

The Permaculture Path



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*From Caring comes Courage.
From Simple living comes Generosity
From Humility comes Responsible Leadership*

Laotse





What is Permaculture?

Permaculture is about community living, building healthy environments, producing fresh local food, minimising use of harmful chemicals, maximising natural energies, ensuring clean air, water and soil, building or conserving bio-diversity, meeting our needs with natural solutions.

Modern Farming depends on Fossil Fuel. Fossil Fuels are used for fertiliser, Farming Machines, Pumps, Electricity, Factories, Plastic Packaging, Advertising and transporting the food. Fossil Fuel is not an unlimited resource. One day, there will be none left. Fossil fuel is actually valuable for many modern medicines and need not be squandered on farming when other methods are easier on the environment and people. The use of Fossil Fuels is accelerating global warming. Global warming is particularly relevant to people in the tropics. Many people live in coastal areas. The predicted sea level increase will leave many people homeless. Already the increase of Hurricanes, Tsunamis and sea changes has made islands unsafe for people. Already people have died and suffered as the result of widespread flooding¹.

Even affluent nations are concerned about the use of artificial fertilisers and farming practices. Some nations such as Singapore can afford to exclude suppliers that do not meet their basic standards. Many affluent societies have researched and scientifically recognised the link between chemicals and cancer, they can afford to instigate change and they do demand it.

¹ Paul Harrison *The Third Revolution: Population, Environment and a Sustainable World*. Winner of a 1992 Population Institute Global Media Award. Pub. Penguin London. 1992, 1993



Permaculture For All.

*"Not until the creation and maintenance of **decent conditions of life for all men** are recognised and accepted as a common obligation of all men...shall we....be able to speak of mankind as civilised."* Albert Einstein

Permaculture is an attitude that we can all afford. The implementation of a permaculture lifestyle begins in the home and is carried through to the office, the schools, the supermarket, the golf course, holiday resorts and to your future plans. We don't need government bodies to take all the responsibility.

When enough people lead the leaders will follow².

We can accept responsibility for our health and our children's future. We should consider our impact on the environment as much as seeing the environments impact on us. We all know if we throw waste over the fence, leachate and vermin will crawl back under. We know if we buy plastic bottles instead of recycle-able bottles, the landfill will incur costs, if not for us, then for our children one day. We know if we build a shade house (a structure providing moist shade and used for growing young plants, ferns and other delicate plants), trees were felled for the wood and it will fall down one day. Whereas when we plant a circle of trees, they filter the air, provide clean oxygen, encourage birds and butterflies, grow stronger over the years and become a magnificent resource.

The Permaculture Ethics:

Care of all People, Share of Surplus

Care of the Earth and her creatures.

² Blue Mountains 'Gardens of Wisdom' Hazelbrook 1995



Where is Permaculture Practiced?

There are Permaculture designers all around the world. At the 6th Permaculture conference in Perth, Australia there were over 500 delegates from more than 300 nations. When we consider that Permaculture has been practiced for just on 30 years, we can see it is a phenomenal philosophy reaching across religions, and across cultures regardless of economic capacity.

Permaculture is a holistic theory that was conceived by Bill Mollison and David Holmgren. Many others have experimented with Permaculture and found new and exciting lifestyles suited to their culture. Permaculture has attracted a diverse range of people: professionals, farmers, politicians, health-carers, and those under-employed and charitable organisations. Permaculture can aid in the growth of social justice and security for all. It crosses all barriers and racial discrimination. It promotes freedom from debt and independence in meeting our basic needs.



Food from Your Region

We eat a wide range of packaged, transported foods. Food is easily spoiled during handling and transportation. Transportation causes bruising, there are also damaging temperature and light changes.

As food naturally ages the nutritional value falls. *Fresh is always best for everyone.* Your region is unique. Food is easy to grow if you know your climate and species suited to it. Habits from other cultures can restrain your regions special

gifts. Rainwater and ground water is easily polluted. Once the soil is bared the micro-organisms that keep the soil friendly to plants die, landslips occur and with the heavy rains vital nutrients are lost into the waterways, polluting the water. Condensation and preservation of water is more important than hopes for reliable rainfall.

Consumerism has grown along with its traps of pollution, land degradation and social ills.



The Developed Nations Hidden Ills

The habit of sharing resources is decreasing in the 'developed' nations and people can easily become alienated from their communities. There is more evidence of social unrest, less security and increases in psychological disorders. Never before has there been such loss of community and culture. Teenage suicide and drug abuse is high. Charity begins in the home. People are beginning to recognise the cost of the consumer lifestyle on others and the natural world.



The "Lucky" countries

The world is full of diversity. In one area there is the tallest buildings in the world, constant use of air-conditioning, shopping for entertainment, stress and fast living. Just around the corner there are communities of squatters in little houses, chickens, wood incinerators, trees and fast cars. Not far away are farmers and

fishermen clearing and fertilising³ land more than ever before. . All are working hard to achieve a food security.

*Permaculture is about planning:
Using our brain before using our back.*



"Isn't Permaculture just an old concept with a new name?"

To many people outside the cities in the topics, Permaculture does not sound new. They have known a childhood of familiar faces, playing in cool gardens full of sweet ripe fruits. They have lived in cool and airy houses with fresh clean water to drink. They have spied a butterfly and known her intricate patterns. They have tasted fresh eggs, free of hormones and colouring and other additives. They have caught a cricket, fed and nursed their animals.

So what makes permaculture special? Permaculture aims to reduce the amount of work needed to achieve this goal. It lets natural energies do some the work that people would have to do with their planning.

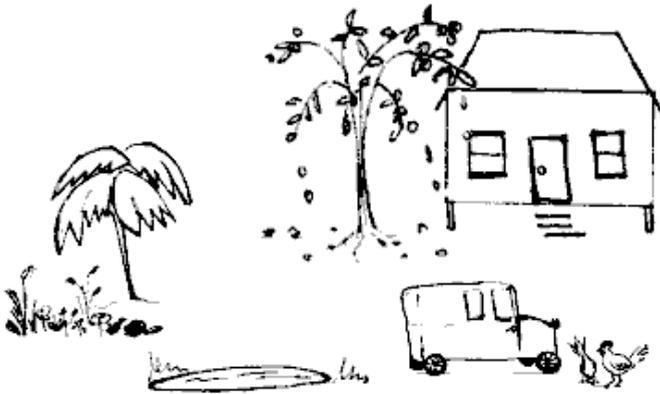
Most lifestyles simply grow one day at a time, we copy what we have always known and rarely stop to question why. We build a house that will look good and rarely ask for one that will function to meet all of our needs. We forget that we can employ nature and not just fight her.

³ 1995 Malaysia imported approx RM 370 million pesticides [Honourable Datuk Amar Dr. Sulaiman Haji Daud Minister of Agriculture 1998, *On Workshop on Organic Farming In Malaysia CETEM Report A Malaysian Strategy to Mainstream Organic Farming*]

It is not **how many** things we can put into our immediate environment (home, factory or office) that matter but **how they are connected**. We try to connect things to make them work for one another. The output of one becomes meets the needs of another.

It's not what you have but how you use it.

A tree has many uses and so does a pond. Even a house produces more than shelter for the residents; it produces some shade and windbreak for the garden. A gnarled and knobby tree that is useless for lumber will provide shade for many years. And an old hen will serve to, fertilise the soil, consume scraps, and scratch up the garden so we confine it where it can be of good use.



Here is a dysfunctional garden, the truck is a danger to water quality and to the hens and is heating up in the full sun. The pond is evaporating fast in full sun. The herb and vegetable patch is in deep shade. The house has rotten fruit on its paths and is not shaded.



Here, the same elements are better planned so that they work together. The falling fruit is eaten by hens; the hens kept out off the paths, away from cars and vegetables; the pond helps cool the house. The vegetables and herbs are close to the house and near the path so they are noticed and harvested often. Palms collect breezes, circulate the air near the house, and shade the house and truck.

There is no set model for the ideal permaculture garden. Each must be tailored according to needs of the user, the climate and situation. Permaculture design works best through observed. The user takes an active role in creating a Permaculture lifestyle.



Old Theories, New Techniques

Permaculture uses old theories and techniques but it is the first design system that aims to imitate nature. Bill Mollison, along with other important theorists of the time such as Lovelock, realised that nature is resilient. Nature consumes its own waste. Nothing is wasted and there is no pollution. Lovelock showed there is no life on Mars because there is atmospheric change not constancy in its atmosphere. Earth adapts, create constancy on a global scale in order to secure a suitable atmosphere for life in general.

Mollison went one step further and suggested that people could create their own systems based on an eco-system. People need not live in a rainforest, but create a similar environment that is cyclic. A cyclic environment has needs met easily and naturally by neighbouring elements. Such systems use natural forces instead of human labour as much as possible. Many old farming technologies are labour intensive and fight natural forces. The farmers fight the heat of a dry spell with irrigation, fight the 'weeds' (unwanted plants) with cultivation and fight rains with drains.

Fukuoka showed that by careful observation he could work within the natural forces to reduce his own labour and increase the productivity of his farm.

Lovelock showed that the planet earth is a giant living organism, it responds to changes if it given enough time, it absorbs natural imbalances and slowly corrects them. What we see around us is part of a larger system.

Ken **Yeomans** Snr. showed the commercial proof of managing farm water naturally.

Alan **Savoury** invested his time in cell grazing and imitating prairie animals in management of hoofed farm animals on prairie soils. He observed the impact of humans in Africa and recognised them as a vital part of the natural food chain - the web of life (*which is discussed later*).

Many great thinkers are indebted to others. Mollison is as much indebted to his fore-bearers and fellow theorists as the great modern aviators are indebted to Leonardo di Vinci among many for theories about flight.



Permaculture Imitates Natural Eco-Systems

Permaculture is modelled on diverse eco-systems because they are self-sufficient. Eco-systems re-cycle energy, absorb waste and are highly productive. They depend on great diversity to adapt and overcome change. Forests need only Sun and Water whereas intensively farmed fields need clearing, ploughing, seeding, fertilising, watering, spraying and harvesting all at once. Intensive farming is very labour intensive. Nature is often the farmers enemy and sometimes the farmers ally in intensive farming.

We can create productive systems based on this natural model. Everywhere there are forests from which we can learn, that teach us about our climate and how to use natural energies. There are diverse models remaining in the tropics and as recently as two generations ago there were people living in harmony with their environment such as the Semai people in Musoh, central highlands of Malaysia.

Permaculture environments produce less pollution than conventional cities or agricultural villages. There is less need to cut into remaining stands of old natural forests, because less land is devoted to agriculture. Permaculture land increases yield and diversity and decreases pollution and waste.

Permaculture Technology



Permaculture searches for traditional methods as well as modern soft technologies (such as wind turbines, solar power, micro hydro systems). Its main aims are to cut back on limited energy stores. These limited energy stores are forests, fossil fuels and genetic material. We aim to reduce our dependence on these energy sources and increase our use of alternative energy stores that can be used again and again, with little pollution. Permaculture technologies are constantly evolving as people learn, share and celebrate their successes.



Traditional knowledge

Some traditional methods we can employ are gravity feeding, integrated pest control, rotation of crops, traditional housing designs, seed saving, community banking, and community-based ethics.

The Basic Needs of the Natural World

The natural world and all her species *including us*, needs clean air, clean water, clean soil and genetic diversity. People need food, security, social justice and safe housing. They also need friends, family and a sense of belonging.⁴

⁴ Grahame Bell *Permaculture in a Nutshell* p.7

Permaculture for Children



Imagine living in a community development that was surrounded by environmentally responsible agricultural lands. There would be fresh food at your door, shared land for recreation, naturally clean and filtered water and air, an opportunity to exercise as they observe nature, connect with friends and increase their productivity.

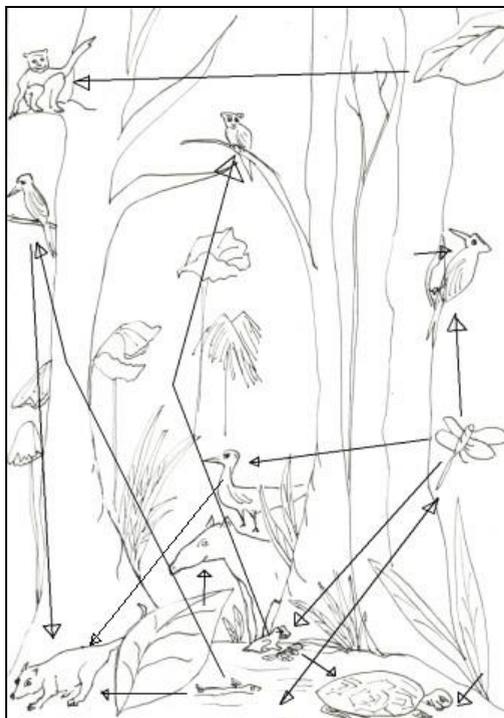
People can still engage in diverse and meaningful work, build their sense of complex worth, feel part of a family and community and this would extend to feeling part of a

healthy nation.

Children learn by observation, seeing, hearing, touch, smell and taste. When we open the possibilities of interacting with the natural world we build their creativity, comprehension, awe and understanding of complex patterns, intricate movement and chemical transformations. These are lessons that no formal training can re-create. Brilliant adult scientists cannot always explain and can only crudely imitate nature.

Who Would Newton Be, Without His Apple Tree?

The Web of Life



In the web of life in a Malaysian forest the Tapir *Cipant* is dependent on leaves to eat. The DragonFly *Pepatung* feeds on water and other insects; the Pheasant *kuaua* and Native Chicken *Gallus gallus* need leaves, worms and insects including the Dragon-fly. The Civet *Musang Merah* eats small animals including young pheasants; Tortoise *kurra* needs herbs and may eat small animals such as frogs; the Frog *Katak* needs insects and eats pests such as

mosquitos. The birds eat the frogs. The Woodpecker *Belatuk Mas*, Eagle Owl *Bubo Hantu*, Common Owl *Burong Hantu* and Kingfisher *Pekaka Api* eat the fish and insects and leaves. The fish eat small water creatures and insects and help keep the ponds aerated and fertile. The soil's micro-organisms consume animal waste. All creatures enrich the soil through their waste. All plants need fertility soil. The soil is made fertile by the micro-organisms. All life is connected. People can live in harmony with nature if we return something enriching to the system.

Before and After Permaculture



BEFORE Permaculture:

RESOURCES BROUGHT IN:

Water: Supplied from Huge City Dams that impede major water courses.

Energy: Coal, Coke, Gas (for electricity) Disposable batteries, Timber,

Materials: Construction, packaging, cleaning chemicals, regular changes according to fashion.

Food: Packaged, processed, agro-chemicals.

Air Unfiltered

RESOURCES SENT OUT:

Water Sewerage, Grey water, Garden run-off, Rainwater lost, chemical pollutants from cleaning fluids, cosmetics, disposable batteries, etc.

Energy: Heat and Light, unburnt gases.

Air and Noise Pollution: Unfiltered Dust Particles 'Rubbish' Toxic, nappies, plastics, car fumes, car bodies and parts and spills, Mechanical toys and entertainment, maintenance machines such as mowers etc.

LIFESTYLE: competitive, repetitive, consumer driven, entertainment sought from outside immediate community consumer driven, pressure to conform, predictable and controlled input from media and friends, controlled and measured education and limited exposure to the natural world and environment.

Basic Changes to Create a Permaculture System:

We have to design for physical and cultural changes to the site and the surrounding area promoting durability and natural choices.

- Harness and use natural energies (Sun, Wind, Water, Flora and Fauna) dedicate 15% of total space to storage of water (this can be as sub-soil storage, in forests or above ground in shaded ponds. They are shaded to minimise evaporation). Ensure that rain water is optimised, sewerage is utilised, pollution is avoided. Only clean water should leave the site. Use only natural fertilisers. Select strong plant species. Build or renovate to create climate-appropriate buildings [sun, wind, and water]. Encourage people to exercise naturally in the course their daily activities by as walking. Produce local fresh organic food.

- Reduce impact and losses of natural resources (heat, shade, soil, water, flora and fauna). There must be no opportunity for soil erosion, hence bare soil. Reduce the risk of sunburn to plants, animals and people. Preserve existing rare species and native animals. At least 20% of the site should serve to meet native animal needs. Choose Flora and Fauna that live well together and not cause conflict.

- Community Sharing encouraged by establishment of Meeting places, Eating Houses, Transport, Sports Facilities, Entertainment areas, Play Areas. Shared gardens can serve as a focal point, a place to meet and build social interaction. Many of these spaces should be multi-functional.

- Choices include preference for biodegradable, durable and re-useable resources. Daily consumption is reduced and selective.



AFTER Permaculture RESOURCES BROUGHT IN:

Water: Less supplied water, Rainwater, localised humidity and condensation, natural cloud seeding.

Energy: more natural lighting and heating, shade and insulation. The capture of cooling breezes, natural air conditioning.

People work: interesting, interactive and diverse, productive, changes according to seasons and evolution of the system. *Materials:* local, natural, recycled, organic, and sustainable with minimal packaging and transportation. *Food:* fresh, local, and nutritious with minimal packaging and processing. *Air* filtered and directed.

RESOURCES RE-USED THEN SENT OUT:

Water Compost toilet, grey water to garden, natural water filter system, poultry, and fish, birds and wildlife access water.

Energy is sustainable, and renewable. There is a lot less 'Rubbish' because most food and packaging, furniture and clothing is re-used, shared, recycled, composted and then finally mulched.

LIFESTYLE: interactive with unpredictable natural elements, interest and participation in local community, educational and health conscious. 'free' entertainment from nature (eg. bird watching). Surplus produce is shared, less pressure on existing farms and forests, Higher real estate value on the property, better community and local environment, safer environment for all especially the children and the elderly.

The Problem is the Solution

Sometimes, through observation, the answer to difficult problems is to turn the problem to your advantage. For example, if your problem is too many snails, start a snail farm. You could supply organic escargot on the world market or simply build up a calcium rich food for your hens and a composting system for your scraps.

The Chinese empress Si Ling chi discovered that the pests on her royal mulberry trees spun beautiful silk threads!

Pollution is simply an unused resource

- Plants can filter silted waters. They trap the minerals, and readily absorb them and converting them into food or other useful plant products such as fibre or bio-chemicals.
- Plants breathe in CO_2 and breathe out oxygen. People breathe out CO_2 and breathe in Oxygen
- Slugs and Snails are not pests if they are used as food for other animals. A duck eats slugs and other pests and provides natural fertilizer, eggs and meat.
- Sewerage (Animal and Human) is not pollution if it is processed and used as fertilizer. There are international systems sewerage treatment systems that make agricultural-grade soil.
- Recycled water can be used by large industry such as Steel and Pewter manufacture.
- Organic waste from farming such as sugar cane, padi, coconut, rubber and oil palm [Daud 1998] can be recycled even as material for Bio-gas plants which are being installed in city waste management plants world-wide.
- Metal and Wood can be re-used or recycled.

It is pollution caused by the use of fossil fuels that is that hardest for the natural world to absorb. Plastics and oil/petrol related products need to be superseded by natural energy efficient systems.

The 6R's of Recycling

Refuse and Reduce

Aim to reduce imports into the system. Refuse to buy items that are over packaged. Choose products with packaging that is not biodegradable or reusable or recyclable. Clothes, furniture and white goods (if repaired to maintain efficiency) can be worn longer if they are good classic designs, they should be handed on to others and not simply thrown in the rubbish. Buy less gadgets, or buy one that fits several functions. Share or hire equipment. Choose re-useable storage equipment such as computer discs rather than paper and reduce need for printing. When out shopping - take a basket, or use the cardboard boxes the goods came to the shop in. Say “no thanks” to plastic bags. At the market, take your own containers. At the bakery ask for paper bags or take a basket and keep items fresh at home in large canisters. You don't have to buy new containers either. Many second hand stores are filled to the brim with unloved good quality containers and canisters.

Re-use

Choose products that are able to be re-used. Avoid so called disposable items that cannot be recycled, much less re-used. Computer Discs have a good life for re-use. Rechargeable batteries ensure there are less toxins in the soil. Cloth nappies

cost only a little more initially than disposables. Why not buy a small towel when you're out and have forgotten a nappy? Nappies are great rags later too. Cane baskets more comfortable to carry than plastic bags, they don't cut into your fingers. Paper bags should be re-used before recycling to store dried seed etc. Re-use any plastic bags. Plastic is not necessary. Before plastic, people used oilskins and paper to transport wet items.

Re-use before Recycling

Re-use is the cheapest and most efficient use of materials.

Re-use means the item stays the same, it may be cleaned (as with bottles) or treated in a special way. An example of re-use without any energy use in modification is the use of old boxes for storage then to provide beds for poultry. The basic shape and function of the item is unchanged (until the poultry have made their mark!).

Repair

As mentioned above, buy goods designed for repair. Less than 20 years ago you could buy even small items such as pencil sharpeners with replaceable blades.

Recycle

Most organic items can be recycled in the home system, plastic can be recycled too, but there may be harmful gases let off during the process. Get some worms onto the job if you only have a home unit, use paper waste as mulch and many paper items can be used for craft in schools.

Recycling involves treatments that changes the shape of the item, even if only temporarily. Paper or Aluminium cans are crushed and then re-made. The final function of the re-made item is the same but it is not as energy efficient and immediate as re-using the item. Recycling may involve the manufacture of a different item from the materials Eg. paper is re-cycled to cardboard, or the old bug-infested, manure enriched cardboard boxes from the poultry are soaked (this kills most parasites) and are then used for sheet mulching.

Re-design



Redesign for durability; ease of maintenance and repair, use of materials that are easily re-used and re-cycled without high-energy input or toxic by-products. The use of modules in equipment can be seen as design feature to increase waste. Modules in many products such as white goods and cars are self-contained, and can usually only be

disassembled for replacement rather than repair. If we design for common parts, sizes and materials with ingenious combinations and application then the design has greater capacity for re-use and repair. Few cars, or even computers, have common parts from one type much less one brand to another. This has often been to enhance the uniqueness of the product, 'It's different, better, sophisticated and new' is the catch cry. Lets start demanding that 'it's durable, repairable and a life-long investment'.

Permaculture is mainly about re-design. Clever design finds multiple functions and use for the waste. Waste is unused output. We need to re-design our cities into self-reliant villages and our home systems into responsible multi-function productive spaces.



Differences between climates and appropriate technologies

Some nations of people have not adapted well from the vastly different environment of their pioneers or colonisers. In Australia, most people still eat food that is predominantly European. They have carved the landscape (much of the thin soils have blown away), irrigated it (leaving in its wake widespread degradation). All this has been part of the consumer drive to eat European foods. European foods enjoy deep soils, cold winters reliable rain. Some soils lack vital minerals that European food species require which means farmers have needed to apply minerals and fertilisers to remain competitive. Many European fruits succumb to the native pests such as fruit fly and this requires pesticide. Some native species have grown to become weeds with use of excessive nitrogen and this encourages farmers to use herbicides.

Very little of the modern Australian diet is actually easy to grow in Australia. Because of the relative affluence of the nation (due to the sale of its primary resources) people can demand these difficult-to-grow varieties. Some fruit is transported over 4000kms. Very slowly tastes are changing; people are trying a variety of new foods. This is not as part of an interest in the Environment but as an openness to international ideas and part of the ease of information exchange. This diversity will enable farmers to grow more foods with sustainable practices. People in the tropical islands have enjoyed centuries of fresh, nutritious food. Lately, with the growth in affluence in Tropics, people are becoming interested in European flavours. Their interest and research has begun in methods of growing Strawberries, Tomatoes and other temperate European foods. However, the flavour and diversity of traditional foods is sufficient to ensure its future. Yet, people all around the world

enjoy Tropical fruits as superior fruits. People in the Tropics have reason to be proud of their national foods and have no difficulty in growing them. Let us all explore and support foods that grow well in our own region.

Different strategies for Different climates

<i>Climat e</i>	<i>Housing</i>	<i>Garden</i>	<i>Food</i>
Cold	Thermally dense, coupled with greenhouses, root cellars. judicious use of snowdrifts for insulation.	Greenhouse and indoor ferments	Ferments, sprouts, pickled food from summer crop, root stores.
Cool Temperate	Greenhouses attached to houses for natural heating. Insulation wood fire and solar energy.	Mulch in spring open orchards Water stored in dams, ponds and swales.	Apples, Brambles, Strawberries, Tomatoes. Food is stored for use during winter.
Sub-Tropics	Large windows on the sun-side. Insulation, ventilation. Wood fire and solar energy.	Living mulch creation of diverse micro-climates.	Most cereals fruits and greens.
Humid Tropics	Biogas Ventilated house surrounded by cool gardens	Morning sun Mulch Western shade Water monsoon stored for dry seasons. Polyculture systems with good mix of land and water	Rice, Mango, Seasonal foods can be grown year around.

species.

Dryland Tropics	Cooling tower technology Water storage underground for cooling, shade and Ventilation. House near to water source and storage . Biogas.	Condensation harvest and collection ie. mist nets, storage of monsoon water for dry period, pits for water harvest on flatlands. Natural irrigation technologies to grow foods during the wetter months.	Food is dried and stored for use during dry season.
Ozone depleted regions	Deep shade	Water conservation and dappled shade during midday sun.	Hardy species

Consumer choices

We cannot simply consume our way out of environmental degradation but we can adjust our consumption to lower our impact on the environment. The first step is lower consumption and put the act of consuming in it's rightful place. Today, *consumption is entertainment*. Instead of going to the park to play, watching a musical or a theatrical performance, going to a party at a friends house, visiting relatives, picnicing with neighbours, enjoying a game of badminton or rowing a boat, most people go shopping.

Shopping malls hype up the thrill of the 'hunt' and provide a bit of bad theatre and canned music as free extras. Some people quickly become trapped in the fashion forces. Whatever you

buy today becomes 'yesterday's fashion tomorrow. The reality is you can't win. The shops need us to keep losing, to keep striving to have the 'best' and the latest.

Instead of loving our image, we must love our inner self.

By loving our inner-self, we learn how to love.

From love come peace, trust and growth.

Biodegradable products

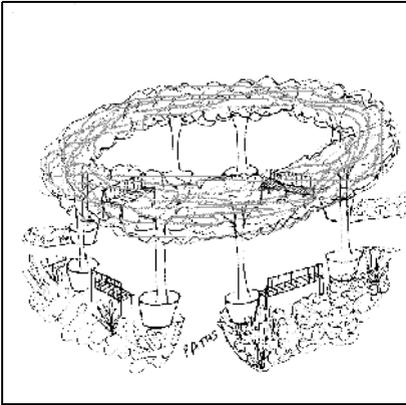
Today we can buy plastic clothes (polyester), plastic cars, plastic furniture. For years now there have been petroleum-based cosmetics such as hair gel, mascara, and petroleum-based medicines such as baby oil! In developed countries, we have lost the art of making water-tight material that is not plastic, and only just re-discovering the value of natural medicine and herbs.

The problems with most plastics are mainly that they become landfill. Plastic is toxic when burnt and leaches dangerous chemicals. The chemicals may cause subtle but long-term changes such as genetic changes in our children. Leading scientific figures such as David Suzuki publicly exposes this. Why risk plastic when other materials are available? There are many countries with splendid traditional crafts using natural fibres and a wealth of medicinal plants, their economies would benefit greatly from our interest of these products.

Biodegradable products decompose, that is they eventually turn back into soil and these products should be favoured. Short-term products such as wrapping for presents should be re-cycled paper rather than foil or plastic, longer term products such as furniture can be beautifully crafted from wood (even recycled) or bamboo. Items that need to be durable can be made from good quality steel instead of plastic.

With clever design we can rely upon living resources.

Biological resources



Instead of using dead materials such as timber or steel, why not try living resources. Here is an example of a living resource, it is a circle of trees growing to form a ring of shade. It improves with age and a little maintenance. Living trees can also be grown and then trimmed as required to be an awning in front of a window, or a shade house for plants or a carport. In a YHA in

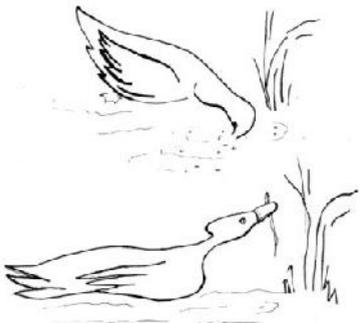
Wales a shade-house has been constructed using *living willow* only as the framework. Many plants will form a strong fence that outlasts all other fencing materials. Thorny plants will form a lasting and impenetrable security fence.

Animals such as geese are good alarms and excellent lawn mowers, fertilising the soil as they mow.

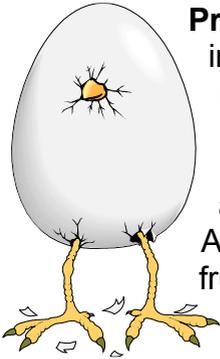
These are all examples of biological resources.

Degenerative and Pro-creative wealth

Degenerative investment means that the investor is not expecting a growing income from the investment except that the market value of the item may increase (Eg. additional homes, jewellery, Arts). In fact, the

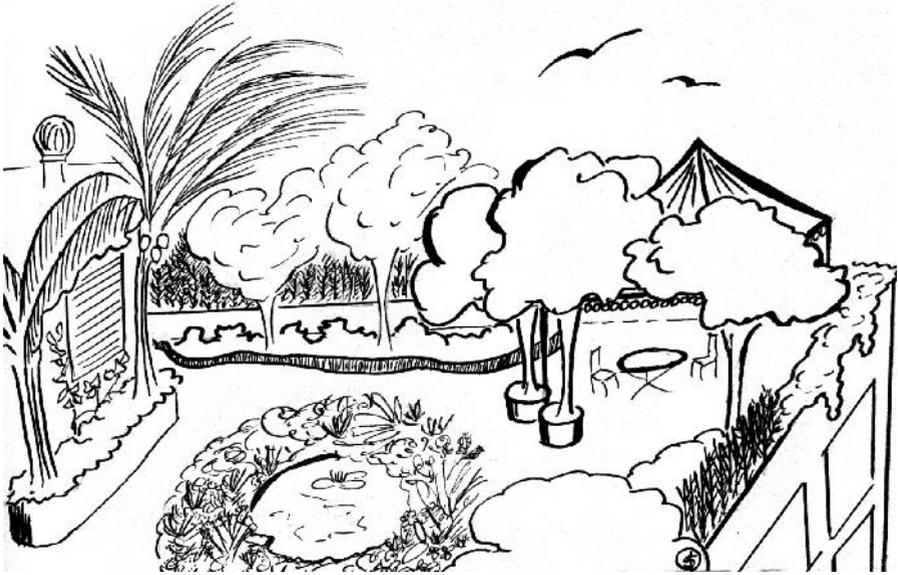


investment will age and deteriorate over time and require further investment for maintenance. Of course the item may be enjoyed and provide another function apart from its purely investment purpose, but when analysing an investment, you should realise what economic forces you rely upon to sustain the 'wealth'.



Procreative wealth can develop a growing income from the item. The income and rewards may be **indirect** (children's education, community facilities) or **direct** as in an orchard, forest or nature reserve. As the investment ages it grows and accumulates more elements. An orchard, vineyard, or forest reproduces more fruit, more lumber and more trees. Being in cooperation with nature, the orchard becomes a habitat for wildlife. Animals and flowers may be added to the produce list and the owner reaps more as it ages. In Vietnam, ducks are used commercially to eat pests in the rice crops. They are introduced at particular stages in the rice crop management. The result is no chemical pest control, food for ducks and extra fertiliser (the duck manure) for the rice. There is the additional harvest of ducks, which are a self-renewing procreative resource.

Education is a procreative investment. An educated person learns more each day from the moment we awaken their thirst for knowledge and confidence in their observations. Not only does it directly benefit the individual but the community who supports them and field in which they study.



Roof Gardens Greening Cities

Thousands of years ago, maybe even before the Hanging Gardens of Babylon, we have created gardens on rooftops. Today rooftop gardening is even more widespread. Rooftop trees (up to 7m tall) can be seen in many major world cities. Modern Institutions such as Hospitals and Universities are also including gardens to increase quality of lifestyle, air quality, food source, composting facilities; relaxation and entertainment.

Roof gardens can be a permanent work of art. They can be designed as part of an internal natural lighting system. The space devoted to the roof garden can extend office meeting space. Roof gardens can be designed as a natural filter for office air before it enters air conditioning units. In the Hanging Gardens of Babylon, water was cooled naturally by simple

underground systems. Many Arabic designs include waterfalls to increase cooling.

With modern farming techniques similar to hydroponics, using nutrient rich water and light soil particles, plants can be grown easily on rooftops. The nutrient-rich water can use organic not synthetic fertilizer. There can be small animals and ponds included to cycle nutrients and purify the water. Rooftop gardens create warmer climates, which enable more tropical species to be grown. Rooftops enjoy maximum daylight hours because there is less shadow from the buildings. Even hot dry Mediterranean species can be included because the drainage is controllable.

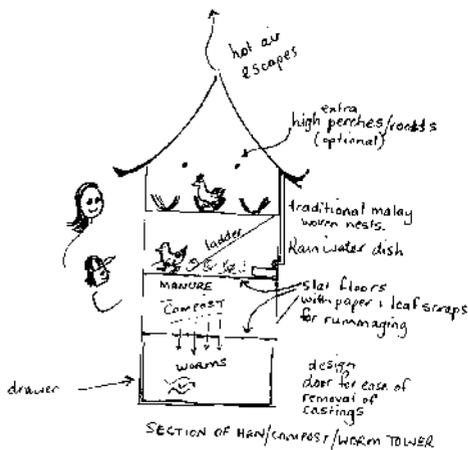
Simple requirements for rooftop gardens:

1. Suitable load bearing capability in the roof;
2. A membrane to prevent water leaking from the garden onto the building and resulting in trapped moisture; there are very good cell-like membrane systems on the market that even allow small water courses to be constructed over shopping malls
3. Protection for the membrane so that people working, plants roots etc will not damage it (this can be simply a layer of good cement or a set of pavers);
4. Light-weight soil such as compost with some light rock particles such as volcanic rock or clean slag.
5. Position windbreaks and shade structures according to your climate. The windbreak can be a hedge of bamboo or other light weight and tall plants. The shade can be partly from structures used by visitors such as gazebos. In the short term, you can construct shade from trellises and tents of bamboo or branches.

Position your roof garden to catch morning sun. Utilise the shadow of a building on the west for the garden. Roof gardens require more water, wind protection and shade than land

based gardens. They are ideal for cities because the land below is usually heavily trafficked, poorly drained, requires security, is located within areas of expensive real estate and is shaded.

Quality eggs from happy hens



Here is a hen tower. It is a natural and fun digester of waste for a family in the city. It provides entertainment for the children, delicious fresh eggs for the family and fertiliser for the garden, pond or fish tank. You can put all food scraps, peelings and weeds into the hens compartment. Any material that the hens don't eat falls through the slatted floor to the

compost compartment. From here it combines with the hens manure and is composted ready to fall through to the worm section at the base. The worms like to eat partly composted material.

The liquid that comes out at the base is rich fertilizer for the garden or pond and the composted waste is clean, fresh soil. The worms can be used for fishing and any surplus can be fed back to the hens.

Rainwater is collected for the hens from the rooftop. This system can be kept on a balcony or small area at the back of the home. If you don't try to put too many hens in it, you will find they can live happily in their tower.

If for some reason the local authorities will not allow hens, you can keep quail or pet birds.

How to create a low maintenance 'recycled waste' garden

Good Pets

Some pets help you reduce household waste. You can get a couple of hens, a small hamster or beautiful talking bird as a pet. These pets will help reduce your wasted food, and peelings. Their dropping can be used directly on the garden as fertiliser. Alternatively start a worm farm or compost bin. (see below)



A Little Plant Nursery

Your plant nursery is the most important element in the home design. For Unit dwellers it can be in the kitchen on window shelves, in a sunny bathroom (especially water loving species such as lemongrass or water chestnuts) or balcony - avoid hot or rarely used balconies. **The plant nursery must be positioned where you will see it closely everyday.** Many people get keen on the weekend, put in cuttings and seed and then forget the plants during busy week days.

We place the pots on the edges of sheet mulched beds near the office and house. They sit on loose mulch, this keeps their bases moist, they are also covered with mulch and protected by bigger plants from afternoon sun and wind.

Soil

Collect soil if you have none from demolition blocks. (One lady managed to regularly dig up soil from her mother's place, put it into pots, transported it by bus and carted it up to her home unit balcony. Others have collected soil in baby baths and dragged it home). Start composting as soon as possible. Balcony composting is possible if you have no balcony and a dark unit, don't despair - the worms will love your place. Keep them under the sink, in the laundry and in the closet. They don't smell unless you tip them out.

Growing Plants without Soil

You don't need soil for sprouted seed and watercress. They grow easily and cleanly in the kitchen. Some plants will grow on a layer of paper and cardboard covered by shredded paper or straw: these include potatoes, sunflowers, parrot mix.

Seed Raising Mix

Cheap and environmentally friendly seed raising mix can be difficult to make. Compost or worm castings are ready made seed raising mix. Good seed raising mix needs only **two components**: lightening and moisture retainer. Lightener: try to avoid sand as it is usually mined to the detriment of a natural ecology, try chopped up used plastic and polystyrene (we don't use these in our system because the ducks eat polystyrene and both are hard to dispose of). One useful by product from the steel industry is fine slag, it is as fine as slag, slightly alkaline and grey. Moisture retainers: ground coconut fibre, [commercially available: *Coprpeat* by Debco], fine sawdust (bit acid), mushroom compost [alkaline?]; sphagnum moss (it is expensive and slowly renewable) but probably preferable to non-renewable peat.

We grow sphagnum moss in a shady moist area. It grows slowly.

Recycle your mix. Only seeds need seed raising mix. Once the plant is juvenile and ready to plant out, save the mix that does not hold roots. If you are experiencing fungal attack - sterilise the mix in your oven or in a container on a slow open fire, or inside a hot pile of decomposing compost (African technique). Also, clean all pots before use or use freshly recycled plastic margarine/milk or other containers. Seed raising mix does not need fertiliser. **Seeds have their own in-built fertiliser** until the plants are juvenile, replant into soil at this time for their nutrients.

Tools.

Rejuvenate old tools with new handles, borrow tools from people who may not use them often. Pay for them to be sharpened as a token of thanks but always give the tools back else you'll cut that friendly supply. Don't wait until the rightful owner asks for them back.

You can use large kitchen utensils that have started to rust. Potting requires no more than a stick and pot shaped containers. Cheap scissors can be used to collect cuttings.

Look after your tools, they will be less likely to be stolen, buried in the garden or cause damage to someone. Request tools for birthdays etc. Let people know what you are searching for, and put the request in local shop window, LETS notice etc. Go to second hand shops and garage sales with great discipline, don't buy something else instead. Second-hand tools are rare because they usually get misused and forgotten. Obviously people don't need a lot of tools. You do need a few good tools if you are trying to work a large area. Some tools can be hired: these include earth moving equipment and heavy mulchers.

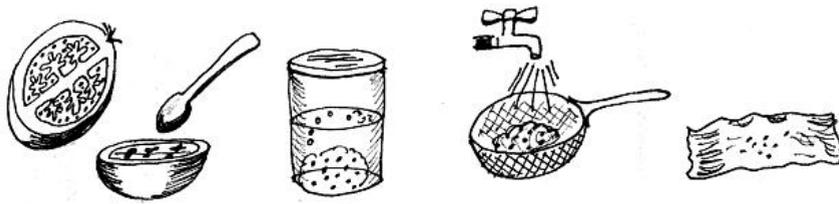
Seeds for Free Plants

Save all the seed from the soft fruits you buy: Eg. Watermelon, Rockmelon, tomato, passionfruit, cucumber, red capsicum. Try planting out the soggy left over alfalfa sprouts. Coconut is easily grown from the nut, simply place on the ground and water it regularly. Potatoe. Sweet Potatoe Ginger, Tumeric Water spinach, Kang Kong and other foods can be grown easily from pieces bought at the market. Save carrot, parsley tops *Umbelliferae* and propagate these on soggy paper or cotton wool (use whatever you have available, don't go out and buy it.)

Let the children grow 'Bird seed'. They can simply throw it onto a layer of shredded paper, discarded coconut fibre, straw (one bale will go a long way this way), or old grass clippings. No, it will not grow birds! But it will grow to give you more seed, some edible and tasty seeds and your first crop of mulch. Mangos, Lychees, Longans, Rambutans, Avocados, Brazil nuts, Macadamias, Citrus and many other plants CAN be and should be grown from seed. You can learn to **graft** onto these plants once they mature.

How to save seed:

All seeds benefit from allowing the fruit to mature fully. Most wet seeds (those in wet fruits not dry in the pod) can also prove more viable if fermented for a few days. Put the seeds into a jar. Don't bother to remove the pulp at this stage. Keep the jar sealed or the smell will be unpleasant and the ferment will develop mould. After 3 days, wash and sieve the seeds to remove any pulp. They should be easy to separate from the pulp due to the fermentation. Dry the seeds on absorbent paper. You may find that you can plant these seeds when the planting season comes, without removing them from the paper.



Mulch

Don't plant until you have a good stockpile of mulch. Mulch comes in many forms: old letters, docketts, Junk mail, old rags, paper wrapping, paper packaging, newspaper, cardboard, grass clippings (other people's grass clippings is much better as they take the time to rake it and put it into bags ready for you). These bags can store and compost the clippings for you while being used as weights to hold down sheet mulch in the garden. *See making a no-dig garden below.*

Weights for Sheet Mulching

Use heavy sticks; off-cuts of wood, boxes, potted plants, water containers, rocks etc., to hold the mulch in place. This helps retain more water in the mulch and stops it from blowing away. The weights can be reused once the mulch is moulded and stabilised.

Plants

Walk around the neighbourhood speaking to people about their garden, asking for snippets (take a bag and pair of cutters with you) often they will give you plants to get you started. My advice is to take what they offer with thanks - don't knock back something because you haven't learnt a use for it yet. Except for highly invasive plants in vulnerable locations, most plants will be, at the very least, pioneer species. Avoid growing plants that are difficult to grow in your area until you have

established a good microclimate, rich soil and natural supply of fertiliser (animal manure, duck water etc).

Propagation

Try to be self reliant with your propagation. Your plants will most likely die from neglect (lack of water, or too much water, root-bound in their pots, falling over, sunburn etc) than from a lack of fertilisers or hormone powder. They need good care but even so, natural selection needs to play an active role. You can be very successful without chemicals. Mankind was successful for thousands of centuries before specialists manufactured chemicals. In fact, we are now in danger of losing the knowledge of natural methods devised over the generations because we now rely on commercial propagation equipment.

Pots

There are usually more pots about than people can re-use. You don't need to buy any if you ask friends and neighbours. Some people use compacted earth instead of pots. Other people use old food pack (cartons, plastic tubs) Clean the pots with soap mixture and add eucalyptus or teatree oil or other native disinfectant if you suspect fungal diseases.

You can sterilise ceramic pots in hot compost heaps with the seed mix already in them. This method also kills weed seed.

Hormone powder

Avoid hormone powder and accept some losses in the strike rate of cutting. Hormone powder is for quick results as required by nurseries. Commercial powders can be a danger to your health and to the environment.

Substitutes include: honey; powdered bark of willow or coral tree. And dried Butter milk. This works well with many plants.

Batryic acid in the butter milk is similar to one of the plant growth hormones (*IBA indole batryic acid*). [Judith Brass BSc].

Direct seeding

Try **broadcasting** seed, we do for cereal and green cover crops such as sunflower. This means simply tossing the seed about, sometimes covering it with a loose mulch.

In areas with little vegetation cover, low and unreliable rainfall and the threat of hungry birds, you can protect and seeds with a mud mixture. The mixture used successfully in these areas contains mud, manure, and seed rolled into **seedballs**. The seed is protected until heavy rains come and is nurtured by the mud and manure.

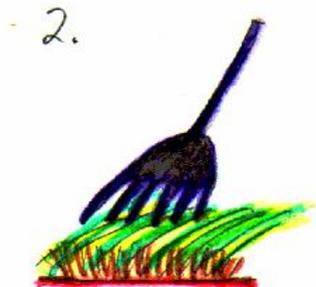
Making a no-dig garden

No-dig gardens are especially useful in the tropics as they help rejuvenate the soil, protect it from erosion and suppress weeds.



1. Let the grass grow VERY long. It will start to die off at ground level.

2. Rake the long grass downhill
OR simply drag something over it



to flatten it. If you are building a garden on a cement slab rather than on grass, then simply lay plastic or sappy leaves such as banana leaves directly onto the cement.



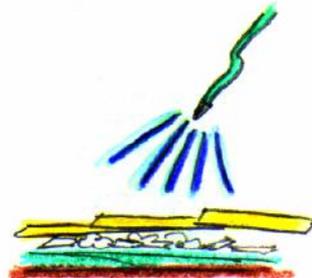
3. Lay small pieces of paper waste loose and light pieces of paper should be placed here to prevent them from blowing away. Use kitchen waste such as packaging, old junk mail, newspapers etc. Wet the papers with hose.



4. Kick any cardboard boxes flat by standing inside them and kicking the sides out. Lay the cardboard flat on top of little pieces of paper. Some people don't use cardboard and coloured paper as it may hold toxins. Some people have few alternatives and using

cardboard boxes that are not always recyclable reduces landfill.

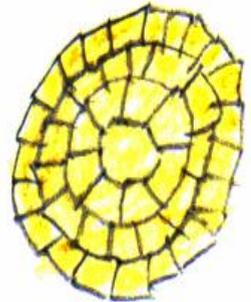
5. Lay sheets of cardboard with a good overlap (10cm). If there is a gentle slope, start laying the cardboard at the top and lay along contour so that surface rain water will be caught by and penetrate the layers



6. PLAN VIEW



6. Fan shapes are ideal for creating gently curving edges. Circular gardens are an extension of this shape, using the spiral principle. They are more resilient



and less easily invaded by running grasses.



7. Place logs on edges, leave some paper/cardboard protruding. This protruding edge can be covered by dry light mulch. Fill the area with composted organic mulch such as grass clippings.

8. Last step. Put branches on top to deter vagrant animals (make sure the branches are free of seed). The branches also prevent mulch from blowing away. Cut any runner grasses along the edges of the new garden bed with a sharp spade. The runners under the new garden bed now become

independent of the outer runners and are more likely to weaken and die off.

After 2- 3 months of regular checking against the invasion of weeds, you can plant trees into the bed. Small new plants can



be placed in the bed amongst the branches, with little pockets of compost to get them started. If weeds have returned simply sheet. mulch again, being careful to cover the area neatly.

An Easy Water Garden

Water plants are the easiest plants to grow, they are nutritious and varied. A pond can be installed in minutes and moved if necessary by simply removing plants and animals and emptying the water.

Ponds can be constructed out of old drums, old baby baths, large pots and halved kegs. These makeshift ponds can be concealed beautifully



by surrounding plants.

Larger ponds can be made creatively and inexpensively from a careful mix of cement (very little sand is put into the mix).

Fibre re-inforced cement strengthens the structure and enables people to use very thin walls. Fine Steel or re-cycled plastic fibres can be used.

Making a 'bog' garden

If you have a leaky pond, you have an opportunity to grow plants that like to have muddy soil around their roots, these include water chestnuts, clumping bamboo and many other delicacies.

If you wish to fix a leaking pond, try emptying it and painting it with a thick paint made from skim milk powder.

Some people in the tropics line the ponds with fleshy plant material such as banana leaves, this is known as gleying and helps to seal the pond. Gleying is a good idea for gardens and not just ponds made on sandy soils. Gleying slows the loss of gardens nutrients into the sand.



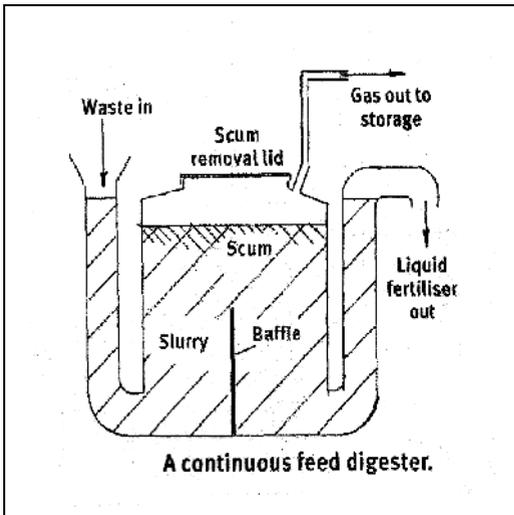
Permaculture Farming

The word Permaculture was made from the two words *Permanent* and *Agriculture*. Modern Agriculture is desperately trying to meet the needs of the growing and developing human population. As fast as agriculture grows, the consumption grows. People in 'developed' nations consume 40 times as much energy as people in under-developed countries, as we all move to becoming developed we all consume more. Modern Agriculture employs bigger and faster machines, flattens mountains and clears forests, silts rivers and pollutes the air, soil and water with pesticides.

Wild food species are quickly being replaced by hybrids, which are chemical dependent and technology-dependent species. There is so much pressure on farmers today that the industry is grappling for solutions. Farming has to become clever rather than chaotic. It has to accept nature as its ally not foe.

Biogas

Biogas is the natural gas from decomposing material. This gas can be used for many gas applications. Biogas systems can be made in any container as long as there is a valve to release any pressure build up. Advanced research for cheap and simple biogas technology has been developed worldwide, from domestic stoves in Nepal in the 70's to large scale government waste management in Sydney during the 90's. On a large scale you can simply cover a rubbish hill with plastic and collected the gas from the top. In Vietnam, biogas has been cleverly made out of recycled plastic tubes instead of drums or tanks. Biogas is possible in any climate and is easy in hot climates.



**Illustration by Bill Hirst, CERAS
Biogas Consultant [Renew
Magazine #68]**

The Biogas recipe:

- ✦ Put in Slurry with a carbon to nitrogen ration of 30:1. If you use organic matter, have it digested mechanically (pulped) or by animals such as chickens, pigs or worms. If you use manure you do not have to process it.
- ✦ Check the pH is between 6.8 and 8.
- ✦ Allow it to cook at 30 to 35° C.

- ✘ Remove scum once a year and apply onto gardens as a mulch.
- ✘ Use liquid fertiliser for gardens and aqua culture.
- ✘ Gas can be processed further (called scrubbing) by bubbling it through water but diesel engines and domestic stoves will run continuously for years on this simple method.

Free natural energy working for your farm

Natural Energy	Positive Effect	Negative Effect
Gravity	Irrigation	Erosion
Heat	Energy – Biogas and solar ovens for cooking, ripening, drying, germination	Spoils crops, sends some annuals into early production of seed
Cool valley breezes	Discourage mould by circulating the air. Cool plants, animals and people	loss to the atmosphere unused
Sun	Kills nasty micro-organisms, Essential for plant growth (areas with thin ozone need to control exposure of plants to the sun) Provides vitamins to animals, fish and people	Burns leaves and people, causes skin cancer.
Shade	Cools your home and animals Protects young plants Cools the air before it is air-conditioned in cars, offices, houses.	Can support mould, compete too heavily against young trees, kill grass and other crops.
Mist, condensation and	Can be stored and regulated for use later by forests, ponds and contour banks	Encourages mould, flattens and uproots tender, unprotected crops

Rainwater		and causes erosion.
Seasonal floods	Enriches the soil and downstream fishing	Destroys crops and animals lying in its path.
Animals	Eat pests, Produce manure as fertilizer, Provide healthy eggs and meat.	Can eat all valuable crops and seed, pollute waterways with excess fertilizer.

Natural energy – Use it or Fight it.

Tree management

- Cutting the lower branches of a tree encourages it to grow tall quicker. And enables you to utilise the area beneath.
- Cutting the top off a tree encourages it to fork and grow bushier. Some trees such as Eucalyptus and Willows can be cut as low as a metre from the ground and will form low, bushy shrubs. The bushy regrowth shelters the soil in dry or overgrazed areas. [R. McLeish 1995]. Most other trees will die from shock with this treatment unless you retain a few branches or side shoots.

You can combine these simple shaping techniques to establish canopy at a desired height. Removing trees causes erosion and silting of waterways. This way, more useful trees will grow and you can harvest them for many years.

You do not need to remove stumps. The root system is holding the soil together. You may very well watch your investment wash away in a storm if you let the soil lay unprotected.

'Problem' Trees.

There is rarely a good argument for removing trees, much less lifting the root system. Some trees are allelopathic (they kill off other trees with chemicals sent out by the roots and their acidic leaf litter). Existing allelopathic trees on a site are a challenge for the permaculture designer. We always aim to turn the problems into solutions!

You can use the area under these 'problem' trees for animal housing, storage of fire wood, and old bits and pieces (at 'Winton' Windellema near Goulburn they use the area under cypress trees to store metal pieces as the rain hardly ever penetrates the tree thicket). These areas are often shady and dry. If you are creating no-dig shallow beds which need some rain water and light access, remove lower branches of the trees and line the base of the beds with plastic or underlay. You can mulch with rocks to trap moisture on the surface of the no-dig beds.

Annuals and shallow rooted plants are not noticeably affected under conifers. You can apply an alkaline mulch material such as mouldy leaves to help balance the pH. On the other hand, some plants are suited to acidic leaf litter. Eg. Berries, *monstera deliciosa* and scented pelargonium. Combine these with orchids and bromeliads, as they don't depend on the soil for nourishment.

Harvesting without killing

We can harvest trees for Fuel and material without killing them. We can simply remove half of the tree each couple of years and it will continue to hold the soil together, continue to produce for many years. Removing trees causing erosion and silting of the rivers.

Avoid the removal of stumps. The root system is holding the soil together. You may very well watch your investment wash away in a storm if you let the soil lay unprotected.

Contour slashing

On a large scale, contour slashing should be practiced. Problem Trees or pioneer species are loped on contour. The stumps are preserved and the tops layed along the stumps, forming a line of branches and logs along the contour. This can be used to shelter young plants, to direct large stock along contours and discourage them travelling directly downhill. This should be done when the trees are NOT in seed.

Frequently Asked Questions

Is permaculture just organic agriculture?

No, it is much more than organic gardening. We try to promote organic gardening in our efforts to reduce pollution. Organic gardening is only part of the strategies to achieving an environmentally friendly lifestyle. Permaculture is about combining agriculture and community spaces.

Why bother to produce my own organic food?

“organic farming cannot feed (this) kind of world. Man has always been dependent for his survival on the environment, which has provided him with fresh air for respiration, food for sustenance and natural resources for energy and power. The present ecological crisis is an outward manifestation of a crisis of mind and spirit. Through...holistic and integrated

approaches to farming, man will learn to co-exist in harmony and co-operation for the survival of the earth planet.” [Wong Choi Chee 1998]⁵

Permaculture is about lifestyles not just food. It is about becoming part of a natural unit, seeing the impact of our waste, and producing more through daily actions.

Is permaculture suitable for city dwellers?

Cities are the places where permaculture is needed most. Food that is produced near to where people are living is fresher and nutritious. People are connected to nature through seeing the food forests within the cities. Air quality is improved by trees and greenery and housing developments can incorporate permaculture gardens.

There is a large global movement called CSA: community supported agriculture. CSA enables people to support small farmers, to be involved in food production and to enjoy gardening as recreation.

Isn't permaculture time consuming?

Yes, but so is shopping, being caught in traffic, and working – all the current activities you may tolerate to acquire all the things you currently need to feed and house your family. It is also convenient to have fresh water, eggs, vegetables, herbs and fruits within a few paces of your kitchen door. It is healthy to be able to walk to a friend's place, enjoy a refreshing herbal tea or relax under a shade tree in a hammock, breathe clean air. You will spend less time at the doctor, at the gymnasium and more time at home. You will spend less time driving to the park and more time sitting in the shade with the children at home instead.

⁵ Wong Choi Chee MARDI livestock Research Centre *CETEM Report A Malaysian Strategy to Mainstream Organic Farming*

Instead of putting out the bin full of rubbish you will compost regularly and put the rubbish bin out only once every few weeks and you will put the compost as rich soil into the garden after a few months.

At first, permaculture is more time consuming. All lifestyle changes involve breaking habits and forming new ones. You will spend time planting trees instead of mowing or sweeping the driveway, you spend time mulching the garden instead of pulling weeds, you spend more time with each other in the family than with the computer or TV.

You will save money on shopping, entertainment and nutrition and need to work less to pay for it.

How long does it take?

Most permaculture systems take 3-5 years to mature, for farms the process may take as long as 10 - 140 years. In the tropics designs are fast to install and may take as little as 6 months if you have the resources for soil improvement, earth moving and access to some mature trees, fish stock and animals. However, young trees are healthier and it may be wise to be patient. They will only take a couple of years to mature.

Where can I find a good site?

You may need to consider renovating existing houses if they are not designed to save energy. It may be easier to invest in a new property that has good community relations and shared gardens. There are permaculture villages all around the world now. There are many web-pages about existing permaculture villages and eco-villages. If you don't have one near you, speak to developers and government bodies, tell them you are searching for a property with garden space (you don't have to own the space, just have access to it) and close to other homes in a secure area with good neighbourly relations. Public

transport nearby is another feature that will serve you and your children well.

If you are looking for land to build your own permaculture village, choose a slope that faces the morning sun and has a mountain or forest on the western side to block the hot afternoon sun. There are specialist real estate organisations selling permaculture sites and promoting related activities in their directory. *Eco-property Real Estate*.

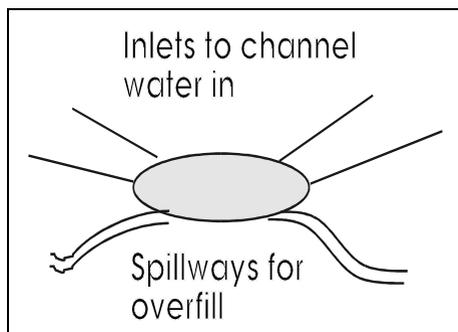
Land ownership

“You own the stars?” said the little prince to the businessman on the fourth planet. “what do you do with them?”...“I own a flower which I water every day. I own three volcanoes, which I clean out every week .. it is some use to my volcanoes and flower that I own them. But you are of no use to the stars”⁶

We can all be a custodian of our space, our land whether you are renting or have bought a home or home unit. We can offer to help others with land in exchange for the opportunity to exercise. observe nature, grow clean, nutritious food and build wildlife habitats.

How to Plant

1. Have your water management well planned before you plant. Decide which areas are going to form banks of forest to store water and set up *swales* (banks of soil along the contour) to hold water in the soil.



⁶ *The Little Prince* by Antoine De Saint-Exupéry 1945

2. Dig a hole deeper than the size of the pot. (see *how to dig a hole*, below)
3. For planting on slight slopes, dig small inlets into the plant hole (these are also known as V-traps) from the high side.
4. When planting in clay soils, dig small outlets on the low side of the hole to help water drain freely from the hole.
5. Fill the hole with water and watch it drain. (Remember that observation is an essential part of Permaculture). If the water is slower than 10 minutes to drain you should dig deeper outlet channels as in step 4.
6. Place worm castings, a small dead animal, old bones, food scraps or weed ferment into the base of the hole.
7. Plant the tree and back fill with broken up soil. Use any remaining soil to form a small wall or bank at the low side of the hole, be sure not to obstruct the spillways in clay soils.
8. Firm the soil with your boots and water the tree.
9. Sheet mulch around the base of the tree with old carpet over paper and cardboard or similar materials.
10. Place a rock on the sunny side of the tree near the base of the trunk to act as a condensation trap, shade for trunk and roots in heat of the day AND mineral store. As the rock breaks down it releases minerals. Rocks are also handy when planting very small trees so you can remember where they are.

How to Dig a Hole

1. If your soil is very hard consider preparing the soil first either with carpet left over the area for a month or two OR, for large scale properties, employing a soil ripper and letting the rain soak into the soil.
2. Stand on the downhill side. This gives you more leverage.
3. Using a sharp mattock or spade place the first insertion. If you have to use a spade, cut into the soil then wiggle it back and forth to gain extra

depth. If you can't remove your first clod of soil, then walk to the other side and cut into the soil to form a wedge. Some soil can be so hard that it will bend the handle of your tool! So it is better to cut it out like slicing up a clay pie.

4. Once you have a starting hole make sure that you always cut away the soil from the outside into the hole. If you are using a mattock: keep the hole between you and the next cut, the soil will fall away more easily as it is coming toward the hole. This will also halve the time spent digging. If you are using a spade: keep slicing the soil off from the edge of the hole TOWARD and into the hole. This loose soil is easy to scoop out.
5. Keep your back straight as you work. Use your leg muscles and don't be afraid to use your body weight on the spade as you wiggle it downwards.

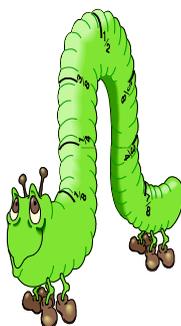
What can I do today?

- Start composting, this can be done in an old sealed container, put a handful of soil in the container, food scraps (no meat scraps) and shredded paper. When this is full, seal it up for a few months. This is suitable for people in units, intensive housing or areas with flies, mice and rats. Make a circle of wire. Put banana leaves or other soft leaves in the base, add your paper waste and food scraps. Cover the top with rags, hessian, underlay or old carpet.
- Start a worm farm.
- Buy or make a portable cage to keep a small animal, ideally a chicken to eat weeds, lawn edges and food scraps.

Worms in your System

Needs:

- Cool Temperature 5-20 degrees C.
- Moist aerated covered bedding of compost or composted manure.
- Partly composted food. They can die from being 'overfed'
- Housing (box or hole)
- Protection from Predators and co-hosts such as birds, rats, ants, flies dogs, bugs and slaters. Wrap food scraps in newspaper.
- Bedding/food pH requires monitoring.
- Regular food and water as with any animal.
- Worms need to be collected and relocated when housing becomes too cramped.
- Protection from the elements. Heavy Rain, cold wind etc.

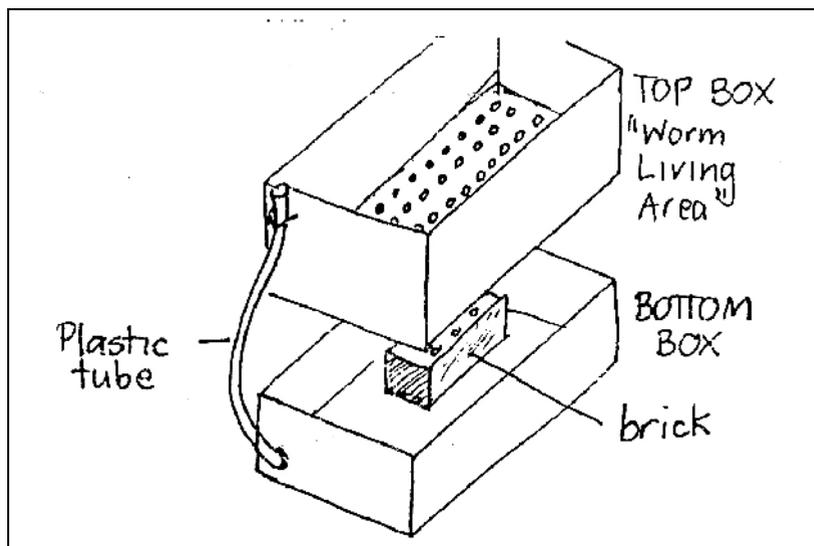


Intrinsic Characteristics

Variations for each of the 2 main types: Earthworm or Compost worm. Earthworm requires soil housing, compost worms will die without decaying matter.

Functions:

- Hasten composting
- Provide rich fertiliser.
- Digest weed material.
- Bait for fishing; food for fish, poultry and other birds.
- Community and industrial biodegradable waste including sewerage treatment and food waste.
- Earthworms regenerate poor soil without soil disturbance. Ideal for existing orchards.
- Earth worms build the plants nutritional value.



- Invest in easy wash nappies and sanitary pads.
- Use rechargeable batteries. Assess items you purchase for their durability, biodegradability and recyclability.
- Consider working in a local office within walking distance from your home. Walk, or ride to work.
- Support public transport and car pool.
- Share your car with family and friends. Sharing encourages you to plan its use and increases car pooling.
- Save all the roots and seed from your food preparations and experiment with growing the seed or tubers. You can grow Kang Kong, Watercress, spring onions and lemongrass from the pieces sold at the grocery. You can grow sweet potatoe, ginger, Turmeric from the tubers sold. Pineapple plants will grow from the tops you cut off the fruit. You can grow melons and other soft fruit from the seed (simply ferment them in water for 3 days in a sealed container and then toss the seed in the garden)

- Cook more simple and fresh meals or eat at local restaurants that compost their waste and buy good quality local fresh produce.
- Grow your favourite herbs in pots near the kitchen where you will notice them every day.
- Plant trees for shade. The house and car will require less energy to cool it.

What if we are renting?

People who rent have the same needs as those living in a house that they 'own'. Most people in developed countries rent, some are paying for their house with a mortgage. Few own the home outright. Even when we own land we are only stewards, managing the land for the next generation.

When we sell or move to another rental property the efforts we made may be destroyed or cherished. When you rent, imagine that you own the property, make it work for you and it will work for the next person. If you make it work for you and your family, you will be happy there and the years will be more comfortable.

You can still have compost containers, worm farms, caged lawn mowing animals and herbs in pots. Only if your landlord destroys your efforts should you give up and move somewhere else.

You can increase your living space by screening your courtyard. You and your family will use the space like a cool outdoor living room. Screening can be made cheaply out of bamboo trellis or wire. Put quick-growing vines on the trellis for extra cooling effect. This is a much cheaper option than extending the existing home.

Even if you are renting you can create a private courtyard with trees in pots. Choose trees that are hardy in pots because pot plants require more water. Mulch the pots to reduce water loss by evaporation. You can take these pots with you wherever you live and you can dismantle and relocate your trellis. Shallow rooted plants such as ferns and palms can be easily dug up and will not affect the foundations of the house you are renting.



How does Biotechnology affect us?

Biotechnology evolved during the 70's Green revolution when many governments and corporations hoped that world poverty could be overcome by high yielding "super-plants". Many of the tropical nations were encouraged to throw away or eat the old seed varieties and plant the new super plants. After most of the old seed was lost, an unfortunate discovery was made. These super plants were highly dependent on artificial fertiliser and the soil had become over loaded, polluted.

Now globally, we have very few different species of everyday food crops. The Hamburger has reached every niche of society and every nation is eating the same foods, as well as the same varieties of those foods.

Genetic Engineering may be seen as the modern-day miracle for world poverty. But genetic engineering needs a wide range of genetic material to make its combinations from. Genetic engineers cannot create new genes. They can only combine them. They too need to help to preserve remaining genetic stock. Try to find local seed and plant it. Eat local varieties of farm animals, fish and plants. Even by buying the seed we are supporting the local farmers. Many countries in the tropics are lucky that seed is still available from farmers with smallholdings.

Agricultural Independence

Another important issue relating to Biotechnology is agricultural independence. Nations in the tropics, as with many other nations should not rely on large global companies for their seed much less food. Each nation should try to be independent and meet the food needs of their people. For many nations unequal currency makes imports expensive and imported hybrid seed will not get cheaper.

Today some seed companies are selling terminating seed. This means each year farmers have to buy the new season seed.

Also, farmers in the tropics must be wary of imported seed that has the potential to become rampant in their favourable climate. Some seed produced today is resistant to herbicide and would be very difficult to eradicate.

Bio-Regional Seed

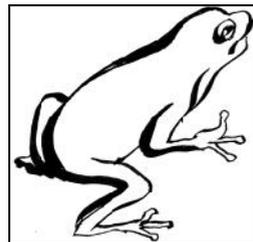
Bio-Regional seed is seed that has adapted to each particular region. Every landmass has pockets of slightly different climates (microclimates). One area may catch sea breezes and another, in the highlands is cooler. One is rich in minerals and another has poor soil. All these factors effect the plants and their seed. With each generation the plants grow accustomed to the climate and grow stronger. Their genetic material has responded to the climate.

This is why we must preserve local varieties of plants.

Wong Choi Chee at MARDI livestock Research Centre writing on Germplasm conservation "There are plenty of indigenous plants and crops that need to be exploited"

Isn't the solution to pollution simply dilution?

Many people think "out of sight, out of mind". Pollution doesn't disappear once it leaves your area. Polluted rainwater flows beneath the ground. The bountiful rivers and seas can become poisoned. The fish may contain harmful heavy metals such as mercury, which has historically caused birth defects and major illnesses.



Mercury and other expensive (and hazardous) metals can be reclaimed from industry to use again, and this reduces industrial costs making them more efficient.

Our Future

- We as individuals can accept responsibility for the destructive pressures on remaining forests, swamps and reserves.
- We can start reducing our consumption.
- We can increase our productivity and enrich our lifestyles.
- We can choose a lifestyle that is holistic and provides us with many of our needs and rewards us with long term cultural enrichment. We can produce natural systems where we live that help absorb our waste.

"If you are not part of the solution,
you are part of the problem." *Mollison*

Permaculture is not a fixed system, it is not a gardening association, an architects group, ethical banking institution or farmers federation, it does not tell people what to do. It does not say "what to put where". Rather, it encourages people to think, to observe and to plan. It encourages people to live in harmony with nature to imitate and learn from nature.

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