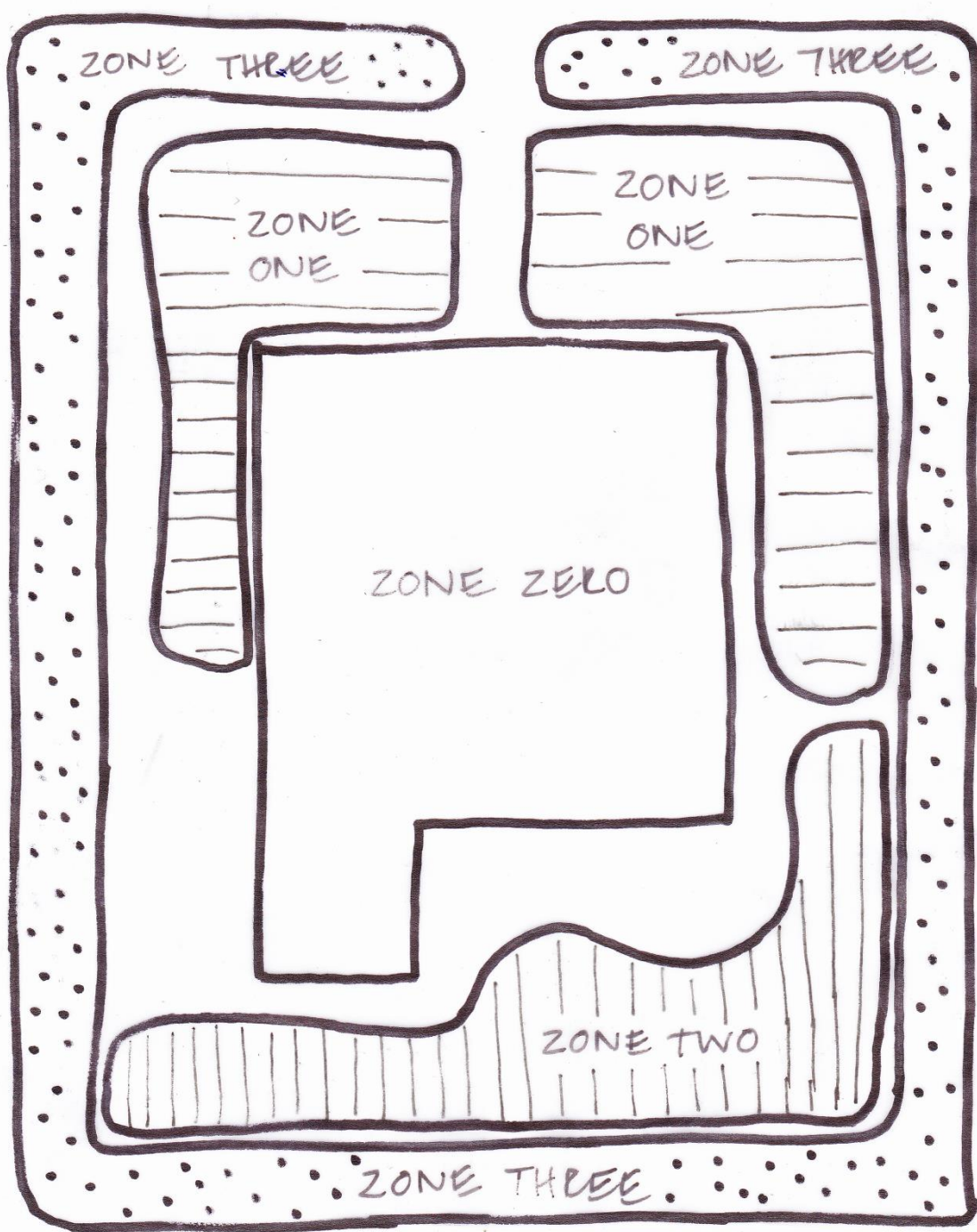
ZONE 3: Farming areas of field crops, large water storages, little-managed trees, windbreaks for zone 2.

ZONE 4: Fuel woods, pastures, foraging areas

ZONE 5: Wilderness areas where we learn our design lessons. Here we are visitors, not managers. If at all possible, it is a great deed to dedicate a small space, even a 1-cubic-metre area, on your urban plot to be a wild space. Plant an indigenous tree or shrub and then leave the area alone – witness what sprouts there, what birds arrive, what unplanned miracles occur.



ZONE MAP 9 CAPRICORN ST.



Elements

Once we know what our household needs are, and understand the local environment, we will have some ideas of the kinds of 'elements' we want to bring into the site, and which ones exist. An element is one part of your 'system', what we call the interaction of various parts of your site in order to make an effective whole.

Typical elements used in an urban space would be:

- the house,
- the vegetable garden,
- fruit trees,
- a greywater system,
- compost,
- rain tank,
- worm farm,
- chickens,
- there can be many others, depending on the size of your site

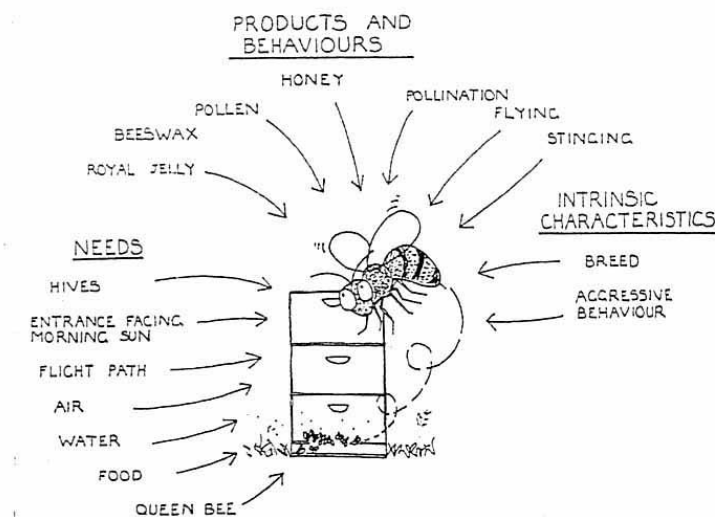
Input and Output analysis

In order to create a good design, we really need to understand each element (thing) we are going to put into the design so that we can link them in the best way.

All elements in a Permaculture have inputs (needs) and outputs (products), as well as characteristics.

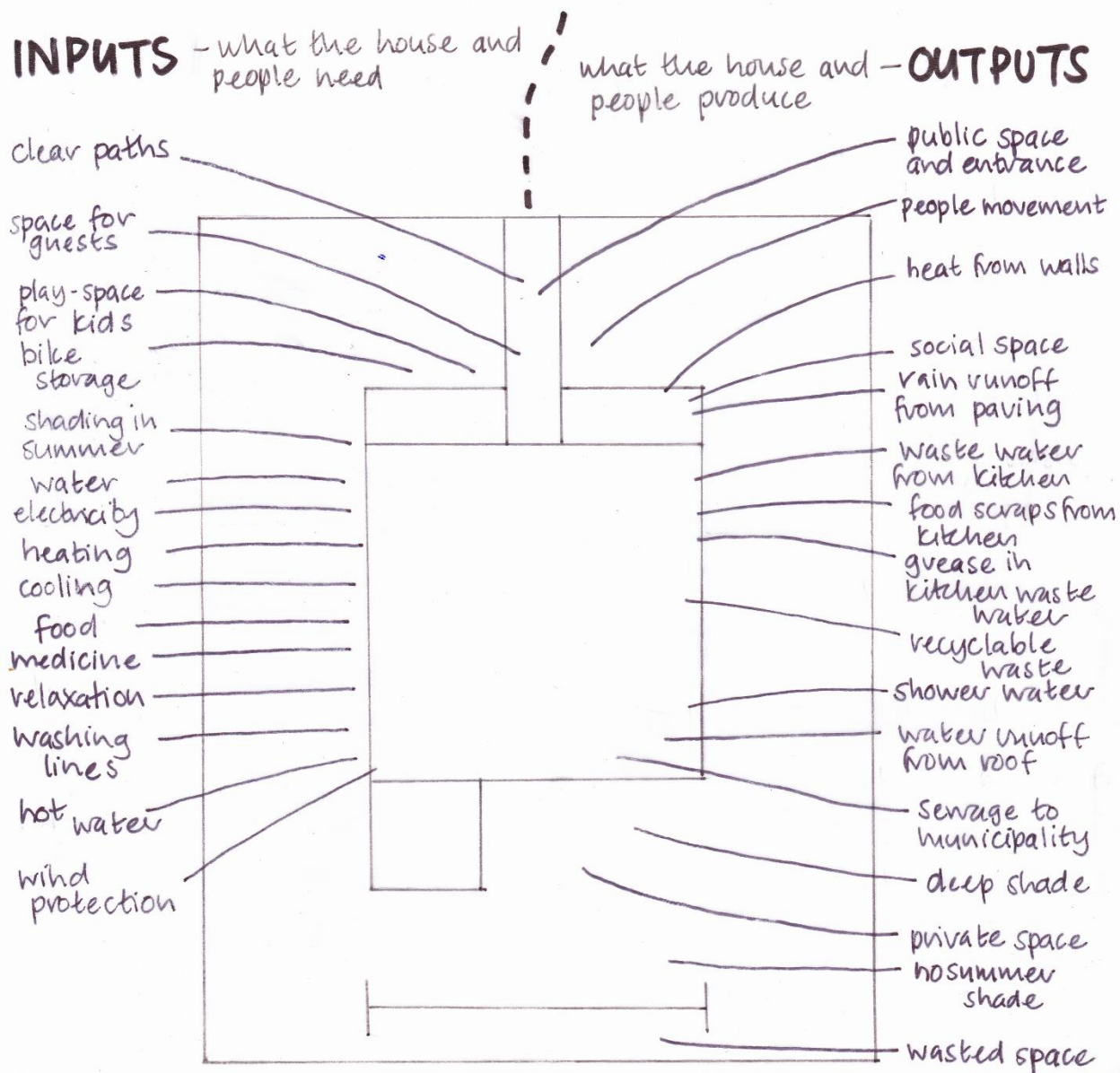
Once you have analysed each element in this way you can start to see which ones can support each other or use each other's products. You can also see whether their characteristics make them appropriate for placement in a particular area on your site. In this way you can place things wisely and so that elements work together so there are no wasted resources on your site, which can become pollution.

A simple example is the bee:



Now that we understand the bee a little better, we need to look at how we can support the needs of the bee through our systems, and how we can make the best use of its products in our systems. It's about making sure that the bee works in our web of life and that our web of life supports the bee.

The home as an element and it's Input and Output analysis



The more we can supply the needs of the house from the house site, the better. We may not be able, right now, to provide electricity and hot water, but we can meet many other needs:

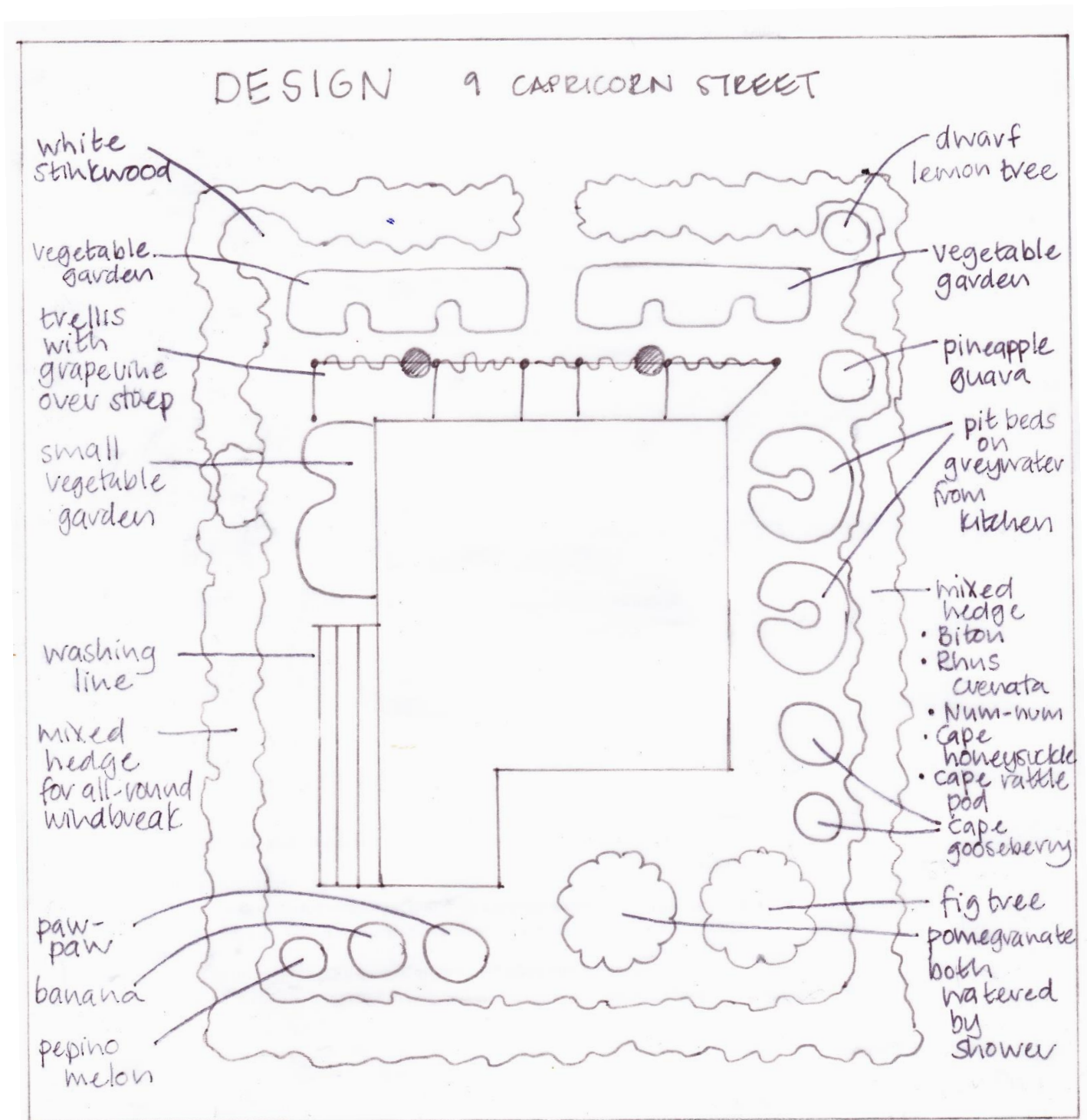
- We can grow some basic foods in the garden
- We can cool and shade the house with plants
- We can heat the house by opening up the North side for windows, and planting deciduous vines on the North
- We can lay out clear paths and clear spaces for people to be in
- We can create relaxation spaces for people

In terms of outputs:

- We can use all the grey water in gardens that feed people
- We can compost all the food waste in pit beds, worm farms and compost
- We can use shade where we need it
- Heat from walls can keep warm loving plants going through Winter
- We can recycle at home, and make things we need

Linkages

Once we understand the links between elements in our design it is quite simple to make a basic drawing of the design of our home site. The example below can give you some ideas. It is important to try and draw things at the right size on paper so that we can plan really well for our home design. It is also important to label the design elements. For example we can see that there is a link between kitchen waste and an earthworm farm; bath water and a garden system.



House design and retrofit tips

There are some basic rules which will help us keep our houses warm in winter and cool in summer.

Retrofit: Improvements made to an existing home in order to make it more efficient, eco-friendly and pleasant to live in.

Heating and cooling your house

Windows

The best source of free heat is called 'passive solar', meaning the warm sunlight that comes through the windows of your home in winter. To take advantage of this you must have windows on the sunny side of the house – generally North – so that winter sun can get in and warm up the house during the day. On winter evenings you will need to pull thick curtains closed to keep the warmth in. In summer you need to shade these sunny windows from the outside with a stoep, vines or external blinds.

Insulation

Insulation helps to regulate temperature in a house – it keeps heat in when it is cold outside, and also keeps the house cool when it is hot outside. In winter, most heat loss in a home is through the roof, especially if there is no ceiling or insulation. Insulating material is any kind of material that acts like a blanket and keeps heat in. A new product on the market is the green insulation material made from old plastic bottles, but there are many types of insulation you can use. The cardboard insulation we have learned about in the NIFTI programme is excellent.

Sealing cracks

If you have cracks around windows and doors, they can allow a lot of cold winter air into the house. Identify where you have areas that need to be sealed, and source non-toxic sealing materials to minimise cold breezes in winter. Sealing the house in summer also helps to keep cool air inside, and prevent hot air from entering.

Curtains

Closing your curtains after the winter sun has gone down will keep a lot of warmth inside the home. If you have really thick curtains they will retain the heat even better. Curtains also keep out any small cold winds that will get into your house and drop the interior temperatures.

Outside blinds

In summer it is more efficient to keep heat off the windows by having blinds on the outside of the windows. These can be simply made from tying together reeds in a simple screen, or even hanging a thick fabric outside the window to keep summer heat out – especially on any western windows that are not shaded.

Sand snakes

Any gaps under doors let the cold winter wind and the hot South-Easter in. If we seal these kinds of gaps with a long sausage shaped fabric and place it at the bottom of the door, we can retain the right kinds of temperatures in our homes. You can even decorate them – some people like to make sausage dogs!

Cooling

Observe where the cool side of your house is – it will usually be the East or South side. If you have a window on that side - open it to take in cooling breezes, and allow the breeze to move through the house and escape on the hot side – usually the North or West side. If you are able, plant a grape vine on the

North side as this will also cool the house from hot summer sun, and in winter, the grape will lose its leaves, allowing the warming sun into the house.

Fridges

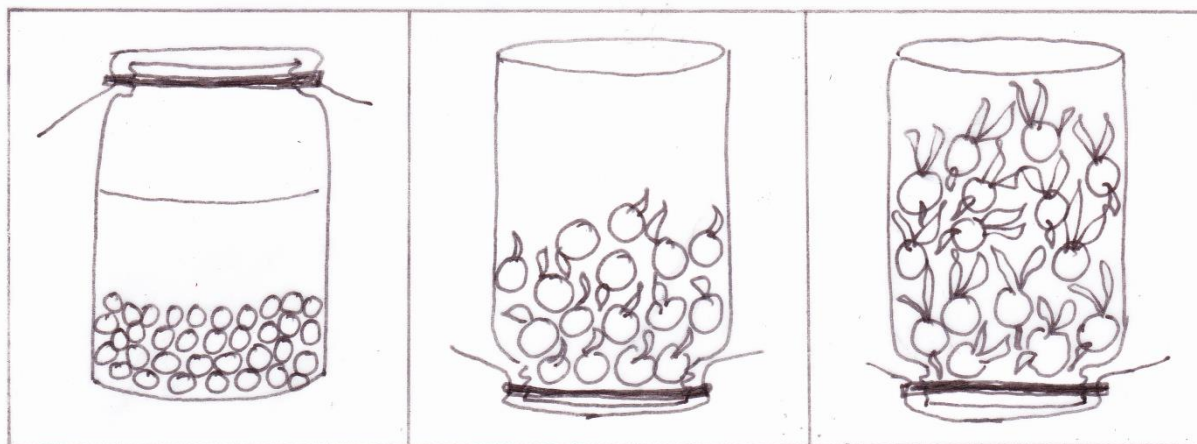
An empty fridge takes a lot of electricity to keep cool, so one trick is to fill your fridge with bottles of water so that it is easier for the fridge to keep food cool. Also cold air is heavy every time the fridge door is opened the cold air falls out, and the fridge has to use electricity to cool down again. You can also make sure that your fridge is not set on too cold a setting as this can also consume electricity. If the seal on the fridge door does not work properly, you will also be wasting electricity. Some refrigeration companies can replace fridge seals at a reasonable price. Cooling your house also helps fridges to work better, as a hot interior will force the fridge to work harder to cool down.

Cooking

We use a lot of electricity and energy to cook food – here are a few tips on saving energy in the home as well as time.

Sprouting

If we don't have a lot of garden space we can actually grow food in our kitchens by sprouting the seeds of lentils, alfalfa (Lucerne), and fenugreek, for example. Sprouts are very high value foods and can help to boost our diets incredibly. Eat them in salads, as a snack alone, or sprinkle them over cooked food. The diagrams below explain how to go about it.



Soak about half a cup of seeds overnight in clean water, in a big glass jar. Cover the mouth of the glass jar with a stocking, netting or any fabric that will allow water to drain out. Fasten the netting on to the neck of the bottle with an elastic or string. Make sure the jar is standing in a shady place in your kitchen.

Rinse the sprouts with clean water the next morning and pour out the water. Turn the bottle upside down on the draining board, and make sure that the netting is firmly secured. Rinse the sprouts again in the evening, or they may become bitter. Do this every day for about three days.

After about three or more days your sprouts should have small roots and leaves developing. They are perfect to eat now. You may find they take a bit longer in winter as it is cool and the sprouts will develop slowly. In summer you may have to rinse your sprouts three times a day as it is hotter and the sprouts can go off more easily.

The Hot Box

A hot box or Wonder Box is becoming more popular again as it saves up to 75% of the electricity, wood or gas you would use for cooking. A hot box is made by sewing two large cushions, or a shaped fabric box which is filled with some kind of insulating material – polystyrene bubbles, sawdust, pillow stuffing or even shredded newspaper.

If you are cooking rice, potatoes, soups, stews, porridge or curries:

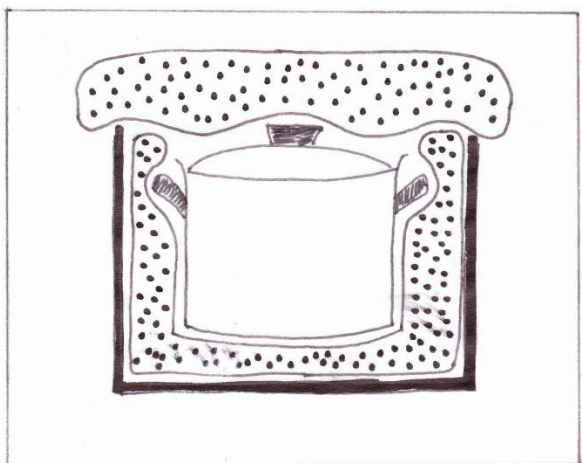
1. prepare the food as you normally would, and let it boil for 10 minutes with the lid on.
2. Once the food has boiled for 10 minutes, quickly transfer it to the hot box, put the lid of the box on and make sure that none of the pot is exposed to the outside. If you do not have a hot box, you can wrap the pot of food in a thick blanket, or even jerseys! It is a good idea to put an old cloth in the bottom of the hotbox so that a dirty pot does not soil the hotbox fabric.
3. Let the food stand for as long as it would normally have taken to cook, and wait another 30 minutes before opening it. Your dish should still be almost boiling hot and ready to eat!

Even beans or samp and beans, which have been soaked overnight and brought to the boil, can be cooked in a hotbox. With beans you may need to do a second round of bringing it to the boil and putting it back in the hotbox. Let the beans stand in the hot box for about two hours. Then take the pot out, bring it to the boil for another 10 minutes and put it back in the hotbox.

Not only does a Hot Box save you electricity, but you also never burn food again. You can also use the Hot Box technique to get dinner going in the afternoon, and if you leave the food in till supper time it will still be very hot and ready to serve.

You can also use the hot box to keep chilled food cold, if you do not have enough space in your fridge.

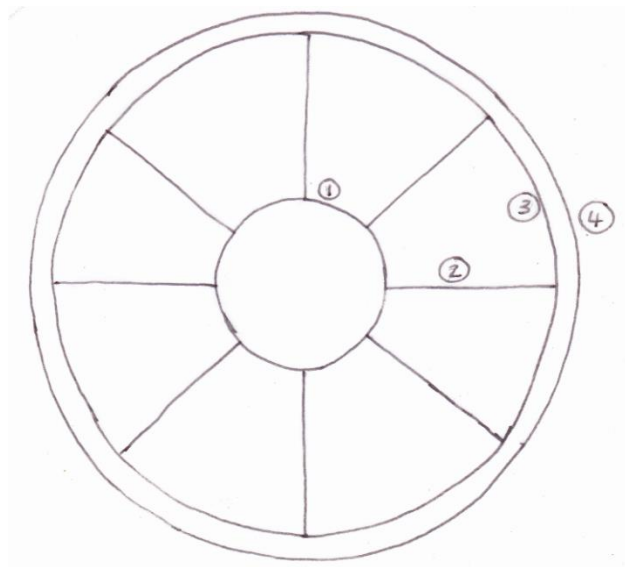
Just a note: Do not leave food for longer than 6 hours in the hot box as it will start to go rotten.



Here is an example of a hot box made from a cardboard box. It has been lined with an old blanket that the pot fits into. The lid is made from another piece of blanket or even pillow, which keeps the heat in.

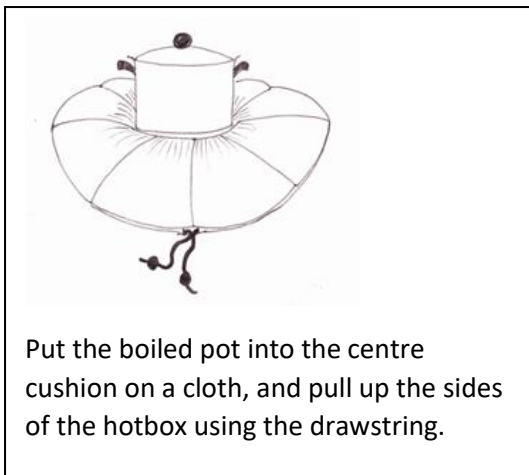
To make your own hotbox:

1. You will need two pieces of fabric about 1m by 1m in size. Another two pieces of fabric about 40cm long and wide will make up the lid. You will also need to stuff the hotbox with insulating materials: you can use sawdust, straw, cotton waste, an old blanket, for example.
2. Mark the fabric out as follows: a centre circle about 30cm in diameter (1). Around the centre circle mark a second circle another 30 cm away from the first (3). Finally mark the outer circle another 5cm away from the last one.(4)
3. Divide the circle into 8 'slices'.(2)

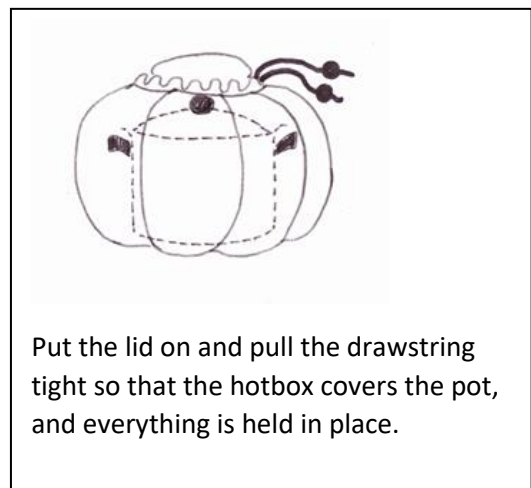


Now stitch circle marked 1, leaving one small side open to push the stuffing in. Once you have stuffed circle 1, stitch it closed. Don't put too much stuffing in or it will be difficult to sew. Then sew all the lines radiating out of the circle, (2) but only up to the line next to 3, as you will need to make a seam for a drawstring here. Stuff each portion, and then stitch closed on line 3. Stitch the final seam on line 4, leaving a small space to thread a drawstring through. You can now use your hotbox.

Now stitch another circle for the lid and stuff it too. The diagrams below show you how to use the hotbox once it is made.



Put the boiled pot into the centre cushion on a cloth, and pull up the sides of the hotbox using the drawstring.



Put the lid on and pull the drawstring tight so that the hotbox covers the pot, and everything is held in place.

It's a good idea to put a cloth in the bottom of the hotbox so that the fabric stays clean.

If you are cooking on a rocket stove, you will want to put newspaper in the bottom of the Wonderbox so that the black soot from the fire does not dirty the hotbox.

Cooking

A solar oven is basically an insulated box with a glass lid. This box is designed to collect heat from the sunshine and trap it inside so that the oven effect is created. You can boil water, cook stews, soups, bake bread, roast meat and even make slow cooked pizzas in a solar oven. It just takes a little longer than a normal oven, and you do need to move the cooker every half an hour so it is continually facing towards the sun.



Steaming food

When we boil vegetables in water, we often lose a lot of the nutrition into the water, which we throw out. If you have a steel colander, or even a Chinese bamboo steamer, or even a flour sieve you can easily steam vegetables on top of another meal which is cooking. Vegetables which steam easily are carrots, sliced butternuts, beetroot, sweet potato, cauliflower, broccoli and many more. Steaming also takes less time than cooking because the steam cooks the vegetables at a much higher temperature than boiling water.

Flasks for boiled water

A huge consumer of electricity is the kettle we use for boiling water. A really simple way of saving power is to fill a thermos flask or two with boiled water in the mornings so that people do not keep switching the kettle on every time they need hot water for tea or coffee.

Using firewood

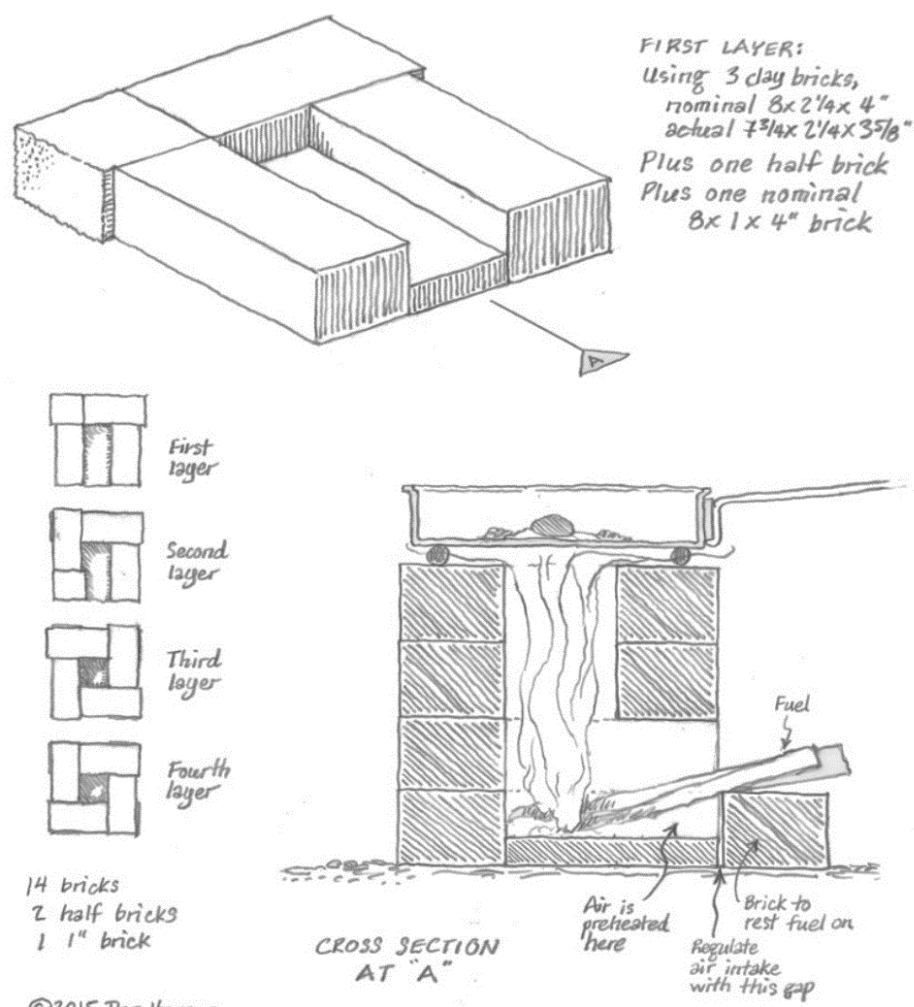
Some households still use firewood for cooking, and it takes an enormous amount of time to collect firewood from the edges of the city. If we cook on open fires, or even in woodstoves in the house, they consume a lot of firewood. However, the use of invasive alien species like *Prosopis* for firewood is a good thing, as it reduces the number of invasive alien plants. If we find that we are harvesting indigenous woods for firewood, and causing deforestation, we need to make a serious plan to grow firewood on the edges of cities, and in large vacant lands within the city. If we use efficient woodstoves, we need grow only thin firewood, which renews itself easily. This however is a whole topic on itself, and will need to be taken up as policy if we are serious about self-sufficiency.

Rocket Stove

The diagram of the rocket stove shows us how to quickly build a very efficient wood stove for cooking. The great thing about the rocket stove designs is that they burn the firewood, and then re-burn the smoke. This means we get a much hotter fire for much less wood. It also means we can burn really thin bits of wood in the stove, and then prevent the cutting down of really big and old trees.

This kind of technology also needs to be supported by growing firewood for our own needs, rather than cutting down older trees because we need the wood.

There are many trees that grow back quickly when they have been pruned, and will provide us with the wood we need for stoves like these.



There are thousands of designs for rocket stoves, rocket ovens and rocket heaters. You can safely build some of the designs into your home for cooking and heating your house.

This website has some ideas, and there are many other websites that have technical design information.

<https://homesthetics.net/rocket-stove-plans>

Water management

Here are a few water management principles that can help us to manage our precious water resources better.

PROTECT water at the HIGHEST POINT of source.

SLOW down any water moving downhill, so that it does not cause erosion

SPREAD water to where it can be used

SINK water into the ground where it can feed plants, and heal the soil through plant cover.

SAVE water in any way you can

REDUCE your water consumption

RE-USE water wherever you can.

RECYCLE water where you can

Plan for DISASTERS – floods or droughts -- too much water or too little

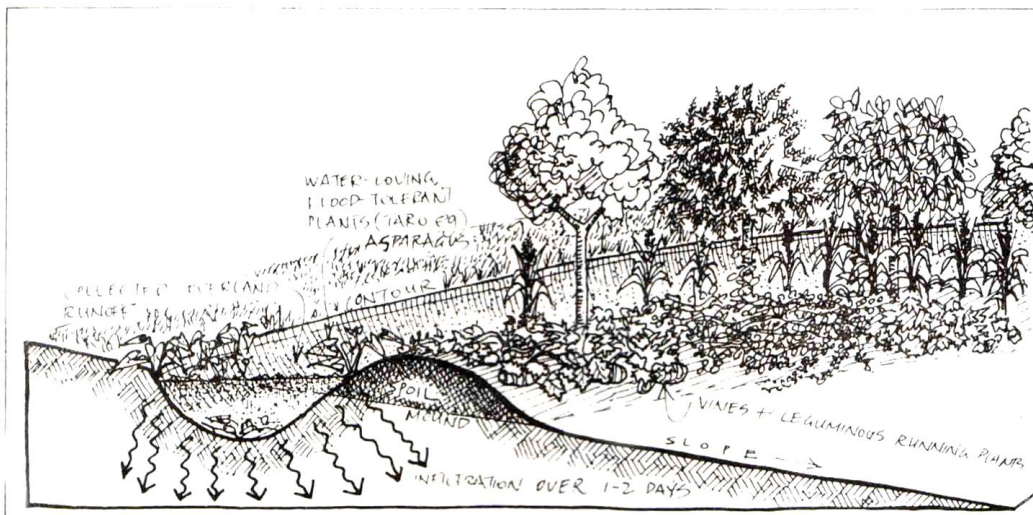
SWALES

These contour ditches are often used to catch and spread runoff water in the landscape.

When we mark out swales, we work on contour, which means that we mark a level line on which we can dig a ditch to catch water. All the soil from the ditch goes on to the downhill side of the ditch to create a “dam” wall to stop water from overflowing. This ditch then allows water to sink into the soil, feeding trees, plants and the groundwater table. We have all seen how important the groundwater table is in dry areas – many people rely on borehole water to survive.

Once the swales are laid out and dug, we plant them up with suitable tree, shrub and groundcover species.

Have a look at the illustrations to get an idea of this.



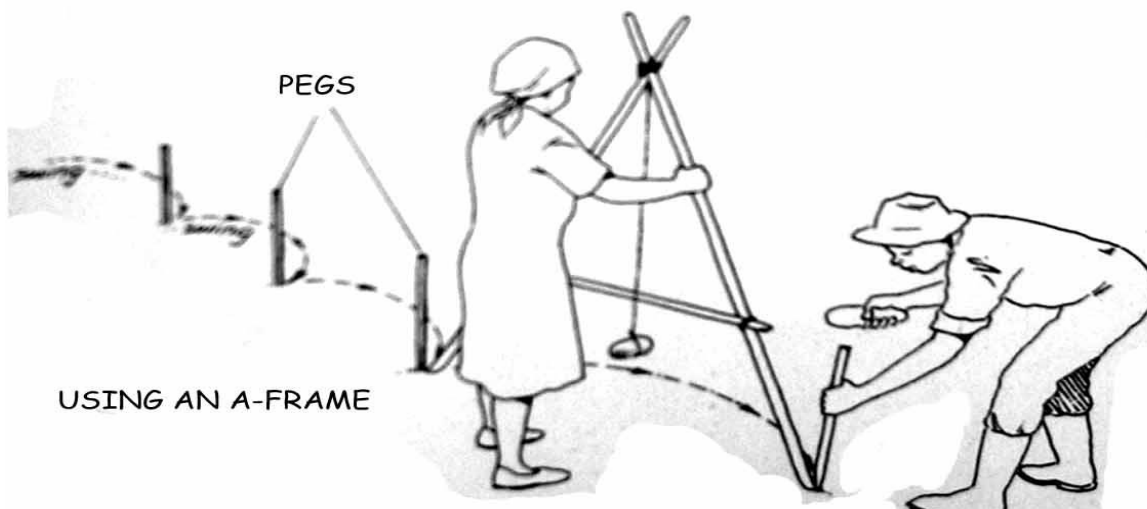
Swales on contour do not flow; they first stop and then absorb overland water flow. Swales are planted with trees or shrubs on the mound side.

A Frame

The A frame is a simple instrument which needs three 2metre poles, good string and a weight like a stone or a short piece of metal piping. We will build some A frames and calibrate them on this course, and then use them to measure out contours for swales, and also to ensure that all the planting spaces we work with are level.



MAKING AN A-FRAME



USING AN A-FRAME

Saving water in the home and garden

Install rain tanks off the gutters on your house. If you cannot afford rain tanks, collect large barrels from industry to store water in, but make sure they are cleaned well before you use the water in them.

Put a brick in your toilet to decrease the amount of water flushed.

Leave urine in the toilet bowl and only flush faeces away.

Or, collect urine to use in your compost heaps.

Use the bath water or hand basin water to flush the toilet.

Install a low flow shower to use instead of taking baths.

Collect shower water in a tub and water the garden with it.

Fix all the leaky taps or toilets in your house and yard.

Use greywater to irrigate your gardens – an interesting fact is that most homes produce enough water from their showers, kitchens, hand basins and washing machines to fully water their gardens. This means that you can garden with almost no extra cost to your household.

Grey water systems

Grey water is water that comes from kitchen sinks, laundry or bathing. It may contain small amounts of soap, debris, dirt or food bits. If you are *not* using strong chemicals in your kitchen or bathroom, you can safely use this water to irrigate your garden. Strong chemicals would be Ammonia, Jik or any other bleach, Handy Andy and any anti-bacterial products.

Bathwater is the safest to use, followed by laundry water, and finally kitchen sink water. Never store grey water for more than 12 hours, and never spray grey water in to the air. In fact if you are piping grey water to your garden, make sure it emerges under mulch. You can safely put grey water into the middle of your pit bed using a bucket – just do not put it directly on to the vegetables. If you cook with a lot of oil or cook a lot of meat you will need to put some kind of grease trap on the kitchen outlet. You can keep this very simple by using a small wire basket with a thick layer of dry grass and leaves, which will catch the fats. This basket can emptied once a week into your pit beds filled with worms.

Do not use grey water on root crops like potatoes, carrots or beetroot. Stake up vegetables growing on greywater, so that the part that you will be eating, does not come into direct contact with the grey water.

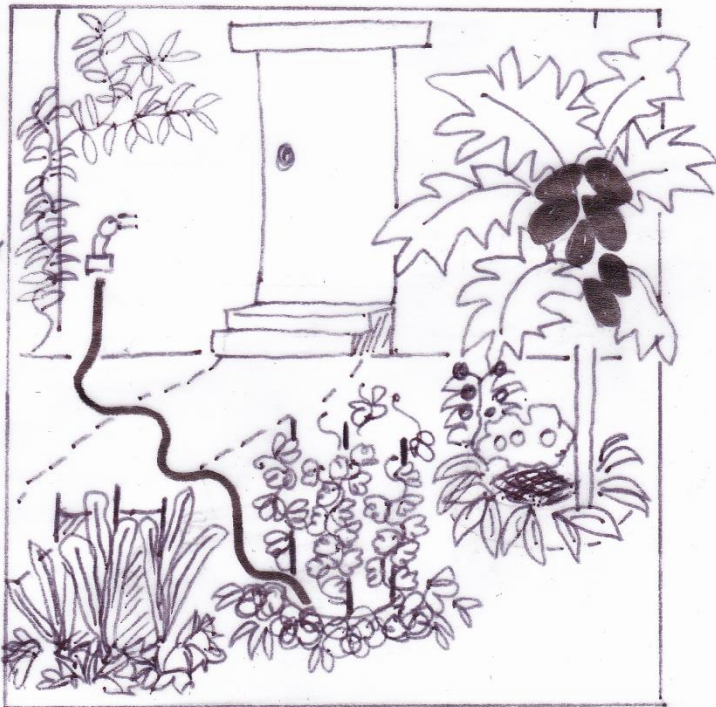
When NOT to use greywater:

- If you have a layer of clay close to the soil surface which does not allow water to drain away.
- If you use Jik or any strong cleaner like Handy Andy - rather dispose of this kind of water down the toilet. These chemicals will kill soil life in the garden.
- If you have a very high water table – ie the soil in the wet season is like a lake!



Simple systems can be set up from basin outlets in the house:

The white plumbing pipes are usually 32mm in diameter. It is simple to get 32mm fittings from an agricultural store, with parts that couple the pipes. Black irrigation pipe is cheap and can be bought by the metre. So you can just measure the distance between the outlet and the trees or pit beds you would like to lead the water to, in order to install the new system. Make sure to clamp the pipes so that they do not fall off. If you have enough height above the garden from the outlet, you could reduce the pipes to 20mm, if there is not a lot of foodstuff in the water. Here the greywater is going to a fruit tree pit with herbs.



In this sketch, the greywater outlet has been connected to a flexible 20mm garden hose so that you can move the pipe to different pit beds. The pipe may be connected to the kitchen basin, and you can water a different pit bed every day.

Here we have a pit bed with paw-paws, gooseberries, comfrey and yarrow.

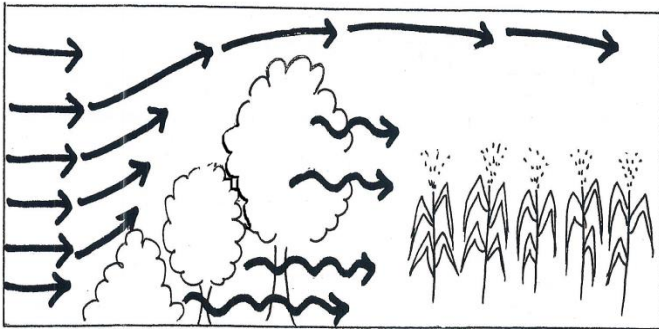
The second pit bed is growing peas and lettuce.

The last pit bed is growing spinach and coriander.

Notice the creeper growing on the walls of the house.

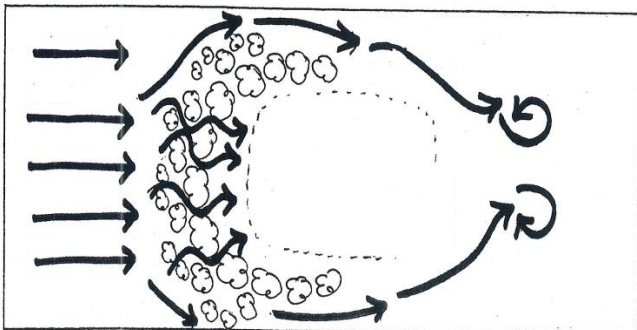
Wind and windbreaks

The harsh winds are a major sector to plan for on the Cape Flats. The diagrams below explain the best shapes for windbreaks around our homes and gardens. Remember that a solid wall will cause more wind problems than a windbreak which allows some wind through. Another thing to remember is that your windbreaks should be managed so that they don't shade your gardens too much in winter.



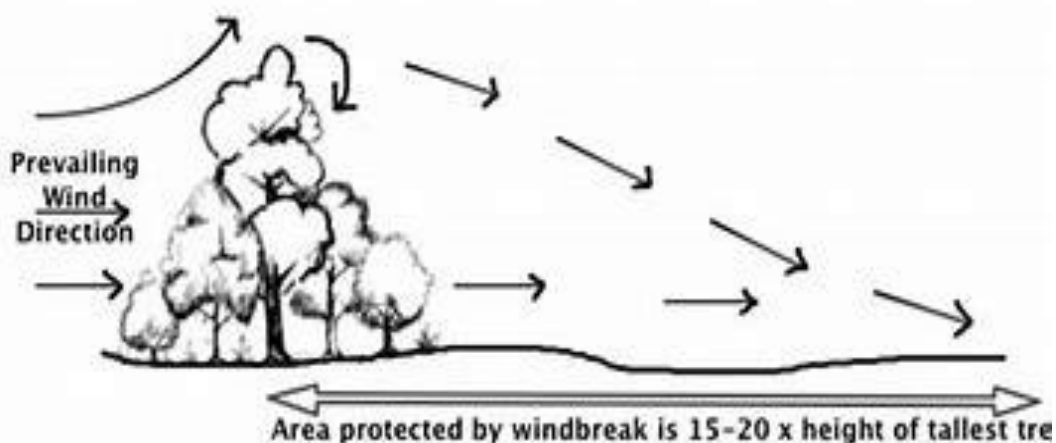
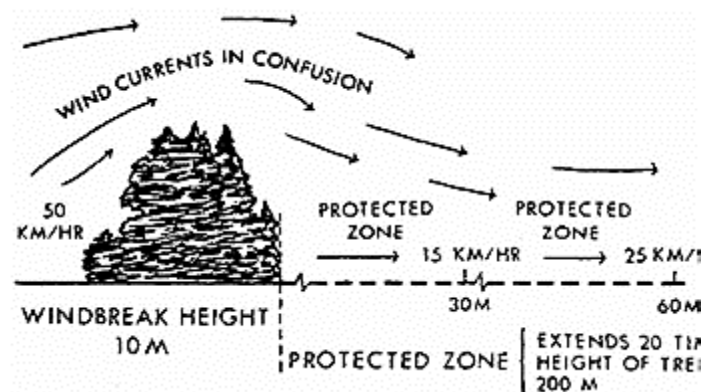
The small, medium and large windbreak shrubs create a ramp shape which lifts the wind over the garden. Only a mild breeze will filter through the hedge created.

Windbreaks also become habitats for birds and animals that eat problem insects in the garden. You can also plant some tough medicinal shrubs in the windbreaks, which will be useful to humans and their strong smells will repel some pests.



A bird's eye view of the windbreaks and gardens also show us that we need to use curved shapes around gardens rather than a straight line blocking wind. You can see how the curved shape leads the wind around the edges of the garden.

At a certain point, the wind starts to spiral back - this would be the space for the next windbreak.



EARTH

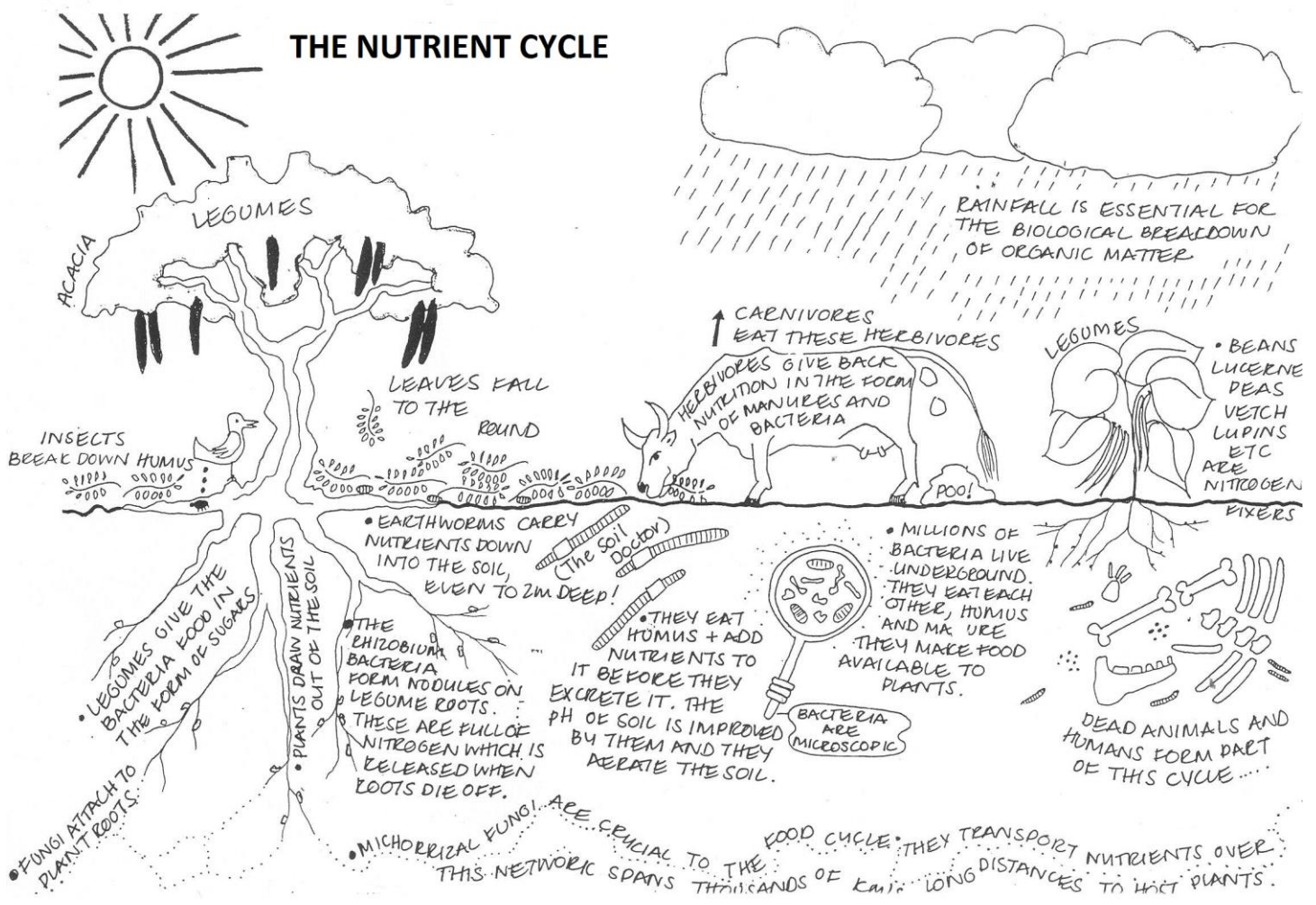
Soil

Most of the soils we will work with will be damaged by human activity. If we are going to survive we have to rebuild soils. Something people do not realise is that we can store more carbon in the soil than anywhere else, and that this can help combat climate change.

So we will need to improve the soils in a number of ways – the main aim being to get as much rotted or dead plant matter into the soils to hold water and make nutrients available to plants. Sandy soils are very low in nutrients, so you will have to use a number of methods to improve your soil fertility. Some people describe organic farming as farming soil, not plants!

Living soils

One of the best ways we have of improving soils is to work with and encourage the living creatures in our soils that build soil and improve plant nutrition. We make use of natural cycles to improve our soils. The diagram below explains some of the role players that maintain soil fertility.



Our free soil helpers

Bacteria

Bacteria are microscopic creatures that also live in the soil. Some bacteria eat and process dead plant and animal matter, other bacteria eat bacteria – all of them produce a form of ‘compost’ which can then feed plants.

An important category of bacteria live on the roots systems of legumes. Legumes are any plants in the Pea family. These plants include peas, beans, broad beans, fenugreek, and legume shrubs as well as tree legumes like thorn trees (Acacia), Faidherbia and Acacia.

The Rhizobium bacteria that live on the roots of legumes are bacteria that cannot ‘eat’ food, so they attach to the legume roots, so that they can get sugar from the plants themselves. The colonies of bacteria then concentrate Nitrogen in small lumps on the plant roots. When the plant roots die back this Nitrogen is available to other plants to use.

Nitrogen is a plant nutrient that promotes good growth in plants.

Fungi

Mushrooms are fungi – and the ones we are especially interested in for gardening are the fungi that attach to plant roots. These fungi have the ability to move nutrients around in the soils to where they are needed. They are similar to the Rhizobium bacteria (discussed above) in that they also receive sugars as food from the plants they are attached to. Other fungi break down dead plant matter and we can see them in soils with good mulch – the whitish mould on leaves is part of the fungal body.

Earthworms

There are two main types of earthworms – those that eat and process soil, and those that eat and process dead matter. Both earthworms are very important in soil fertility as they improve the nutrients in the soil, and also help soil to bind better, as well as making small tunnels which allow air and water to move through the soil. In short, worms are great for our soil, and when you see worms it is a sign of healthy soil, so please let them do their work!

In situations where we have waste food coming out of our kitchens, the red wiggler earthworm is an excellent way of turning waste into plant food. We will look at a number of ways of using earthworms in our gardens.

All of these organisms need BIOMASS and moist conditions to survive. Biomass is living plant materials that we cut and use green or dry.

Mulch and Biomass

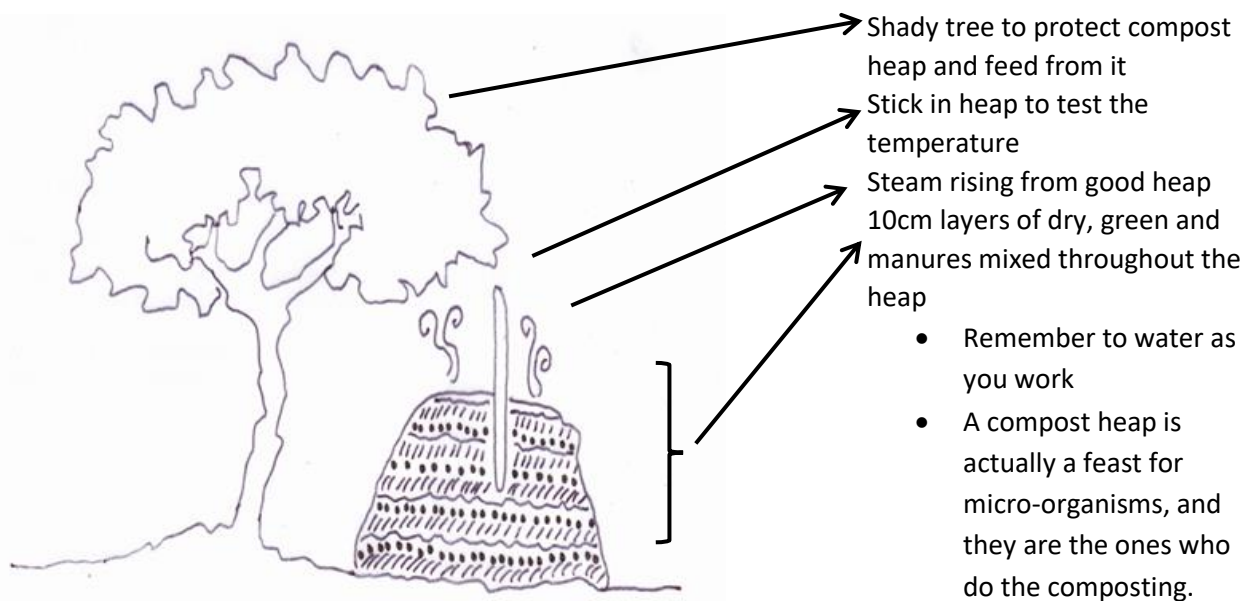
Mulch is dry plant matter that we put in a thick layer on the ground around our plants. It does many things:

- Protects the soil from hard rain and compaction
- Keeps the soil cool in summer and warm in winter
- Prevents soil water from evaporating
- Stops weeds from growing
- Feeds the soil organisms that make plant food

Composting

A hot compost heap is a good way of processing a lot of garden waste, manures and dry plants in one session. To make a good compost heap you need to collect a lot of composting materials – about 12 wheelbarrows full. You will need about 4 barrow of fresh manures and green plants, and about 8 barrows of dried plant material – preferably not woody material. In urban spaces this could be challenging if you do not have the space to make a conpost heap, or the transport to collect all the materials. If you can do this, follow the simple diagram below for making compost.

Making compost is a bit like making a cake: you need the correct ingredients, and you need to layer them correctly. After you have made the heap, it heats up after 24 to 48 hours – a bit like baking. You will need to turn your heap and mix all the ingredients well – every week for about four weeks. Keep it moist by watering it as you turn. In summer you may need to give it extra water and in winter you may need to cover it with plastic from the rain.



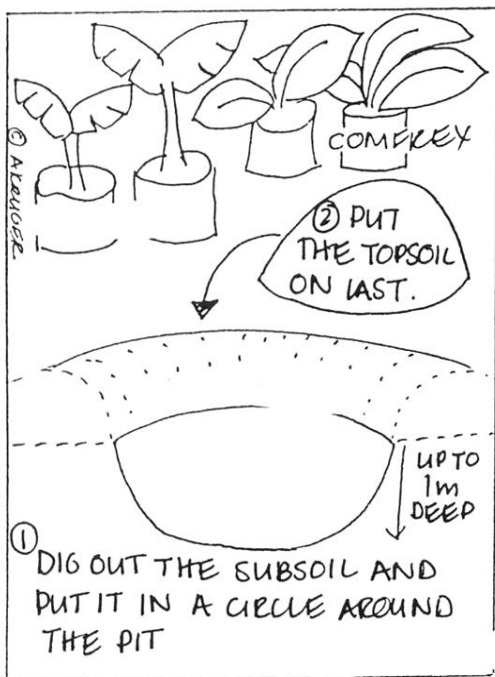
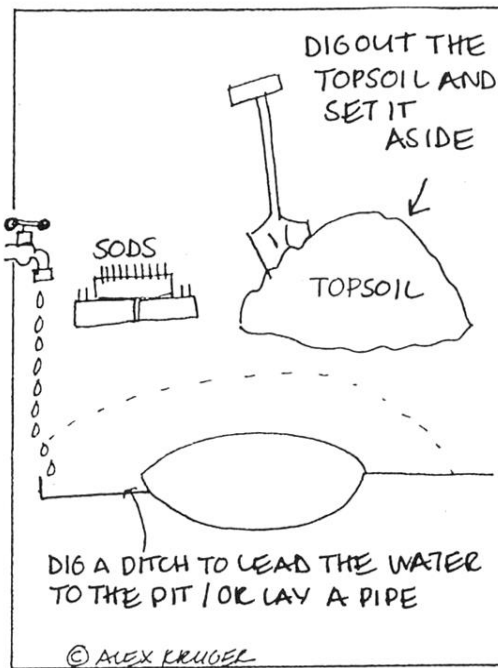
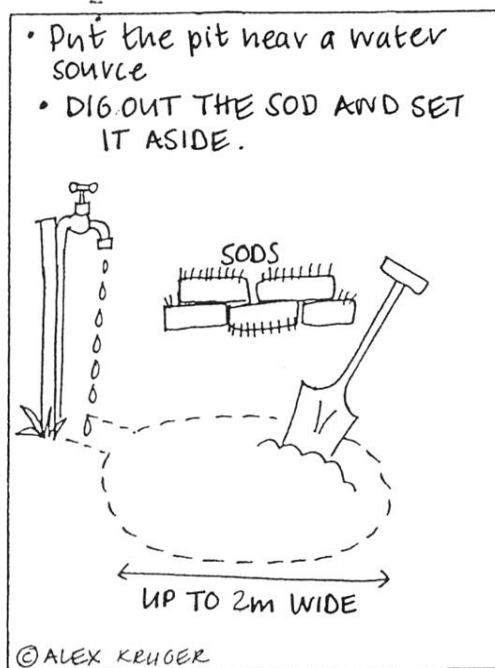
If you cannot collect enough for a big heap, remember that you can use Bokashi (from the Agri shop) to break down kitchen waste and put it into your container gardens.

You can also use the LAB spray and IMO3 to help break down the waste faster.

If you have good relations with neighbours, you could all collect materials for a communal heap that you share out once it has become rich, dark compost.

Pit beds

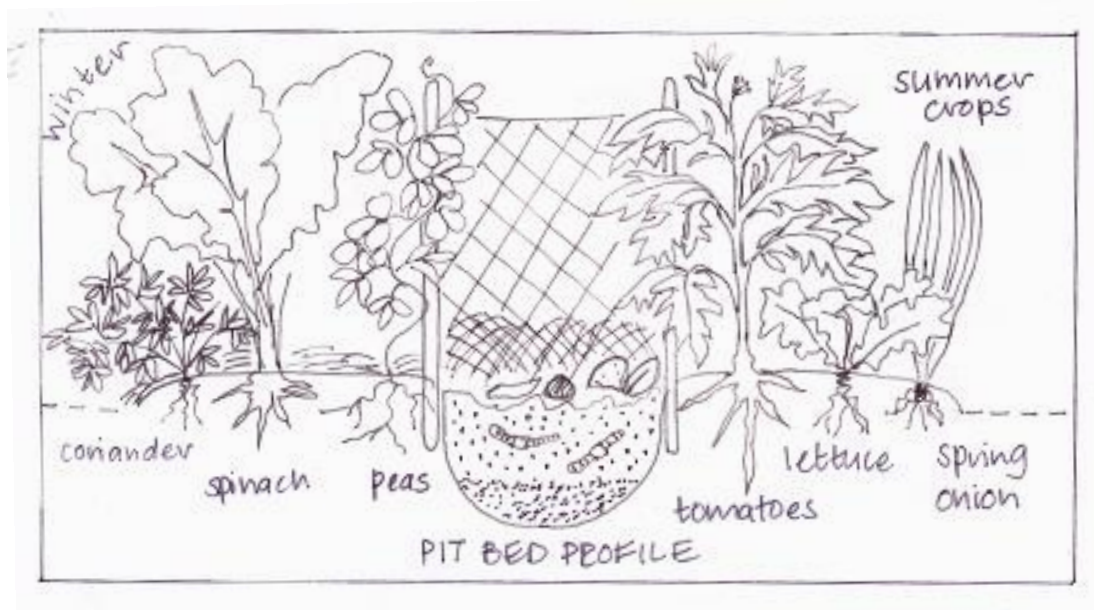
If you are producing small but daily amounts of food waste, and grey water, the pit bed is an ideal way to combine cool composting and your food garden. The diagram explains how to make a pit bed.



In sandy soil, we will probably only dig the pits out to about 50 cm deep so that the water contained in them is easily accessed by plant roots. If you are making a food garden pit bed it will be 2 metres wide in total. However if you are making a big fruit pit bed, it will be up to 3 metres wide.

Below is a diagram showing what the pit bed will look like from the side, including the areas below the soil surface.

The diagram also has suggestions of both winter (on the left) and summer (on the right) crops.



The pit part of the bed is rich in cool compost and water, and your vegetable roots will grow towards the pit. You can also put up a circular trellis made from reeds, sticks or chicken wire around the pit so that peas and tomatoes can grow close to the centre. Plants that need fewer nutrients can be grown towards the edge of the bed. You will need to water the outer part of the pit bed. Another thing you can do is to put red wiggler earthworms into the pit – they will decompose the waste matter faster, and improve the nutritional value of the matter in the pit. This is also an easy way to produce earthworms and you do not have to worry about them starving if you go away for a few days.

You can also empty out the compost from the bottom layers of the pit twice a year and apply it to the soil surface before you plant your next season's crops.

Make sure that pets do not scavenge in the pit beds – they will damage your gardens.

Working with Nature

We are able to breed the microorganisms shown in the Nutrient Cycle diagram, using very simple ingredients. You must stay focused on the process as the timing is very important.

When we multiply the natural organisms, we can bring them into our garden systems to work for us. And we will need to make sure that our gardens are well mulched to keep the organisms working for us. A wonderful thing is that once we have the local organisms in our systems, they will connect to the wild areas around our gardens, or agriculture, and bring nutrients from Nature to areas that need it in our gardens.

This excellent website has many different natural farming recipes you can easily make and use in your home gardens or agriculture: www.cgnfindia.com - just follow the tabs to find the recipes you want.

Indigenous Micro-organism breeding.

These recipes will help us to make really good compost, and also decompose all kinds of organic materials really fast.

The incredible thing about these recipes is that you start with very little material and multiply some of it by 1000, which means that a little goes a really long way.

Indigenous Micro Organisms (IMOs)

IMO 1: Step 1: catching and multiplying organisms on cooked rice

1 kg rice

1,5 – 2 kg brown sugar

Two 5 litre buckets

Clean cloth

Elastic bands or string

Deep mulch (leaf mould) from under trees – look for the white fungal threads.

1. Cook the rice as usual. Make sure you drain it very well as you want a lot of space between the rice grains. Too much water will cause this process to go rotten.
2. Put the cooled-down rice into a very clean plastic bucket. If you have a clean clay pot, or a clean wooden box, you can use that too. Mix the mulch well into the rice. Put the cloth over the opening of the container and tie the cover on tightly. Let this stand in a dark, warm place for 3 to 6 days.

Step 2: Colonised rice and sugar (IMO2)

1. You are ready for step two when all the rice has been covered with white moulds, and is almost held together by the moulds. The rice is now colonised by the micro-organisms. It should smell like beautiful soil and mushrooms.
(If there are any sour smells, throw the mix in the compost heap and start from Step 1)
2. Weigh the rice, and add the same weight of brown sugar to the rice, and mix very well. If you can pack this into a glass jar or jars, or a clay pot, it is even better. So for every kg of rice, 1 kg brown sugar.
3. Cover the opening of the container with a clean cloth and tie it on very tightly. Put it in a cool dark place.
4. The sugar is going to keep this whole mix stable, so that it cannot go rotten.
5. Wait 7 days before using this mixture as it needs to ferment.
6. Whatever you do not use, will keep for a year in the container as long as the sugar syrup covers the rice.

Step 3: Add to Bran (to make a mixture that will last for a year.) (IMO3)

You will need 20kg of wheat/oats/rice bran

10 litres of water

100ml of IMO 2

A patch of clean soil, protected from rain.

A sack of clean, dry grass or leaves

1. Mix the IMO 2 and 10 litres of water together, and add to the bran. Mix and mix and mix until the water is evenly spread through the bran. You should be able to pick up a handful of the bran,

squeeze it, and it should hold its shape. No liquid should run out. When you drop it, it should fall apart again.

2. Make a pile or layer of the bran mixture about 30 cm high, and as wide as it needs to be on the clean soil.
3. Cover the layer with dry grass or leaves to keep the sun off it.
4. In two days, pull off the grass or leaves and turn the layer. You are making sure that the heap does not get too hot.
5. Repeat this 3 times and by the 7th day you should have white fungus covering all of the bran mixture.
6. You can now store this mixture in a cloth bag, in a cool and dark space.

IMO3 can be used for the following:

- Mix 1 part IMO 3 to 20 parts fresh manure, slightly damp. Make a heap of about 40 cm high and cover with dry grass or leaves. Turn daily to help manure break down fast.
- Add a 2 litre bucket of IMO 3 to a big compost heap by sprinkling it into the layers as you build the heap.
- Sprinkle one small handful of IMO 3 into the pit toilet daily to help break down the faeces and reduce the smell.
- Sprinkle a handful of IMO 3 into your pit beds to speed up the composting.
- Try sprinkling a bit of IMO 3 into your kitchen waste bucket daily to help break down the kitchen waste. If the kitchen waste is very wet, add dry grass or shredded newspaper to soak up the extra liquid.

LACTIC ACID BACTERIUM (LAB)

This liquid is something you can spray on to plants to promote health, and also on to animal and human manures to reduce smells. You can also spray it onto compost as you are making it.

You will need:

1 cup of rice

1 cup of water

2.5 litres of fresh milk, as fresh as possible. NOT UHT or box milk.

A 3 litre glass jar or three 1 litre jars

A cloth cover/s

String

3 kg Brown sugar

Step 1

Rinse the rice in the water, and pour the rinsing water into a 1 litre glass jar.

Put the cloth lid on the jar.

Keep the jar in the dark in a room, and do not move it.

After three to five days the rinse water should start to smell very slightly sour and it may have a layer on top.

Take off the layer on top and throw in the compost, and pour the liquid into a big 3 litre jar or a very clean bucket.

Step 2

The liquid you have poured off should be about 250ml. Add 10 times as much fresh milk, 2,5 litres.

Put this mixture into the three 1 litre jars

Put the cloth lids on and stand the milk in a dark room. Do not shake the jar.

In three to five days the milk solids will be floating on top of the yellowish liquid. There will also be a bit of milky stuff in the bottom of the jar.

Carefully pour this through a fine cloth so that the yellow liquid is clear of any solids.

You can now hang up the solids in the kitchen and in a few hours you have a fermented cheese.

Step 3

Pour the yellowish liquid back into the clean glass jars and add 3kg sugar altogether between the jars.

What you are doing now by adding the sugar is stabilising the LAB so that you do not need to put it in a fridge, but can store it in a dark cool cupboard.

Stir well and put a lid on loosely so that gases can escape.

The magic! You now dilute the LAB 1000 (one thousand times!) to use it.

So if you have 10 litres of water, you will only need two teaspoons of LAB mixed in to make a spray.

This spray can be used on:

1. The leaves of vegetables and fruits early in the season to boost plant health
2. It can be sprayed on the soil to increase the micro organisms
3. It can be sprayed on animal manures to reduce smell and speed up composting
4. It can be put in the drinking water and food of domestic animals to improve their immune systems and digestion
5. It can be sprayed on to composts with IMO 3 to improve the compost
6. It can be sprayed daily into pit toilets to reduce the smells and speed up composting.

Cities have a lot of waste when it comes to organic matter like garden and kitchen waste. There is a huge opportunity to set up micro to medium sized businesses recycling and composting this waste.

Thank you for using this manual. It is just a a start, and we will all work on it to improve it.

INTERESTING READING

<https://permaculturenews.org>

Economics

<http://www.perennialsolutions.org/financial-permaculture-organizing-communities-to-manage-resources-with-perennial-objectives-ends.html>

<https://medium.com/permaculturewomen/transition-economics-principles-of-financial-permaculture-79281bd017e3>

<https://nandor.net.nz/2015/08/22/permaculture-and-economics/>

Refugees

<file:///C:/Users/Alex%20Kruger/Desktop/Permaculture-for-Refugees-in-Camps-ENG.pdf>

<https://permaculturenews.org/2019/08/25/permaculture-and-refugees-part-1/>

Holistic Management

<https://holisticmanagement.org/training-programs/>

Social Permaculture

<https://www.ic.org/social-permaculture-what-is-it/>

Haiti

<http://www.permacultureguild.us/permaculture-disaster-relief-in-haiti>

Staples

<https://insight.wfp.org/innovation-in-the-desert-30f90f846ec0>

Intermediate technology and agriculture

<https://practicalaction.org/>

<https://attra.ncat.org/>

<https://www.engagement-global.de/homepage.html>

Permaculture networks

<https://permacultureglobal.org/> a 'facebook' for permaculture

https://en.wikipedia.org/wiki/List_of_permaculture_projects

<http://www.permaculturaibera.org/> spain

<https://permacultureinstituteasia.com/> Asia

<https://www.permaculture.org.uk/>

<https://scotland.permaculture.org.uk/>

<http://www.permacultureclimatechange.org/>

<http://northeastpermaculture.org/>

<http://www.permacultureactivist.net/>

<https://www.prod.facebook.com/African-Permaculture-Association-APA-2126451547569650/>

<http://permaculture-eastafrica.com/>

<https://permaculturenews.org/2019/06/22/permaculture-helps-ethiopias-rural-areas-prosper/>

<https://permaculture.org/> USA

<https://permaculturenews.org/> PRI Australia based

<https://www.youtube.com/watch?v=ptxIXwDpx50> Ethiopia

<http://www.permacultureactivist.net/pcresources/LatinAmerica/latin-america.htm> Latin America

<https://www.facebook.com/groups/PermacultureAssocCanada/about/> Canada

<https://www.soils-permaculture-lebanon.com/> Lebanon

Middle east: Rhamis Kent <https://www.youtube.com/watch?v=agekzXwsfkk>

<https://www.facebook.com/groups/permaculturegermany/about/> Germany

<http://fambidzanai.org.zw/> Zimbabwe
www.berg-en-dal.co.za Berg en Dal South Africa, Alex Kruger
www.permaculturesouthafrica.co.za South Africa
www.seed.org.za South Africa
www.agroecologynow.com
<https://www.facebook.com/permacultureuganda/> Uganda
<http://www.broadfieldpermaculture.org/> Uganda
<https://inhabitat.com/permaculture-feeds-and-empowers-refugees-in-uganda/> Uganda
<http://www.otepic.org/> Kenya
<http://practicalpermaculturekenya.com/> Kenya
<https://ourecovillage.org/permaculture-practicum-kenya/> Kenya
<https://www.facebook.com/PRIKenya> Kenya
<http://www.permaculturenamibia.org/vergenoeg.html> Namibia
<http://www.eloolopermaculture.com/> Namibia
<https://www.permaculture.org.nz/> New Zealand

Ecovillages

<https://ecovillage.org/> Global Ecovillage Network
<https://www.ic.org/directory/ecovillages/>
<http://thechikukwaproject.com/> Zimbabwe

Collective Design

<http://www.resilientbayarea.org/permaculture-social-equity>
<https://www.calearth.org/blog/tag/zanzibar> Fumba Town Zanzibar

Regrarians

The Regrarians workplace on Facebook
<http://www.regrarians.org/> Regrarians

Bioneers for interesting talks on You Tube

Permaculture Podcasts - Permaculture voices etc

Joanna Macy Youtubes