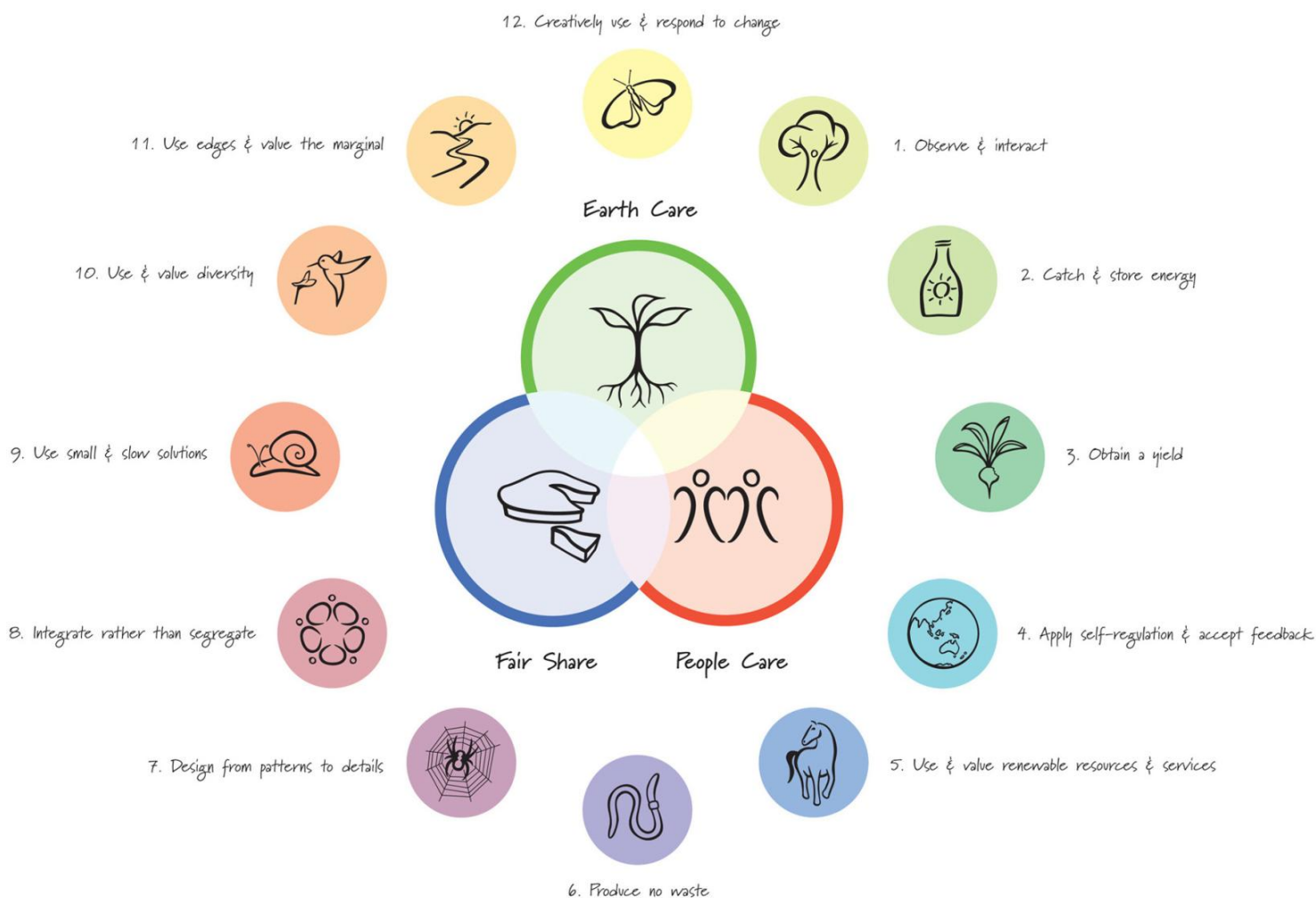


An Introduction to Permaculture



Terra Perma Design
permaculture education & design

PDC Certification Company

Terra Perma Design is the permaculture business set up by Tod Smith & Tash Levey in 2010, based in Perth, Western Australia. Tod, and Tash are active permaculturists with many years experience on their own suburban and rural properties during which time they completed their PDC with Dr. Ross Mars in 2008 and qualified as PDC teachers. On the same teacher training course they met Charles Otway, and, now Terra Perma Design, runs 72 hr Permaculture Design Certification courses, sustainable living workshops for councils and communities and our own specialised skills workshops.

PDC Course Booklet Acknowledgments and Requests

Terra Perma need to notify holders of this booklet that this is in draft. Our eventual intent to make this Western Australian structured Permaculture Design Course material and book available to permaculture teachers and the general public to ease the burden of teaching PDC's under creative commons licensing, this document is in a draft form currently. The best available information from Permaculture text books, internet sources and local knowledge sources has been compiled and authored by the above facilitators, however some of the material is still largely the work of the original authors. Hence this draft of the manual is not currently suitable for distribution or copying.

This is a draft copy for the purpose of reading and studying material for the students of Terra Perma Design course. If you have acquired a copy of this document please respect the authors and await the formal final release. Terra Perma can be contacted at info@terraperma.com.au for enquiries.

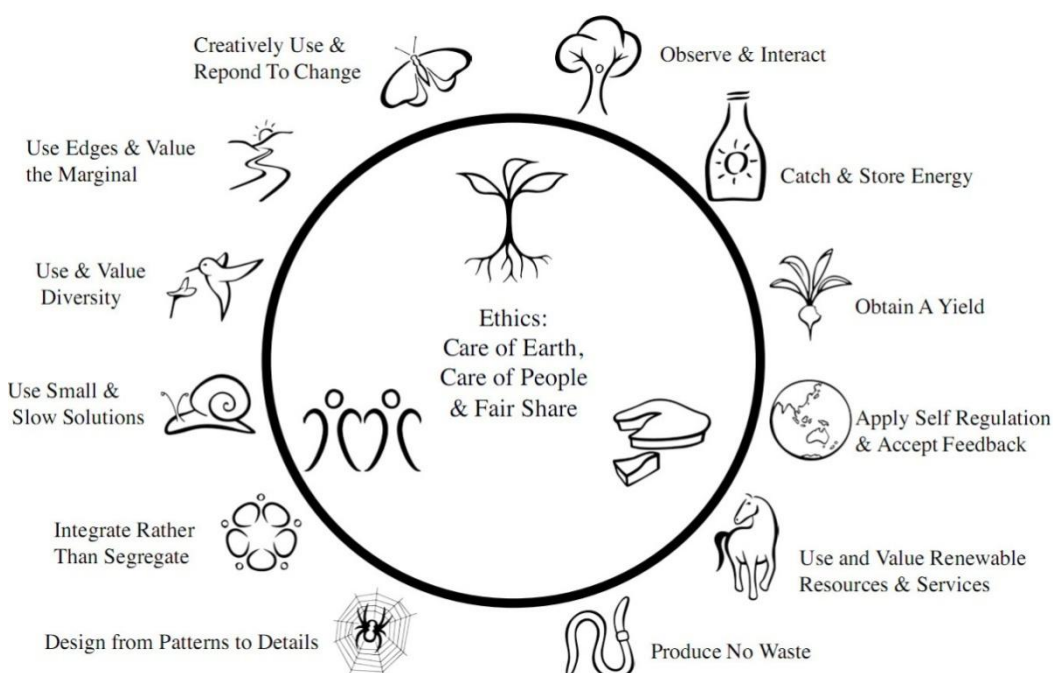
We would like to acknowledge a huge range of sources for the basis of this knowledge. Over time acknowledgements will be more focused but at this point we would like to thank all authors who have inspired and educated us in our permaculture journeys. Special thanks to local permies Ross Mars, Clare and David Coleman and Peter Austin for keeping the permaculture torch light and training and inspiring so many of us in the recent years in WA.

What is Permaculture?

The term Permaculture comes from a combination of the words 'permanent' and 'agriculture'. There were four core principles in Permaculture outlined by the co-founders Bill Mollison & David Holmgren in the 1970's.

Care for the Earth ---Care for people ---Share surplus produce---Reduce consumption.

We can follow these principles to develop a sustainable human habitat where the needs of food, water, shelter and community are provided in a designed landscape and environment. This is based on natural ecological models that follows natural cycles and harmonizes with local climate and geographical conditions. It's a combination of traditional knowledge and modern science that can be applied to urban and rural settings.



An example of these design systems is to divide an area into zones and sectors dependant on frequency of use. Each element of the design whether it's a tree, a chicken, a house or a dam is placed in relation to the needs and functions of all the adjacent elements. A fruit tree in the chook yard; the tree provides shelter and food to the chooks, while the chooks fertilise and control pests and diseases.

All elements serve multi-purpose functions with every other element so that in a mature system the needs of each element are met by the system, therefore requiring little or no external input of labour and materials and there is no generation of waste that requires removal.

That's where Permaculture becomes a self-sustaining design system for human needs which evolves over a long time and develops into a complex, organised structure that produces maximum yield with a minimum amount of work.

Einstein said the thinking that got humanity into its current situation is not the type of thinking that will get us out. This means re-thinking carefully about our environment, our use of resources and how we supply our needs.

Permaculture aims to create systems that will enable us to inhabit the earth forever. From a philosophy of co-operation with nature and each other, of earth care and people care, it represents an approach to deliberately designing environments which have the inherent diversity, dynamic stability and resilience of natural ecological systems.

Initially its eye opening common sense tool kit to empower you to take responsibility for the weight of your own foot print, and the legacy you will leave future generations. At the end of the day it becomes a way of life. The beauty of permaculture is that as a grass roots movement it doesn't need government funding or committee approval, just the willingness of people to move towards a preferred reality.

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1. Principles & Ethics of Permaculture

1.1 Care for the Earth

Mollison suggests contemplating the difference between asking the following question in two different ways:

“What can I get from this land?” or “What does this land have to give?”

Of the two approaches, the first leads to a war with nature, the latter to peace and plenty. Many problems and conflicts arise from how questions are asked rather than from the answers. This is the type of shift in thinking that Permaculture requires, working with nature, respecting natural resources and processes. The Gaia principle is a worthy model for seeing the world as a living organism and reflecting on the consequences of our own presence here. It's the difference between perceiving ourselves as stewards of the earth or owners of a commodity.



1.2 Care for People

In Permaculture we believe that cooperation and mutual support make healthy communities, and provide for all people to access the resources necessary to their existence. People care has a progression from self, to family, neighbourhood, community, nation, the world and thus species care.

1.3 Set Limits to Consumption and Population

“The irresistible force of human population growth is about to meet the immovable object of finite planetary resources “ Anonymous



Unless we curb the population growth curve and reduce per capita consumption the above is certainly true and definitely not going to go our way. Earth abides. She can start again without us. If we want to stay in the game we have to understand how to move towards a stable population growth and lower energy future, with secure sustainable food and water resources. Critical shortages of these basic human requirements are the giant killers of civilisations: Inca, Maya, Greece, Rome. How many failing states are there in the world today? No longer able to provide an acceptable standard of living for their populations who consequently riot and rebel. How many must fail before global civilisation itself is at risk?

1.4 Share the surplus

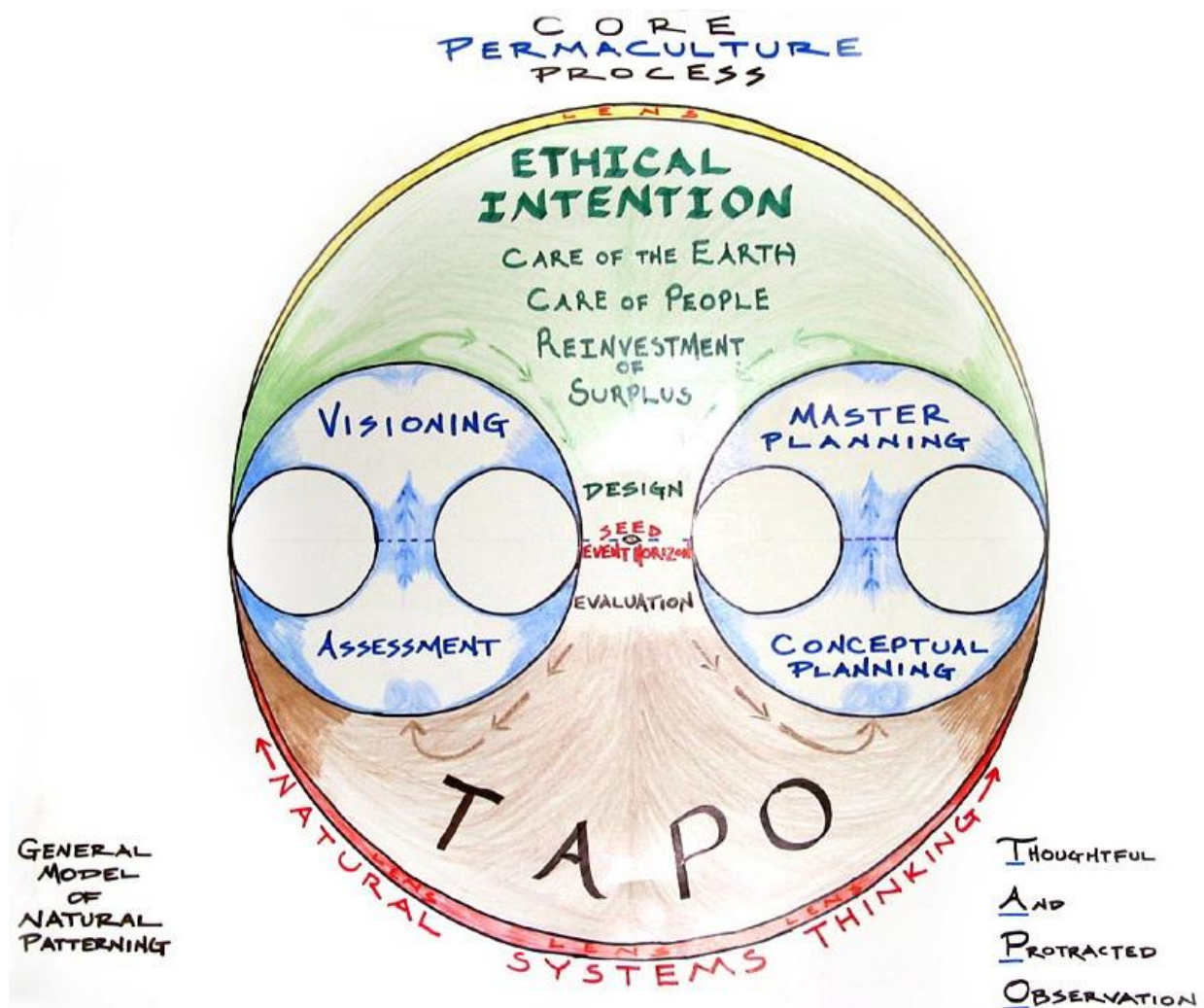
Surplus yield is returned to the earth and to people. This means all perceivable yields, including our surplus time, resources and wealth for the common good. Reinvesting surplus yield to the earth ensures ongoing fertility and regeneration. IT allows the ebb and flow of energies to still provide an abundant system.

Sharing your time can be helping your neighbours, volunteering in the community or mentoring.

1.5 All life has intrinsic value

Evolving mature ethics and philosophy for inhabiting the earth forever, inevitably leads to the conclusion that all life has an intrinsic value beyond its production resource value. Forests are more than merely timber mines, but rather vast reservoirs of pure water, species diversity and the lungs of the earth.

"Changes, to be of any consequence, must come first at the basic philosophical level" Fukuoka – One Straw Revolution



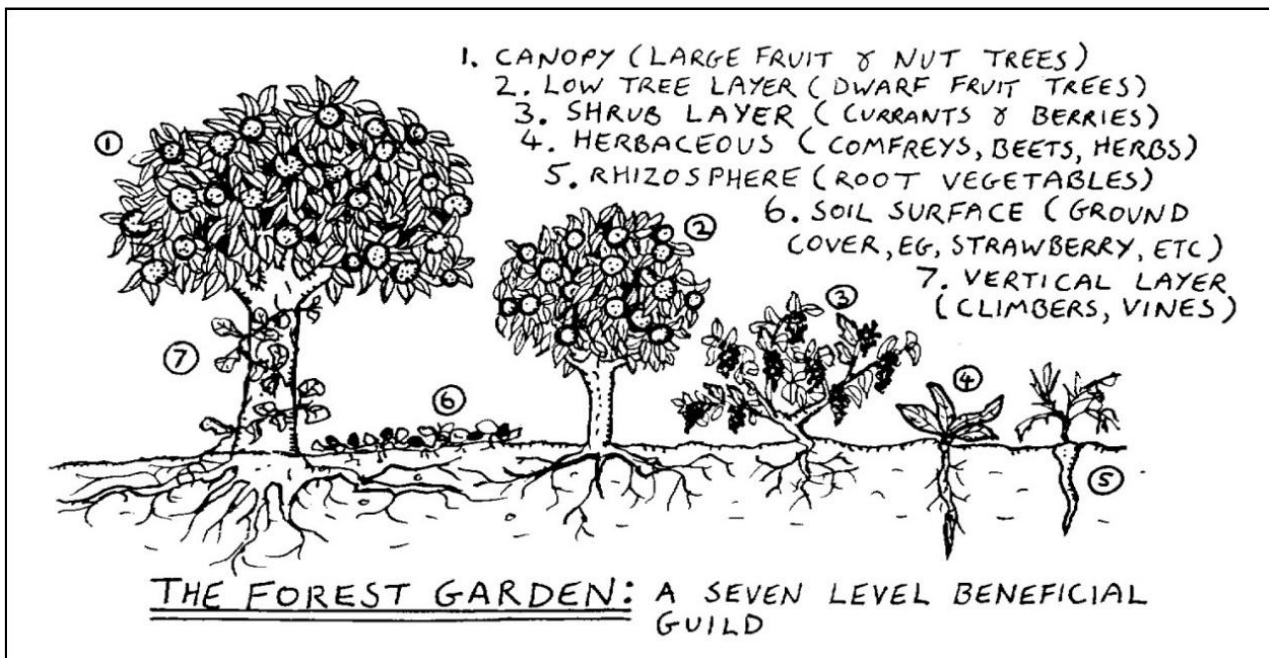
2 Designing Design - Mimicking nature

All ecology and thus ecological design is driven by the Sun. And while a full understanding these mechanics is beyond the scope of the Introduction to permaculture but we need to realise that it, along with water in WA, is always driving ecology and thus must also drive effective human ecological design.

“Plant the water first and the trees will plant themselves”

2.1 Food Forest Design

Essentially we are using the sun's free and ongoing light/energy accumulated by plants to 'grow' the amount of biomass, yield and therefore abundance of our system. An immense amount of diversity exists in natural forests and thus in mimicking this in a food forest we can create permanent agricultural systems.



1. **Canopy Trees** – these trees are selected to grow up and over all the rest and to provide gentle dappled shade – not to completely block the sun out. They can provide timber, nitrogen fixation, fruit or nuts yields and a home for birds and animals, and may include such trees as, Bunyas, Pecans, Wattles and Ice-cream Beans.
2. **Lower Trees**– generally these are fruit trees as in natural forests most of our common fruit trees where protected under the canopy, which is even more important given Perth's summer heat. You might have citrus, sapotes, carambolas, accerola, jubejube, payayas, and low chill varieties of European fruits.
3. **Shrubs** – lower growing plants – these provide another layer and food that will also attract different birds and insects increasing biodiversity – Cape gooseberries, vine berries, nightshade, blueberries, midyims, small nuts and medicals like Indian Ginseng, Elder Flower etc.
4. **Herbs** – herb flowers attract beneficial insects into the food forest floor, these should be specifically chosen dynamic accumulators, medicinal herbs, and self-regenerating/seeding. Dandelions, comfrey, borage, Herb Robert, thyme, sage, parsley, etc.

5. **Root crops** – Using the underground area increases the yield and diversity again. We could plant carrots, sweet potatoes, Galangal, and Arrowroot for food or flowering bulbs for winter yield in a deciduous canopy. An unseen soil base yield and diversity in a forest's uncultivated soil is the immense fungal and bacteria networks.
6. **Groundcovers** – Generally legumes that feed the soil or dynamic accumulators– Purple vetch, clover, yarrow, Peanuts. We could have sweet potato doing this also but adding the vetch or allows nitrogen fixation.
7. **Edible Vines** – food vines growing up canopy trees – passionfruit, lablab, beans, peas, yams, even grapes. Larger perennials will need a stronger trellis tree, and some pruning will be required. You can use annual vegetables to avoid issues.

Integrating animals by having chickens and encouraging native animals and the use of a water feature/pond in the food forest, adds even more layers of edibles and diversity. Water allows aquatic plants, and more importantly it attracts and provides a home for predators, beneficial insects and pollinators.

Two of the key principles of creating a food forest or forest garden are plant stacking to use light, water and nutrients and a highly diverse planting to mimic a natural forest.

As you can see from the previous illustration each tree is at a different height, this means it has access to enough sunlight to grow but not some much it needs to be protected. Similarly the canopy plants have the competition of the layers below to keep them under control but also the moisture recycling and leaf litter compost to keep them sustainably feed and watered. Adding in the rest of the layers maximizes the yield, resilience, diversity of the system, thus giving us a poly-culture, not a monoculture like most farms and vege-beds.

Food forest are an excellent way to create a sustainable food production system in WA's poor soils, without this carefully created diverse water management and nutrient recycling via this density of plants a food system can't exist without heavy human input. In permaculture we model our system on natures models, in WA natures model of existing on very poor unstable soils is to slowly create a forest.

Permaculture allows us to speed up our forests carbon bank and manage the succession of trees. A good knowledge of tree types and functions is important, as plants are specifically chosen. For example, when establishing the first trees of the forest we will choose hardy pioneer plants that do this job naturally in nature, nitrogen fixing legumes like acacia, wattle, albizia, honey locus, tagasate and leucaena all provide great host trees for the next years more delicate food production trees. If we plant a wattle first, let it get to 6 foot, then plant a mango inside the canopy, we nitrogen fix, shade, wind protect and bacterially protect the mango. In 2-3 years when the mango is strong and hard and the wattle is to large, we can prune the wattle down to add more light, but don't remove it as it can still fix nitrogen and provide mulch.

These concepts and techniques do become quite detailed but are essential in combating our drying climate and poor soils in WA, hopefully this introduction has inspired your mind and future knowledge seeking. Plants certainly are the key to a blossoming future, and the 7 F's might help you appreciate our trees:

Food, fibre, fuel, fodder, fertiliser, 'farm-a-cueticals', fun'da'mental

3 Soil from Sand – Swan Coastal Plain Solutions

Before we start talking about the most important part of the garden, the soil, we must realise that in Perth we have very little water, be it from rain or other sources. It is critically important that you build up your sandy soil and catch all run off, even from driveways, and channel it into the soil. Harry Wykman explained it to me this way, in Perth “**precipitation (rain) only exceeds evaporation for 3 months of the year**”, thus without heavy soil improvement or continual and unsustainable watering we can only grow conventional food crops 3 months of the year. However in our urban habit we have limited space and don't practice food forestry and yet want to have a yield all year. So lets get soil smart.

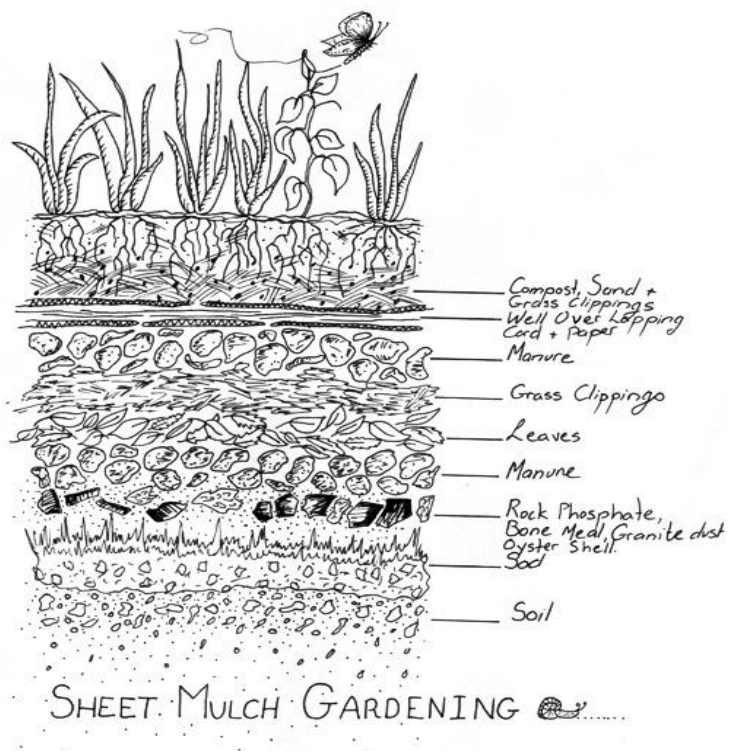
So to recap before.....WATER - Plant the water and the plants plant themselves.

And for the next catch phraseSOIL – Feed the soil not the plants.

3.1 Building Soil

Sandy soil must be built up in the following order for high yield systems (veggie beds), however if in clay soils obviously omit step 1.

1. **Clay** – Water and nutrient holding, the GLUE of the soil. Bentonite, Sand Remedy, Soil Solver, pure kitty litter are some sources. Swap soil with Friends in clay areas in hills. Loam is 5-25% clay get it in.
2. **Rock Minerals** – Our ancient sand is nutrient deficient, Granite quarry and mining 'waste' minerals are a natural slow release source of minerals.
3. **Sea Minerals** – The ocean was different minerals, seaweed solutions and powdered kelp make our soils better and allow strong disease resistant plants.
4. **Compost** – Any organic matter (composted manure, leaf litter, grass clippings) feed the fungi and bacteria in the soil, that soil food web then feeds our plants as required.
5. **Mulch** – Lucerne or lupin feeding mulch, put it underneath, and Street tree prunings for water saving goes on top in summer. You should you both or at least Street Tree mulch.



Yes this can be an expensive process so start small, these techniques lead down the pathway of soil growth not loss, so the investment is not lost, and combined with your plant biomass accumulation techniques you will be healing yourself and the world faster than your thought. Oh yes, and nothing leaves your land, compost scraps, mulch tree pruning's, save grey water, even use composting loo's in your can.

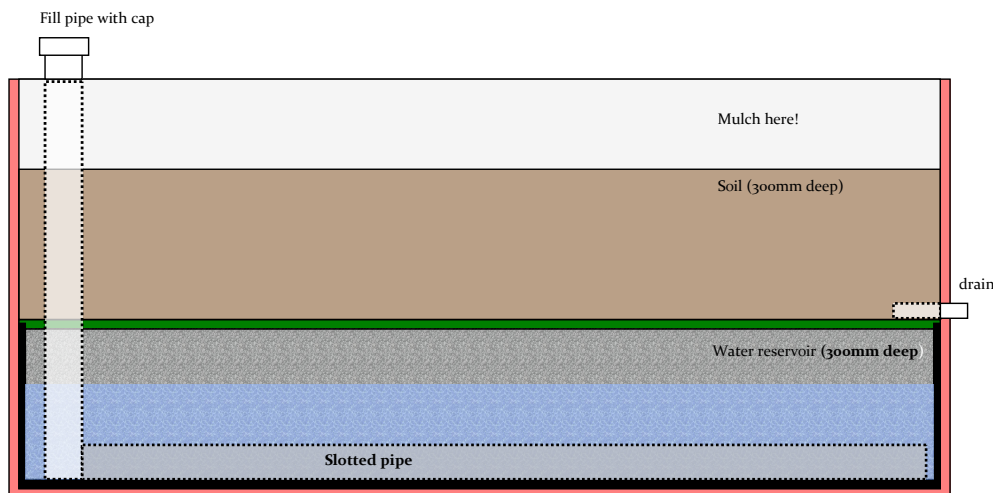
3.2 No Dig and Lasagna Beds

Commonly called the no dig method or the Lasagna Bed the method of layering lots of good organic stuff in a pile is a great way to create a fast healthy sponge like soil.

Get a bale of lucerne/lupin, some clay (Bentonite or other), compost or leaf litter, a bag of rock dust. Sprinkle on bentonite into slashed weeds, spoilt hay, basically organic stuff sprinkle on rock dust, cover in 10 cm lucerne, cover with compost, sprinkle bentonite, cover with 10 cm lucerne. Wet well and leave to rot down. You can plant in small piles of soil pushed into lucerne or cover with cardboard/hessian/etc and let it rot down first. Sea minerals from ground seaweed (kelp), seaweed emulsions or even fish hydrolysates is also great for increasing plant and intern your health.

We recommend lucerne hay, yes its more expensive, but it is mineral rich and has a natural growth promoter, another good option is lupin mulch from DSATCO in 1000l bale for \$215. Don't use pea straw to avoid pea viruses, don't use hay/straw to avoid grass seeds. If you are concerned about the number of weeds and weed seeds in that top layer of soil, or in the 'mulch' you have already put down, it is suggested you sheet mulch with paper or cardboard before building the lasagna bed on top.

3.3 Wicking Beds



Black "U" shape is the liner

Green layer is shade cloth or similar porous interface

- Wicking Bed Basics
 - Water can travel upwards despite gravity thanks to capillary action (wicking) and evaporation and condensation.
 - Use this to our advantage with a "wicking bed", a garden bed that has soil and a reservoir of water *underneath* the soil.
- Problems in Perth
 - hydrophobic soils
 - little or no rainfall and high evaporation over summer
 - watering restrictions
 - poor soils (sand or gravel/clay in hills)
- Wicking Beds as a solution

- large reservoir of water reduces need for frequent watering
- soil remains moist all the time
- evaporation reduced with thick mulching
- improve soil life / quality with soil moisture, cooler conditions, and cycling of nutrients that would otherwise be leached away.
- can be made cheaply from variety of materials
- **Wicking Bed Design**
 - flat base, and I mean flat! (use a level)
 - approx 600mm total depth, 300mm soil and 300mm for the water reservoir
 - width and length of bed to suit available space and practical purposes.
 - water proof liner for reservoir: builders plastic, pond liner, or clay
 - fill pipe: access for filling, and running length of bed for good water distribution (speed of filling). Use slotted ag pipe or PVC pipe with holes etc. Also allows air under as water wicks.
 - fill reservoir with material that allows for easy water distribution such as blue metal, gravel, crushed brick, or even coarse mulch. Mulch or other organic materials will break down over time, fine for a test bed but for longer life use something that will last.
 - reservoir to soil interface: use shade cloth, geotextile, carpet, old sheets etc... To prevent soil migrating down/blocking up the reservoir.
 - Soil should be good quality organic soil that's a bit coarse as the water will encourage a bit of compaction. Keep off the beds!
 - Drainage at the interface. Drain should be protected with a bit of shade cloth to prevent soil escaping.
 - Can be built in-ground, above ground, or partial. Use tin, wood, rocks, straw bales, anything to form the sides as with any standard raised garden bed. If in-ground then consider the drain, if it's also underground that will work in sandy soils but not in heavy/clay soils!
- **Other Points:**
 - closed wicking beds most appropriate for annual veggies
 - not as good for larger root perennial veggies, root crops, legumes (air needed in soil for N fixing) and dynamic accumulation purpose plants
 - allow reservoir to completely dry out every now and then
 - heavy rain not a problem thanks to drain – no worse than normal ground or raised bed (i.e. excess drains away). Probably better because nutrients aren't all leached, end up in reservoir.
- **Variations:**
 - incorporate worm farm
 - open wicking beds for larger areas, perennials, and deep rooted veges.
 - bathtubs (goose neck drain)

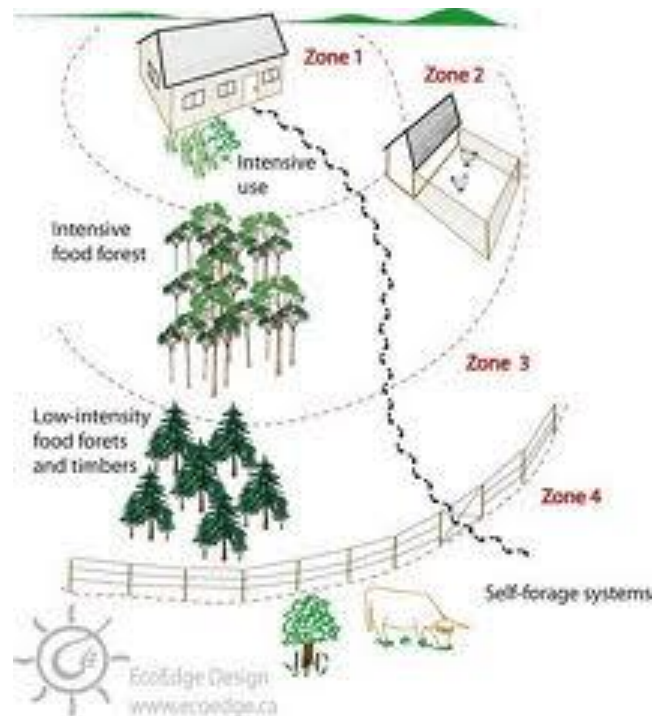
4 Zones & Sectors

The term '**Zones**' in Permaculture are simply labels for areas that are grouped together reflecting specific activities and characteristics.

The zones are used to make ecologically complex design easier and ensure that each area is efficient, low maintenance, produces good results and integrates smoothly with other zones.

The zones are:

- **Zone 0** - Where you live, or where you spend most of your time in relation to the place of your Permaculture Project (i.e. it could be your office or shop)
- **Zone 1** - Vegetable Patch and close plantings to your house (or office or shop)
- **Zone 2** - The "Food Forest" or Orchard
- **Zone 3** - The Farming Area (whether it be crops or animals - often for commercial use)
- **Zone 4** - Harvest Forests
- **Zone 5** - Natural Forests or Conservation Areas



Source: www.scribd.com

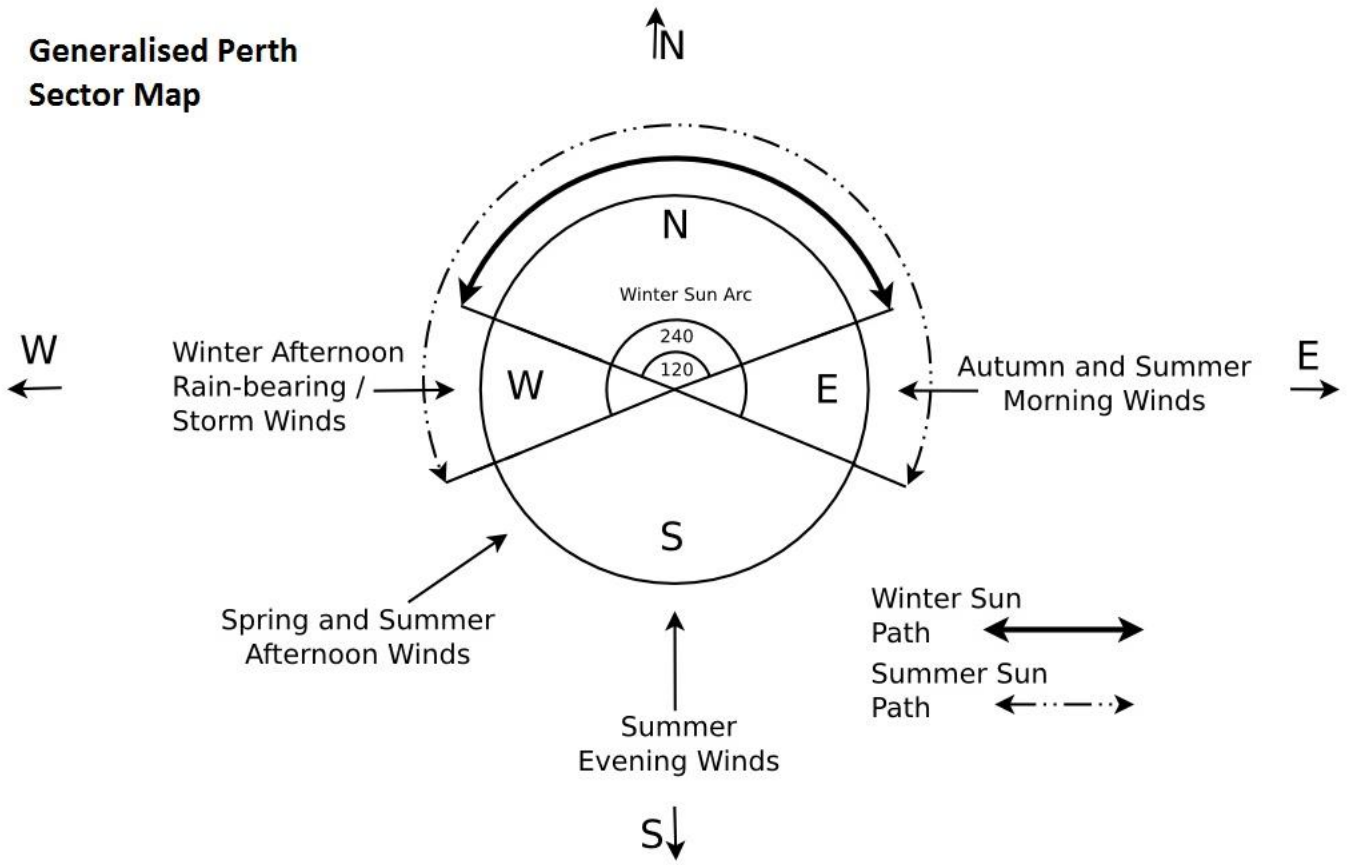
Sectors refer to the corners of the globe; North, South, East & West and their relation to the movement of wind, sun & water (wild energies).

Sector Analysis = Gathering information & identifying the type & direction of these external energies & how they affect the entire property.

The purpose of doing a sector analysis in the design of any property is not to prevent these external energies but to incorporate design strategies & elements that can minimise or accentuate their impact. For example, you can't prevent a bushfire outside your property but you could plant fire retardant species to help reduce the impact.

To help understand and plan the zones & sectors on your property, you draw a sector diagram. This is a plan view of the entire property with wedge shaped areas that radiate out from the house to show which direction the external elements are coming from. The zone & sector factors together regulate the placement of particular plants & structures.

Generalised Perth Sector Map



5 Permaculture is not just Organic Gardening

At the start of the permaculture journey organic gardening does have the important role in allowing us to practise Permaculture, but it is only one technique used in Permaculture, not the whole thing. What it does do is act as the easiest way for us to start observing and interacting with nature, which is so removed from modern society.

Design is often confused with technique, which is how to do something, for example organic gardening, no dig gardening etc. It is also mistaken as strategy, which is how and when to do something, for example crop rotation, moon planting.



Permaculture emphasises the patterning of landscape, determination of function, and assembly of species. It asks where an element should be placed for maximum benefit in the system.

Gardening with a permaculture design eye and mind is not just copying permaculture techniques from a good book. Take a herb spiral for example, while a herb spiral demonstrates lots about using vertical and horizontal space, stacking plants, understanding niche, etc, the technique generally fails in Perth as it is just too hot and dry and thus the whole spiral gets 'cooked' in summer. So to the permaculture or gardening copycat this is a permaculture concept failing, to the permaculture designer this is an appropriate technique or idea but in another location and climate.

Why grow my own plants from seed when I can buy seedlings?

1. **Weak seedlings-** Commercial seedlings are grown in artificial greenhouse environments with plenty of water, heat and fertiliser to grow them as quickly as possible. This tends to produce seedlings that are more likely to be stressed when first planted in the garden as they are not used to the tougher conditions.
2. **Not as environmentally friendly-** Time, money and fuel is spent raising seedlings offsite, delivering to a depot and then on to you. Transporting seeds uses less fuel and they have a much better 'self life'. Also the plastic punnets that they come in are only used once. If you grow your own seedlings not only will less fuel be burnt but the punnets and pots used to grow the seedlings can be used over and over again, and you will know the age and source of your seedlings.
3. **Expensive-** Commercially grown seedlings are much more expensive than buying seeds and growing your own seedlings. You usually only get eight seedlings per punnet and in Australia punnets generally retail for around \$3-4. A packet of 30-50 seeds might only cost \$3.



Permaculture gardens tend to get hardier and more robust as time goes on so we tend to have a spot for raising seedlings to a suitable 10cm size before letting them out into the deeply mulched ecologically active (pests and predators) garden. While some plants need to be grown in situ or direct sow, like carrots, having soil exposed for seeds to germinate is not ideal and is only advised during winter in Perth.

A permaculture thinking solution to seed raising system might be a slat bench, sitting on a bathtub worm farm, draining to a worm we bucket. This is placed on the east side of the shed near a water tank. This setup is in Zone 1 on the way to or from the chicken run as part of the daily stroll. When you water the seedlings each day the worms get kept wet, nutrients from the pots go into the worm farm, the worm wee is caught underneath and every other time you water the seedlings you use worm wee to boost their growth. Hence instead of having 5-6 isolated elements we have combined them all.

Don't be disheartened with a few failures. Just observe them and learn from them. I think we've designed & redesigned areas several times before coming to a way that works for us. And that's not to say we won't change things in the future, we're always observing and open to better ways when they come along. A stable well designed system is not a stationary one, but one evolving over time through TAPO (thoughtful and protracted observation), hence the dynamic stability we have previously discussed.

5.1 Starting the Veggie Patch, Seed Saving and Seed to Seed Cycles

Let's start with annual vegetables, these garden plants can be grown from seed to maturity and then allowed to go to seed themselves, all within the span of one growing season. The common vegetables that are annuals include **bean, broccoli, Chinese cabbage, corn, cucumber, eggplant, rocket, lettuce, peas, tomato, capsicum, pumpkin, most radishes, spinach, and pumpkins**. Annual flowers include calendula, cosmos, marigold, sweet pea, and zinnia. Growing one of these annuals is the best starting point for most gardeners wishing to raise seeds.

If you note that a certain crop does particularly well in your garden, try growing that one for seed first. Peas are a good example, or snap beans. Tomatoes are a good bet for first-time seed savers, too, though remember that hybrids should not be grown for seed, and there are a lot of areas of Perth that suffer Tomato virus problems.

Many flower gardeners start by saving only marigold seeds. When saving seed the easiest success will be had with self-pollinating annuals, such as snap beans, lettuce, peas, and tomatoes.



The term **self-pollinated** means that pollination occurs within each individual, and not from other plants. The reason for choosing a self-pollinating plant is that such plants do not depend on either the wind or

insects for assistance in pollination. While insects sometimes do pollinate some of these self-pollinating plants, the problem of isolation, or separation of varieties to avoid crosses, is practically eliminated.



“All of the world’s problems can be solved in a garden” Geoff Lawton.

5.2 Perma-culture implies Perma-nent Plants

So let's think about 'Foodscaping' your property. Limited resources and space put a finer point on the permaculture design pencil, over time common annual vegetables are not enough, focus should be on multiuse perennial (plant that live for more than 1 year) food sources, herbs, and fruit and nuts trees.

If you cannot think of 5 uses of each element and plant variety there is just not room in an urban backyard for that level of inefficiency. Annuals (plants that live for one growth season and die) should be hardy, well-chosen species capable of self-seeding and self-perpetuating; there should be plant and animals systems, and a focus on integration and species diversity for overall food system stability and resilience. We are trying to reproduce an ethno-botanical garden that is as; seasonal, resilient, raw and ecological as the original forests prehistoric man roamed and gathered food from.

5.3 Polycultures

The emphasis on polycultures can't be made enough; conventional mono-cropping broad acre agriculture is the single greatest threat to our world's ecosystems. They poison, deplete, and denude the soil and don't provide even as much yield as a low yielding ecological polyculture. We don't hear about Polycultures, they can't be farmed by machines and wrapped in plastic for the supermarket, so there is no money in it for large companies. So let's get the jump on these failing food systems and not contribute to them by buying their artificial food, and instead use all available space for creating edible, beautiful, ecological garden polycultures.

"Permaculture annuals" are hardier plants, generally self-seeding and multipurpose. They replace less useful annuals like spinach, iceberg lettuce, and purely decorative flowers. Parsley, basil, borage, sunflowers, Lambs Quarters, Coriander, Dill, loose leaved lettuces, mustard, calendula, Shinjuku and many other annuals self-seed enough to allow me to forage and transplant them as required. As most plants that are not killed in cropping they will form flowers and go to seed. Not only is this self-perpetual but feeding beneficial insects, creating beauty and extending seasons and therefore diversity when left to go to seed. There are many great books on basic backyard permaculture gardens so I suggest you grab a copy of Linda Woodrow's or Jackie French's books to give you more ideas.

Perennial food systems

Perennial food plants offer much more than annuals to a permaculture system, they generally offer multiple uses (sweet potato, soil aerator, living mulch, vertical trellis shade, all year round edible shoots, and edible staple tuber crop), they don't need to be replanted from seed each year and are generally hardier (low maintenance), and as they include larger herbs and trees they provide shade, habitat, and ecosystem backbone of your garden.

Eric Toensmeier has written the best guide to perennial vegetables and it is highly recommended reading, so rather than trying to list hundreds of types please see his text, *Perennial Vegetables*, and we will just illustrate with a few Perth suitable species.

For hot dry areas sweet potato presents the best option in Perth, it survives the 40°C summer days when many plant perish and it mulches and protects the soil, as a bonus the stress on the plant prompts better tuber set. For optimum tuber production new plants should be planted from vine tips each year, but you can certainly leave many plants to grow and expand which allow occasional racooning of tubers.

Other options for this hot zone include, Malabar Spinach, Jerusalem Artichokes, Moringa Tree, winged bean, and citrus. Areas that are more sheltered with some moisture but not garden beds can grow arrowroot (grown more for biomass than root), papaya, bananas, dandelions, daylilies, thyme, sage, Warrigalia Greens, perennial leeks, capsicums, garlic and Society Chives, Kale, and many other perennials. In high nutrient sheltered garden beds, instead of the normal salad greens like lettuce planted every 3-4 weeks we should be planting salad burrett, sorrel, lovage, musk mallow, perennial onions, ground nuts, and other

more diverse, nutritious and extended harvest plucking greens.

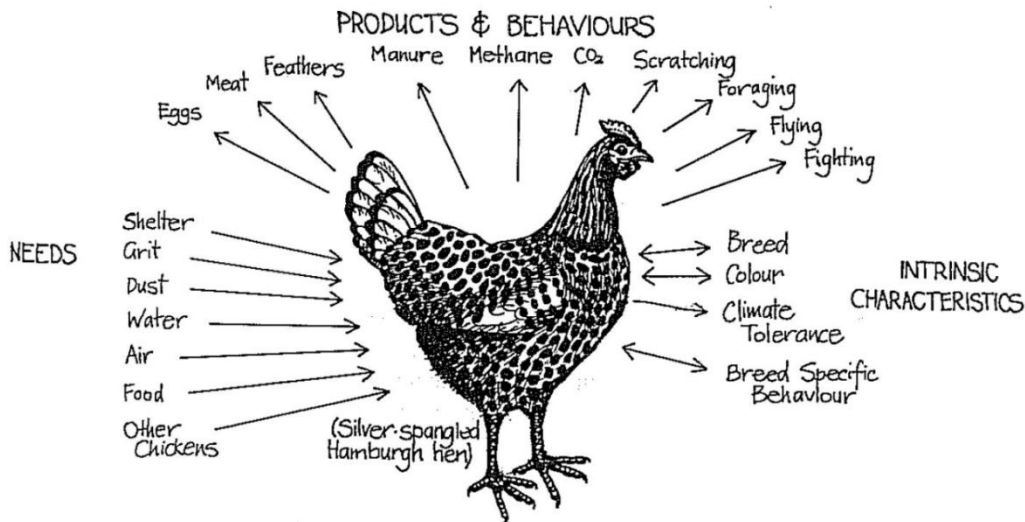
Herbs are essential for human health, soil health and insect health they are the Doctors of the system. Diversity is essential and most herbs are hardy, multipurpose, perennial and beautiful so there is no excuse.

Trees provide structure, habitat, biomass, and many other permaculture system building blocks, but space is limited on urban blocks so we have to make careful selections and maximise their benefits. Fruits trees are most commonly used, but nuts and natives or timber crops can be used when appropriate. Hardy fruits like quince, wampi, persimmon, are often forgotten for the more appealing peaches, nectarines and apples which are often climatically unsuitable and pest prone. Fruit and nut trees need to be selected for their overall addition to the system, fruit to eat is just one of the outputs of the tree, the Moringa is a drought tolerant, highly nutritious foliage, edible pods, medicinal qualities tree and can be grown as a 10m tree or a 1m hedge. The nectarine produces nectarines prone to fruit fly requiring netting and is prone to leaf curl and other viruses.

Many resources of useful trees are available, some even for our bioregion. Jeff Nugent's, Permaculture plants is a great resource and further development into forest gardening is encyclopaedically covered in Food Forests by Jackie and Toensmeir.

6 Permaculture Animals and Urban Chickens

Everything in permaculture is about “Integration rather than Segregation”, this is especially important for chooks and other animals in a system. By looking at Animals as design elements, permaculture shows how to best fit in the system and maximize its potential.



Chickens are wonderful pets and are fun to watch, and regularly produce home made eggs. But look above, you provide them with the simple needs of shelter, food (kitchen waste), water and company (several chooks), and they provide, eggs, meat, manure, features, soil cultivation, pest removal and weeding, and many hidden ecosystem diversity builders. It amazes me that these animals seem to produce far more than they consume, and are truly biology and food production catalysts for your system.

6.1 Planning for chooks

Before getting chooks you might want to consider a few of their needs. A chook house must:

- Be fox and bird of prey proof, so dig in wire and enclose roof. That said I don't in Innaloo!
- Be weatherproof (yet allow for summer ventilation), with coops having adequate ventilation plus a draft free area for nesting boxes.
- Chickens are jungle fowl they, like shade and protection, with some warm morning sun.
- Have a perch (Chooks like to perch off the ground at night. These perches should be 30cm or more off the ground, allowing 30cm space per bird). The manure will build up under perches, so this should be deep litter area also, this allows them to scratch it around stopping the concentration and need for continual house cleaning.
- Food and water containers should be placed above the ground level at about the height of the chickens' backs, and must be kept clean and fresh.
- Be easy to access (you'll visit it at least once per day)
- Have nesting boxes where the chooks can lay their eggs in private. Nesting boxes should be about 300mm square. It is ideal if you can provide a hinged opening outside the coop, behind the nesting boxes, so that you can retrieve the eggs without disturbing your chooks (Old lawn mower leaf-catchers or wooden boxes are good.) Add straw or preferably bug repelling tansy/wormwood to the laying boxes. Allow 1 nesting box for every 3 chooks.

Deep Litter Scratch Yard

A deep litter scratch yard, which is a fox-proof fully enclosed area adjoining the house is essential for urban backyard chickens to control odours, flies and scratch that chicken itch. Street tree mulch and any other carbon based litter can be used to similar effect, as per permaculture principles use what you have. Cover the floor with 30cm deep litter, and every few months put this into your compost systems and replace the litter.

Runs and Chook Tractors

Chooks need room to move about, and ideally need a large run broken up into several separately gated sections. Fences should be at least 1.4m high. This area usually doesn't need to be fox proof, as the chooks are only out in their run during the day. This run/area should be your orchard if possible. Note chickens will scratch the dirt continuously, so runs soon become devoid of vegetation and then become muddy, wet and unsightly, hence again advising deep litter runs.

Consider a chook 'tractor', i.e. a mobile pen without a floor. This can be moved around the garden allowing the chooks to scratch the ground and eat weeds or left-over veggies, while spreading their droppings.

Chook Health

Comfrey, broad leaf plantain, Kale, nasturtiums, and weeds are just some good fast growing green foods. You have a lot less issues with your chickens if they have a fresh vegetables, weeds and food scraps each day, rather than just grain or pellets. Chickens are no different to us, and while we can survive on pasta we get few nutrients and general health declines.

Southernwood, Wormwood, Tansy, Rue and garlic can all be placed beside the chook run fence to be grazed for de-worming and general bug repellence. This is preventative medicine, the alternative, treating all chooks and the entire run for mites or disease is far harder than a little preventative medicine.

Fresh water is also key to healthy chooks and continuous laying, and can't be stressed enough. There are lots of fancy waterers but I just used Galvanised Pales hanging at head height. These get cleaned 2-3 times a week or as food scraps on beaks caused contamination.

They also need a sand patch to dust themselves. Chickens bath in dry sand so it is suggested you make a elevated container of sand/soil, out of the deep litter that will stay sandy and dry.

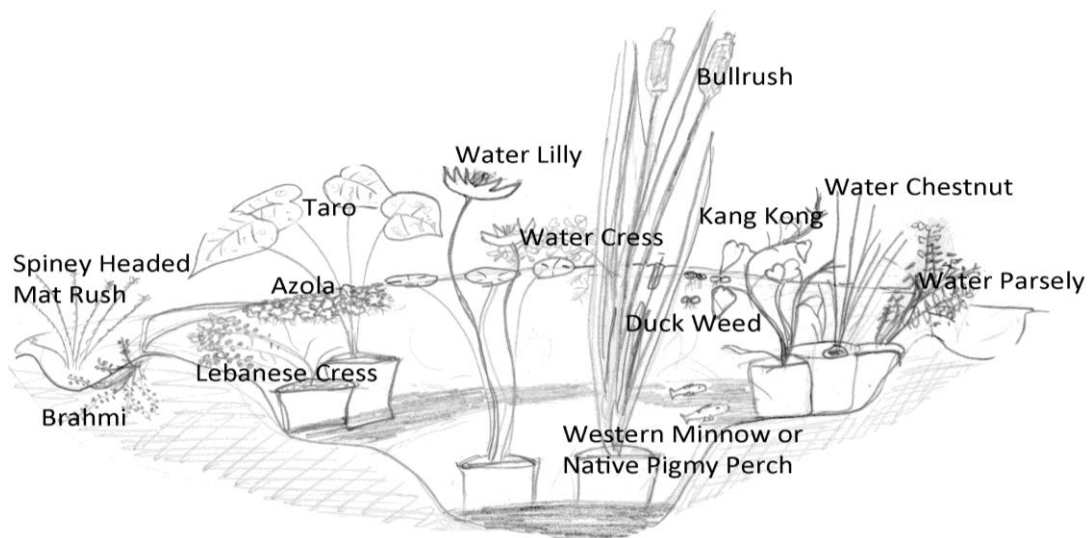
Chooks Breeds and Buying Chooks

The brown chooks you normal see are Hyline, Hyline Brown, or Isa Brown. They lay 300 brown eggs a year for 2-3 years before declining. The Hyline has been especially breed as a factory chook, calm, strong egg layers. You might also choose other breeds, but as you can't have a roster and 'breed chooks' in the city meat breeds are not worth having.

I got some Point of lay (14 week) hens from Swan Valley Egg farm. You can also look up WA poultry breeders society to find reliable breeders. The quokka, Gumtree and other places have some cheap backyard chooks but often you end up with half rosters and half hens so not that helpful, or cheap in the long run.

7 Edible Garden Ponds – Food and essential Backyard Biology

A pond or water garden is essential in any permaculture garden. It relaxes us, feeds us, and provides a habitat and drink for many insects and creatures. A water garden is a diverse aquatic ecosystem, one of the most productive and efficient systems around, far more productive than any land based systems. This is because the aquatic plants have a constant supply of water that has nutrients dissolved in it.



Waste from fish and other animals in the system provide additional nutrient to the plants, making for a very efficient and productive system. And on that note: fish are required to control mozi breeding, and to avoid then snacking on frogspawn and tadpoles small natives like Western Minnow and Pigmy Perch are recommended

Don't confuse the virtues of a Permie Pond with the trendy new plastic tank over populated aquaculture systems, that are reliant on continuous pumps, and a perfect/fleeting balance between plant, fish and water systems. These do not offer acceptable stability or ecological design to be considered a permaculture solution.

The trick to creating a stable aquatic ecosystem is the various types of plants in it, each of which plays a specific role to support and sustain aquatic life. Most people go wrong by not adding enough plants and end up fighting algae. To stack in the plants look at the four categories of water plants that can be included in a pond to achieve perfect balance.

1. Rooted floating plants, such as water lilies, Nadoo, Lotus)
2. Marginal plants (Bullrush, Spiney Headed Rush, Pickerel Rush, Vietnamese Mint, Water Chestnut)
3. Submerged (oxygenating) plants (Millfoil)
4. Floating plants (Duckweed, Azola, watercress)

For 1m2of pond surface area you should aim for:

- one Rooted Floating Plant, three Oxygenating Plants and two Marginal Plants.

For coverage of the water's surface to both avoid algal growth but allow oxygenation of the water

- Half of the water's surface should be covered with free floating and rooted floating plants. Or, conversely, *no more than half* of the water's surface should ever be covered with floating plants, however if with plants like azola that are cropped continuously for mulch this can be over looked.

An excellent local source of plants and information is Swan Valley Fish and Lilly.

http://www.fishandlily.com.au/water_plants/

8 Enriching Environment & Society

8.1 Local Trading Schemes / Alternative Currencies

Unless you're 100% self-sufficient you have a need to trade. The formal money system serves this purpose but there's plenty of informal trading taking place such as sharing tools between neighbours, helping out friends and family, etc... These informal methods have their limits though and tend only to extend to people you know. At the community or broader scope a more formal system is usually looked at, such as LETS or an alternative currency. A side effect of LETS and local currencies is that they may be set up in a way to encourage use over the formal money system which in turn encourages the local economy.

The downsides are they have to be maintained and people abusing the system. Also they tend to fizz out unless there's enough engagement. Why have 100 Gumnuts (Swan Hills LETS currency) if I can't do anything with them!

Local Exchange Trading System (LETS)

"LETS is a community based non-profit trading system that enables its members to exchange a wide variety of goods and services using little or no cash. It is a method of trading which depends on energy, skills and time instead of money, exchanging a unit of local currency, not as an alternative to conventional money but to complement the current system of trade." – LETS Australia website.

Maia Maia Project

Maia Maia is a community based greenhouse gas emissions reduction currency system being trialled in Western Australia. The value in supporting the Maia Maia project is in encouraging greenhouse gas reduction efforts. The currency issued from these activities is called the 'Boya' after the rock trading tokens used by the Native Nyungar people. These 'Boya' notes can then be used by participating businesses as a discount to their standard pricing.

The project was conceived in 2008 or earlier but so far has yet to really make an impact.

Bitcoin

Bitcoin is a peer-to-peer digital currency. By peer-to-peer that means there is no central authority or bank. Managing transactions and issuing money are carried out collectively by the network.

Bitcoin really represents two parts though, the software and an actual alternative currency. It's possible to use the bitcoin software to create your own alternative currency.

At a world-wide level the bitcoin currency has been facing many problems since its launch in 2009 due to wildly fluctuating value compared to hard currencies for a variety of reasons. It will be interesting to see how things progress as it's early days.

Using the bitcoin software at the local level may make more sense and solves the problem of having to track and manage hard currency. But this introduces other problems, such as what if you just want to pay in cash!

Additional Resources

- Swan Hills LETS: <http://swanhillslets.org>
- Maia Maia Project: <http://www.themaiaimaiproject.blogspot.com>
- Bitcoin: <http://bitcoin.org>

8.2 Intentional Communities

An Intentional Community is a planned residential community designed to have a much higher degree of teamwork than other communities. The members of an intentional community typically hold a common social, political, religious, or spiritual vision and often follow an alternative lifestyle.

They typically also share responsibilities and resources. Intentional communities include co-housing communities, eco-villages, communes, survivalist retreats, and housing cooperatives. Typically, new members of an intentional community are selected by the community's existing membership, rather than by real-estate agents or land owners (if the land is not owned collectively by the community).

8.3 Community Gardens

“Community gardens are places where people come together to grow food and community” – Claire Nettle

These outdoor environments nurture community connectedness, outdoor learning and sharing of skills to grow stronger communities. Community gardens provide productive, high quality, creative and accessible open spaces in local communities and deliver a range of benefits in physical and nutritional health, mental health and wellbeing, environmental sustainability, food security, social inclusion, education and training, economic development, cultural vitality and community resilience.

A resource for WA is www.growingcommunitieswa.org.au. Here you'll find out everything you need to know about starting a garden, joining one, resources, info, contact people etc.

9 Water, and using Grey water

A common error in timing of irrigation is to apply **small amounts** of water every day or two. It's better to **soak** the ground over a **longer period of time, occasionally**. However, you do need to build the water holding capacity of the soil as we have previously discussed to see the benefits.

This works well when using drip or trickle systems where a small amount of water will soak deeply into the soil. If you must use sprinkler irrigation, apply 2-5cm of water at one time and then wait several days until the soil surface dries before irrigating again.

Less frequent irrigation decreases risk of plant foliage and root diseases. Also with deeper watering plants will be less likely to create surface roots reliant on the frequent shallow watering for growth and even survival.



Greywater is wastewater from non-toilet plumbing systems such as hand basins, washing machines, showers and baths. When handled properly, greywater can be safely reused for the garden. Never re-use water from toilets, washing nappies or kitchen water. Do not use greywater above the ground on vegetables, fruit, herbs or anything you plan to eat. Only use sub soil irrigation. Our advice is to avoid the use of this grey water on your 'expensive' highly tuned and high output food production soil, and wicking beds, due to the slow but continual buildup of salts and other contaminants.

The average Australian household uses many litres of water every day, including in the:

- Bathroom – 50 per cent (Showers, followed by washing machines)
- Laundry – 22 per cent and Kitchen – 8 per cent.
- Garden – 19 per cent

Improving the quality of your greywater

You can improve the quality of your greywater by monitoring how your water is used in the first place. Suggestions include:

- Choose **phosphate-free** or **low-phosphate** household cleaners and detergents.
- Avoid Boron based products (due to Boron Toxicity)
- Use all-natural; biodegradable soaps whose ingredients do not harm plants. Most powdered detergents, and some liquid detergents, are sodium-based, which can inhibit seed-germination and destroy the structure of clay soils.

Other various issues to consider before installing an irrigation system for untreated greywater include:

- **Expertise may be needed** – consult with a licensed plumber before tapping into your plumbing system. All household plumbing work must be undertaken by a licensed plumber and comply with the Australian Standard AS 3500.
- **Use 'low risk' greywater** – your irrigation system should divert greywater from low-risk sources, such as the laundry rinse cycle, bath and shower.

- **Keep it in your yard** – your greywater must not leave the boundaries of your property. It must not be allowed to discharge into any (piped or surface) drainage system.
- **Keep it out of the stormwater** – your greywater must not leak into the stormwater system. Make sure your pipes don't discharge near any underground agricultural pipes.
- **Check for blockages** – the contaminants in greywater, like grease and slime, can easily block pipes. A filter may help to avoid this problem.
- **Store only for a short time** – don't store untreated greywater for any longer than 24 hours, as microbes will thrive. Your surge tank shouldn't exceed 80 litres. Make sure you have an overflow drain connected to your surge tank that directs excess greywater straight to the sewer.

10 Climate Change

As peak oil becomes a greater challenge for the world we run the risk of accelerating climate change all the more by considering dirtier and more destructive alternatives. As it stands we're already progressing faster than even the most aggressive models presented by the Intergovernmental Panel on Climate Change (IPCC). With global governments unwilling to reach agreements over reduction in greenhouse gas emissions then it's hard to see this improving anytime soon.

Whether you believe in Climate Change or not, it's insanity to ignore so much destruction and pollution of the planet and not expect it to cause problems. This is where we live and our children live, we need it to last so it makes sense to adopt practices that improve our planet versus destroy it.

While the overall effect of climate change is a global average increase in temperature the actual localized effects are:

- Flooding due to ocean level rises
- Increased drought / decreased rainfall in areas
- Increased flooding / increased rainfall in areas
- Higher evaporation
- Fluctuations in seasons and uncharacteristic hot/cold spells disrupting natural systems.
- Increased hurricane and other wild weather events.
- Biodiversity is lost and species are marooned in remnant enclave habitats

10.1 Soil Not Oil

Industrial Agriculture has a heavy reliance on fertilisers, herbicides and pesticides which are all oil derived, petroleum based products. Energy use is high, many costs of modern production are externalised and crops often subsidised. It isn't as low-cost or cheap as it appears.

High-tech society pre-disposes us to ignore soil health. How many of us are food gardeners anymore? But what could be more important? Everything comes from soil, everything returns to it. All the great civilisations, the Egyptians, Mayans, Greeks and Romans depended on adequate fertile soil to feed their populations. These civilisations ended when soil resources declined due to erosion and bad management.

If we continue with oil based food production, we will run out of food along with oil. As the cost of oil increases as a consequence of dwindling supply, so will the cost of food. Peak oil represents not only the need for alternative energy, but the need for alternative food production, and human inhabitant design.

11 Transition Movement

The Transition Movement emerged from work that Permaculture designer Rob Hopkins had done with the students of Kinsale Further Education College in writing an "Energy Descent Action Plan". This looked at across-the-board creative adaptations in the realms of energy production, health, education, economy and agriculture as a "road map" to a sustainable future for the town. Two of his students, Louise Rooney and Catherine Dunne, set about developing the transition town's concept and took the far-reaching step of presenting it to Kinsale Town Council, resulting in the historic decision by councillors to adopt the plan and work towards energy independence.



The idea was adapted and expanded through 2005, 2006 and beyond in Hopkins' hometown of Totnes where he is now based. The initiative spread quickly, and as of May 2010, there are over 300 communities recognized as official Transition Towns in the United Kingdom, Ireland, Canada, Australia, New Zealand, the United States, Italy and Chile. The term transition towns has morphed into transition initiatives to reflect the range and type of communities involved - e.g. villages (Kinsale), neighbourhoods of cities (Portobello, Edinburgh), through council districts (Penwith) to cities and city boroughs (Brixton).

In the United States, transition initiatives have sprung up in many communities. Transition US is the national hub and has a vision "that every community in the United States will have engaged its collective creativity to unleash an extraordinary and historic transition to a future beyond fossil fuels; a future that is more vibrant, abundant and resilient; one that is ultimately preferable to the present".



Transition US is a resource and catalyst for building resilient communities across the United States that are able to withstand severe energy, climate or economic shocks while creating a better quality of life in the process. They are accomplishing this mission by inspiring, encouraging, supporting, networking and training individuals and their communities as they consider, adopt, adapt, and implement the transition approach to community empowerment and change.

A large number of state sites have also been set up using the Ning social networking platform. These state sites, under the umbrella of a National Ning site, were set up to help facilitate, network, inform, monitor, and house regional and organizational Transition initiatives and further the rapid spread of the Transition Movement while networking related organizations, projects, ideas and activities. These social networking sites have now begun to spread worldwide.

11.1 Features of the Project

The main aim of the project generally, and echoed by the towns locally, is to raise awareness of sustainable living and build local ecological resilience in the near future. Communities are encouraged to seek out methods for reducing energy usage as well as reducing their reliance on long supply chains that are totally dependent on fossil fuels for essential items. Food is a key area, and they often talk of "Food feet, not food miles!" Initiatives so far have included creating community gardens to grow food; business waste exchange, which seeks to match the waste of one industry with another industry that uses that waste material; and even simply repairing old items rather than throwing



them away.

The Transition Network website contains a listing of the initiatives that have registered there.

While the focus and aims remain the same, the methods used to achieve these vary. For example, Totnes has introduced its own local currency, the Totnes pound, which is redeemable in local shops and businesses, helping to reduce "food miles" while also supporting local firms. This idea is also planned to be introduced in three Welsh transition towns and in Maleny Australia, the Baroon Dollar as a part of a regional transition town's project.

Central to the transition town movement is the idea that a life without oil could in fact be far more enjoyable and fulfilling than the present:

"by shifting our mind-set we can actually recognise the coming post-cheap oil era as an opportunity rather than a threat, and design the future low carbon age to be thriving, resilient and abundant – somewhere much better to live than our current alienated consumer culture based on greed, war and the myth of perpetual growth."

An essential aspect of transition in many places is that the outer work of transition needs to be matched by inner transition. That is in order to move down the energy descent pathways effectively we need to rebuild our relations with our selves, with each other and with the "natural" worlds. That requires focusing on the heart and soul of transition.

11.2 Energy Decent Action Plans

A key concept within transition is the idea of a community visioned, community designed and community implemented plan to proactively transition the community away from fossil fuels. The term "community" in this context includes all the key players - local people, local institutions, local agencies and the local council.



12 Passive Solar Please

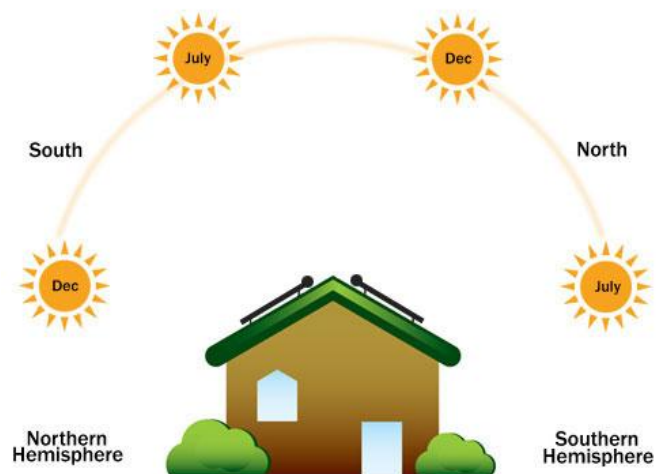
Passive Solar house design has architectural features which minimize thermal effects of seasons and thus reduce supplemental energy needs for maintaining desired comfort levels in the house.

In summer, these features minimize heat gain while providing for ample natural ventilation to maximize the heat loss. During cold winter months, these features minimize heat loss while maximizing the heat gain and storage for gradual release during the day and night. In addition, passive solar design incorporates practices for natural illumination reducing the need for daytime artificial lighting.

Prominent architectural features that characterize the Passive Solar house design are simple elements that can be incorporated in any kind of house design.

12.1 Design Principles

1. House Orientation (long axis east-west) including shading on the north side to protect from summer sun but still allow winter sun in.
2. Window selection and placement: For Perth approx. 50% north facing with minimal east or west.
3. Thermal mass in floors and walls to smooth external temperatures and provide a more stable internal temperature.
4. Insulation: in ceilings, walls, and floor to minimise heat gain/loss. Windows also need to be considered in the form of double/triple glazing and/or appropriate curtains.
5. Natural ventilation
6. Natural lighting



12.2 Integrating the Garden & Other Structures

By taking a Permaculture approach we realise the house isn't isolated and we can integrate elements surrounding the house to enhance the overall comfort. In some cases these are the only options we have in situations with existing dwellings or restricted space.

Consider trees to provide shade or direct wind. Use verandahs and pergolas to provide shade in summer but allow light in winter using angled blades or deciduous vines such as grapes. Incorporate shade houses and green houses. Add wet plants and ponds to enhance cool breezes before they reach the house. Use vegetation to provide additional insulation on walls and roof.



Additional Resources: Your Home Technical Manual: <http://www.yourhome.gov.au/technical/index.html>

13 Habits& Home Improvements

This is about reducing waste, making things last longer, go further and taking a close look at our ingrained habits that may be improved to be more thoughtful to our environment & wallets. They are common sense ideas & suggestions to get you thinking & then acting.



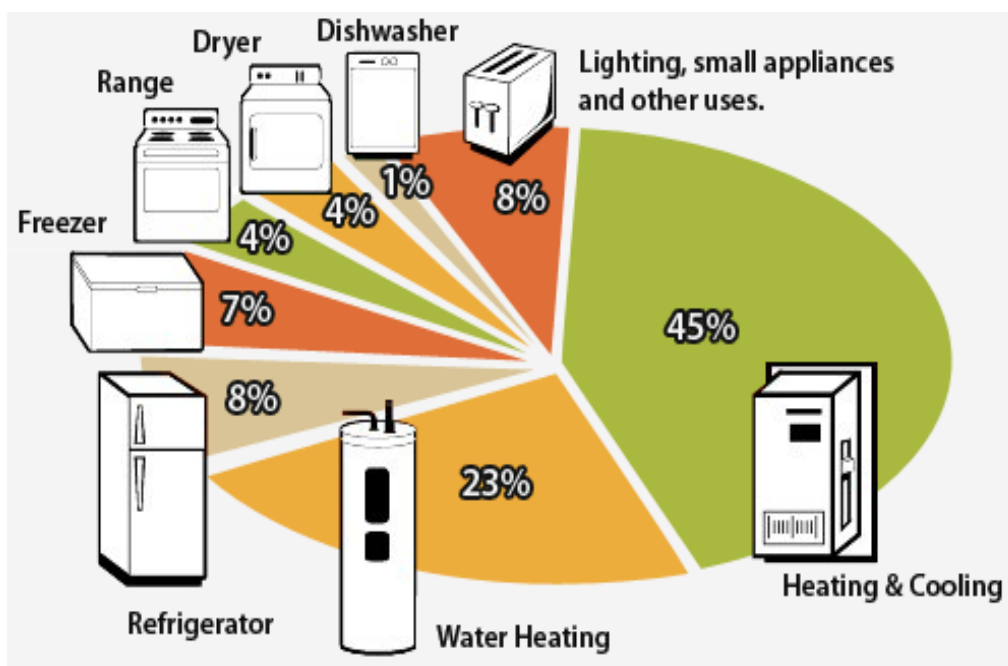
- Have a large bowl in the sink when rinsing veggies, salad, dishes etc to catch run off & then take it to some pot plants or into the garden.
- Think about how 'full' you have you tap on/running. You rarely need it 'full bore' for most tasks, a light stream is enough.
- Keep a container or tub close to your preparation area for compost/worm/chook scraps. If you have a few recycling systems at your place, you may want separate containers. Remember to empty regularly.
- Grow & constantly propagate cuttings, seeds, or sprouts on your bench or window sill where you're able to easily monitor it daily. Even the smallest but well organised kitchen can produce something with little effort.
- Grow, dry& store herbs for unique & yummy herbal teas. Get creative & try different herbs. They may be ones you wouldn't go out of your way to purchase, but if you're growing them for next to nothing, you can create some wonderful combinations. They can also make cute & thoughtful presents.
- Same thing goes for some produce you can grow in the garden; chillies can be strung together & dried, hung up in the kitchen ready for use anytime of the year. So easy to grow & takes up almost no room and again, great thoughtful presents. Bottle with some EV olive oil & garlic& instant homemade present.
- Eat less meat. Having a western diet with the traditional 'meat & veg' every night increases the stress of consumption on the market, which increases the demand. Meat consumption in diets is a main cause of land degradation, green house gas emissions& terribly energy inefficient. Start by having 1 non meat day a week or fortnight. It can save you a lot of money as well!
- Use powered appliances like dishwashers or washing machines before 7am or after 7pm. The cost of power is off peak at these times and will be cheaper to run. Check with your power company if times vary.
- Get into the habit of turning things off at the power point. If the point isn't convenient to reach, think about how things can be moved or adapted to make it convenient. Remember, you may only keep doing these things if it's either a habit or it's easy to do.
- Plan one night a week or month that you don't turn on the TV or computer, have a conversation or read a book instead.
- Most fridges don't really need to be on 24 hours a day. Buy a timer and set it to turn off when you're in bed at night, that way the door isn't being opened frequently and the cold air stays in. It can turn on again just before breakfast time.
- Lights- we all know someone who always leaves them on! But, fluoro lights shouldn't be constantly turned on & off when entering & leaving the room. This can reduce their lifespan & it actually costs more to turn them on & off than to keep them on for the day. Do a light audit at your place, plan where you may need a light on more often & use a fluoro. When I get up in the middle of the night I don't need to turn lights on, I know my house and my way around without a light. Do you know yours?
- At home or work when using a printer, set the default to double sided printing. And ask yourself if

you really need to print it.

- When starting a word document on the computer, expand the margins to the edges to increase the amount you can fit on a page. Think about space efficient layout too.
- Recycle your used envelopes; keep them in a handy spot for messages, shopping lists etc.
- Add another layer of clothing to stay warm instead of turning on a heater. And add another blanket to the bed or maybe a hot water bottle or heat bag instead of the electric blanket. Put the dog or cat on the bed an hour before you go to bed, they warm it up nicely!
- “Make do & mend” -Learn how to sew & mend your clothes. You can extend the life and use of almost everything with a little knowhow. This is a great skill for trading goods & services, & presents.
- Generally buy less stuff – say no to consumerism and bring your own bags when shopping.
- Shop at second-hand and op-shops. My favourite place is the Tip Shop!
- Utilize your local library instead of buying books and magazines.
- Say no to soft drinks and bottled water, refill your bottle instead.
- Try to cook homemade meals as often as possible.
- Buy local produce in season: Farmers markets are great for fresh fruit and veggies.
- Take your homemade lunches to work (in reusable containers).

And the old saying “If it’s yellow let it mellow, if it’s brown flush it down!” You know what I’m talking about.....!

This shows general appliance energy use in an ‘average’ home.



14 Clean Cleaning

- **Look under your kitchen sink: Remove toxic products**

WHY: Almost everyone in the world has a cupboard full of poisons under their kitchen sink. Fly spray, oven cleaner, waxes and polishes—the place is full of chemicals that display the words poison, danger, warning, or caution. Small amounts of the poisons drift from, and leak out of bottles and spray bottles, which then waft around the kitchen. Household poisonings are one of the highest threats to the health of children

- **Baking Soda** A commonly available mineral full of many cleaning attributes, baking soda is made from soda ash, and is slightly alkaline (its pH is around 8.1; 7 is neutral). It neutralizes acid-based odors in water, and adsorbs odors from the air. Sprinkled on a damp sponge or cloth, baking soda can be used as a gentle non-abrasive cleanser for kitchen counter tops, sinks, bathtubs, ovens, and fiberglass. It will eliminate perspiration odors and even neutralize the smell of many chemicals if you add up to a cup per load to the laundry. It is a useful air freshener, and a fine carpet deodorizer



- **Washing Soda** A chemical neighbor of baking soda, washing soda (sodium carbonate) is much more strongly alkaline, with a pH around 11. It releases no harmful fumes and is far safer than a commercial solvent formula, but you should wear gloves when using it because it is caustic. Washing soda cuts grease, cleans petroleum oil, removes wax or lipstick, and neutralizes odors in the same way that baking soda does. Don't use it on fiberglass, aluminum or waxed floors—unless you intend to remove the wax.
- **White Vinegar and Lemon Juice** White vinegar and lemon juice are acidic—they neutralize alkaline substances such as scale from hard water. Acids dissolve gummy buildup, eat away tarnish, and remove dirt from wood surfaces.

- **Liquid Soaps and Detergent**

Liquid soaps and detergents are necessary for cutting grease, and they are not the same thing. Soap is made from fats and lye. Detergents are synthetic materials discovered and synthesized early in this century. Unlike soap, detergents are designed specifically so that they don't react with hard water minerals and cause soap scum. If you have hard water, buy a biodegradable detergent without perfumes; if you have soft water you can use liquid soap (both are available in health food stores).

- **Mold Killers and Disinfectants**

For a substance to be registered by the EPA as a disinfectant it must go through extensive and expensive tests. EPA recommends simple soap to use as a disinfectant There are many essential oils, such as lavender, clove, and tea tree oil (an excellent natural fungicide), that are very antiseptic, as is grapefruit seed extract, even though they aren't registered as such. Use one teaspoon of essential oil to 2 cups of water in a spray bottle (make sure to avoid eyes). A grapefruit seed extract spray can be made by adding 20 drops of extract to a quart of water.

Caution: Make sure to keep all homemade formulas well-labeled, and out of the reach of children

Read more: <http://www.care2.com/greenliving/five-basics-for-nontoxic-cleaning.html#ixzz1NW5xpGTb>

15 Links & Resources

Web - Permaculture

- www.permaculturewest.org.au
- www.teraperma.com.au – *Us, your inspired educators.*
- <http://members.westnet.com.au/lwpl/livingwaters/> - David and Clare Colman (Denmark)
- <http://www.cfpermaculture.com/> - Ross Mars
- <http://www.peacetreepermaculture.com.au/> - Harry/Bonnie/Joshua
- <http://www.small-farm-permaculture-and-sustainable-living.com/> - Meg
- <http://permaculture.org.au> – great web site for all things permi
- <http://old.relocalize.net>-Post Oil Perth
- www.growingcommunitieswa.org.au – All things community gardens in WA. Excellent resource.
- www.permablitz.net
- www.veryediblegardens.com -- fact sheets, courses, our recommended books
- www.sgaonline.org.au -- great newsletters and fact sheets from Sustainable Gardening Australia
- www.aussieslivingsimply.com.au -- lots of information and help in these great forums
- <http://www.urbanfoodgarden.org>

Books –Permaculture, Gardening, Farming, and Plants

Earth User's Guide to Permaculture. Morrow, Rosemary. Simon & Schuster, 2000. An informal introduction to permaculture by an experienced teacher.

Edible Forest Gardens. Jacke, David and Eric Toensmeier. Chelsea Green, 2006. Simply the best book on forest gardens, comprehensive and readable. A good all-round permaculture book for temperate climates.

Gaia's Garden: A Guide to Home-Scale Permaculture. Toby Hemenway. Chelsea Green, 2001. Easy to use and understand tour through the permaculture garden.

Introduction to Permaculture. Slay, Reny, and Mollison, Bill. Tagari 91 Tyalgum. The best intro, includes a concise listing of principles.

Permaculture: A Designers' Manual (alternate subtitle: A Practical Guide for a Sustainable Future) Mollison, Bill. Island Press Covelo, CA, 1990. A comprehensive study guide; the bible of Permaculture.

Earthworms for Ecology and Profit. Gaddie, Ronald, and Donald Douglas. Bookworm, 1977. One of the best books on worm composting and worm beds.

Start with the Soil. Gershuny, Grace. Rodale, 1993. A superb handbook on the how and why of creating great soil.

Teaming with Microbes, A Gardener's Guide to the Soil Food Web, Lowenfels & Lewis. The Soil Foodweb organization is another great resource.

The Composting Toilet System Book. Del Porto, David and Steinfeld, Carol, CEPP, '99. Excellent reference on the subject by leaders in the field.

The Natural Way of Farming. Masanobu Fukuoka. Rodale Press. Fukuoka-san's insights into applying nature's knowledge to agriculture. A classic, hard to find.

The Self-Sufficient Gardener. John Seymour. Dolphin Books, Doubleday and Company, Garden City, N.Y. 1980. One of my favorite general garden books. Excellent colored line drawings, Soil care, propagation, controlling insects and diseases, harvesting and storage, etc.

Forest Gardening: Cultivating an Edible Landscape. Hart, Robert. Chelsea Green, 1996. A personal account of forest garden design by one of the originators of the field.