PERMACULTURE DESIGN

FOR ST CLAIR PRIMARY SCHOOL

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UNDER THE CHOKO TREE

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Ethics and Goals

The following ethics and goals underpin the work that we do in and around the school garden.

School Garden Ethics

- Foster a sense of community
- Teaching and learning together
- Live more sustainably
- Value and care for the environment

Our Goals

- Give our kids education about the environment using hands as well as minds
- Enhance the curriculum by connecting it to the natural world
- Provide students with the opportunity to grow, cook and eat fresh produce
- Offer parents and the community an opportunity to engage with the school and its students and teachers.
- Develop a program that will sustain itself year on year.
- Make the school more attractive and welcoming

What is Permaculture?

“Permaculture is a design system for creating sustainable human environments. The word itself is a contraction of not only permanent agriculture but also of permanent culture as cultures cannot survive without a sustainable agricultural base and land use ethic”.

From “Introduction to Permaculture” by Bill Mollison with Remy Mia Slay

Permaculture is not just for large scale agricultural concerns, however and translates equally well from balcony through back yard and acre block to full scale agriculture equally well, the ethics and principles apply at all levels. A school garden is very appropriate to design according to these principles because it opens the door to teaching newer generations how to walk more lightly upon the land and surely there can be no greater purpose than this.

Permaculture Zones Explained -

Zone 0 – In urban Permaculture this is usually the house or dwelling but in this case it is the school building which is to be turned into a room for cooking and processing the products of the Permaculture garden.

Zone 1 – this is the vegetable garden which is intensively cultivated and is likely to need the most intervention in the form of watering, weeding and harvesting etc and so is placed closest to zone 0

Zone 2 – this zone contains the closely planted and somewhat intensive fruit orchard which is also close to zone 0 but requires less intervention than the veggie production area.

Zone 3 – is the farming zone where commercial crops are grown and animal forage systems are used such as organic orchard, nut forest or extensive organic poultry system, or even cereal production or sheep or goats could be raised here. In the current land allotment there is no suitable area for zone 3 at this stage but t could be incorporated in the land on the northern side of the chain link fence.

Zone 4 – is the harvest forest where long term tree species are grown to produce firewood, mulch or timber to be used for sustainable building, complementary grazing animals can also share this zone at low stocking rates. This zone may also be sued to develop a food forest. As for zone 3, there is no place for zone 4 in the current design but in time a zone 4 are could be set aside in the land north of the chain link fence as well.

Zone 5 – is the indigenous conservation zone where plants native to the region are allowed to regrow into what would become natural forest. The stand of native trees in the land north of the chain link fence fulfils this function in the current design.

Element 1 – Swales and Fruit Trees

Description

This area is a series of small crescent-shaped mounds and hollows dug into the slope of the hill parallel with the contour and is designed to catch rainwater flowing down from the play area and direct it down into the soil. The fruit trees, which are planted one per small mound, are able to make use of this water and reduce the need for supplemental watering, especially once they are established.

Features

- Stops runoff from up the hill impacting on the mandala garden.
- Traps and holds any material eroded from up the hill, which may then be utilised by the fruit trees.
- Mulch reduces water loss.
- Intensive production of edible fruits, nuts and/or leaves.
- Allows observation and teaching of tree based food production

Construction details

1. Make an A-frame with plumb bob to set out the contour lines
2. Mark out the contour lines with pegs such that there is one metre between each peg.
3. Mark out a crescent shape two metres long, along the contour.
4. Dig out the upper side of the swale to form a crescent shaped ditch and mound up the spoil on the down slope side of the ditch, compacting it to prevent it being washed away before it becomes incorporated into the slope.
5. Plant the tress, one per swale, into the mound and if required fill in some of the ditch with gravel or wood chips so that the water can still penetrate.
6. Mulch the mound after watering in the tree.

Plant list

(Where possible dwarf varieties should be sourced)

Lemon; Orange; Mandarin; Lemonade; Lime, Tahitian or Kaffir; Finger lime; Mulberry; Olive; Avocado; Feijoa

Other productive trees

Bay tree; Curry leaf; Macadamia; Almond

Element 2 – Mandala garden

Description

The mandala garden is a series of eight keyhole garden beds arranged in a circle around the herb spiral. The keyhole beds are designed so that all parts of each bed are accessible from inside or outside the keyhole without the need to step on, and compact, the growing area of the beds. Being round in shape means they facilitate irrigation with a sprinkler that has a round footprint and they are fertilised and cultivated by the chooks in the chook tractor. The beds are raised and the areas in between are used as pathways which can be covered with straw, sawdust or wood chips depending on what is available.

Features

- Provides area for growing annual vegetables.
- Learning experiences possible for raising and planting out seedlings, watering and weeding as necessary, observation of stages of growth for various vegetable families, demonstration of insect interfacing with the plants, harvesting, storage and use of vegetables.
- Can provide income stream from sale of vegetables.
- If managed correctly it can provide food throughout the year

Construction details

1. Set out a circle the maximum size of the mandala garden using one peg in the centre tied to a another peg with rope or string the length of the radius of the circle. Use the outer peg to scribe a line in the ground.
2. Remove all grass or sheet mulch the area
3. Set out eight circles equidistant from each other within the main circle, at this point it would also be possible to set out the circle to mark out the herb spiral which is to be built in the centre of the mandala.
4. Using materials available such as bricks, pavers, straw bales or straw filled hessian roll, set out each keyhole bed.
5. Fill the first keyhole bed with growing medium, mulch and plant out with vegetable seedlings and/or seeds.
6. Depending on requirements, fill mulch and plant out the next bed moving clockwise around the circle every two, three or four weeks (every three weeks would probably be best).
7. After the first cycle when all beds have been filled and planted out, introduce the chook tractor.

Plant list

From seed: beans, peas, carrot, turnip, corn, beetroot,

From seedlings: celery, broccoli, cabbage, cauliflower, Brussels sprouts, onions, shallots, cucumbers, zucchini; squash, tomato, radish, leeks.

Sub-element 2.1 – Chook Tractor

Description

The chook tractor or dome is a lightweight plastic conduit and wire dome that acts as a tractor, ie it is the same size as a keyhole bed in the mandala garden and sits over the each of the beds in turn, allowing the chooks to dig each bed over and fertilise it, removing all pests and excess foliage in the process.

Features

- Removes the need to cultivate veggie patches
- Removes the need to apply artificial fertilisers
- Eggs are produced by the chooks for consumption or sale
- Chooks provide entertainment and companionship for those in the garden
- Teaching opportunity on caring for animals

Construction Details

1. Lengths of 20mm PVC conduit are used to make a series of concentric circles which form the rails
2. The same material is used to construct arches, to which the rails are affixed forming a dome and the sides cross-braced with bailer twine or wire.
3. The dome is then covered with chook wire mesh or equivalent, then the top covered by a tarp to provide shelter.
4. An opening is left in the wire to act as a door which is then closed using shade cloth.
5. Roosts, a waterer and feeder are placed inside the dome and a recycled motor mower grass catcher installed to act as a nesting box.

Notes

a. There may be a requirement for secure over the weekend accommodation for the chooks, well supplied with food and water to keep out human and animal predators.
b. A tool/potting shed in the same area would be an advantage as well.

Sub-element 2.2 – Herb Spiral

Description

A herb spiral is a structure made of rocks, bricks or other durable materials in the form of a spiral in three dimensions that provides many different microclimates that suit different culinary and/or medicinal herbs. The south face tends to be cooler and wetter where the tip is drier and the west facing areas tend to be warmer. It allows plants to be stacked vertically so that more produce is obtained from the same area of land.

Features

- Various microclimates suiting a range of herbs
- Herbs can be used on site for cooking or sold fresh
- The herb spiral is attractive and provides a pleasant feature for the mandala garden
- A small recycled stainless steel sink is usually installed at the bottom to attract frogs etc and can be used to grow water chestnuts
- Due to its circular form it is able to be watered with a standard garden sprinkler
- A number of teaching opportunities present themselves about herb and other edible plants including cultivation, history and use of herbs in cooking

Construction details

1. A circle is laid out where the spiral is to be constructed using two stales and a piece of rope or string as long as the radius of the desired circle.
2. Any grass can be dug out or the area sheet mulched
3. The building material eg bricks is laid out around the edge two bricks high then a circle taken of and wound around leaving a 300mm or so gap between the lines of bricks.
4. As each turn is taken around the circle more layers of brick are added so that as well as moving in towards the centre of the circle, the runs of bricks get taller resulting in a three dimensional spiral.
5. The bricks should be secured with mortar and once the mortar is set, the spiral is filled with growing medium and panted out to the required herbs, inter-planting annual and perennial herbs.

Plant List

Lemongrass; rosemary; thyme; tarragon; basil; marjoram; oregano; sage; lavender; borage; coriander, summer and winter savoury, chives, fennel, mint (various) parsley

Element 3 – wicking beds

Description

Wicking beds are a recently developed technology to improve the efficiency of water usage to grow food. The consist of an outer support structure, the bottom half of which is lined with an impermeable layer such as plastic or pond liner which is filled with material to act as a water reservoir e.g. gravel and a filling tube is installed through which to measure and add to water levels. The top half of the structure is filled with growing medium and mulched.

Features

- Ideal to produce perennial vegetables
- Can be left for several weeks without needing to be watered
- Beds are raised 60cm from the ground allowing access to disabled students
- Teaching opportunities around water conservation, perennial vs annual vegetables etc.

Construction details

1. Lay out the area where the wicking beds are to be constructed, level off if required and remove any grass or sheet mulch the area
2. Construct the wooden sides of the bottom half and place in their intended location.
3. Line the inside of the wood with a plastic sheet, securing it to the wood with staples
4. Construct the top half of the bed and put it in place on the bottom, secure one to the other with some wooden pegs.
5. Install 50mm agricultural drainage pipe along the bottom and up both sides of the bed, cut it off at the top and secure both ends with a nail into the wood.
6. Fill the bottom half with support media such as gravel or wood chips, then place the growing medium over the top until the bed is full and add a layer of mulch
7. Using a hose, fill the bottom of the bed with water until it overflows from the crack between the two wooden supports and plant out.

Plant list

Rhubarb; capsicum, chilli, asparagus; Jerusalem artichoke; perpetual spinach; warrigal greens; choko; scarlet runner beans

Element 4 – Flower/Strawberry Towers

Description

PVC pipes have hollows fashioned in them to take plants, are filled with growing medium and then stood on end in the ground and planted out. The growing plants trail down the side of the towers improving the aesthetics of the area.

Features

- Keep strawberries of the ground and result in improved fruit
- Edible flowers provide aesthetics as well as a harvestable crop
- The towers can be painted and decorated by talented students to resemble totem poles or other sculptural feature.
- Teaching opportunity about the existence, raising, harvesting and use of edible flowers.

Construction Details

1. Obtain the 200mm PVC pipe and cut to length, they should not be so long as watering from the top is difficult
2. Mark out where the plants are to be accommodated and then cut through the pipe to 1/3 to ½ the diameter of the pipe with a hand saw, jig saw or circular saw etc.
3. Use a hot air gun to soften the plastic and, using gloves and a block of wood, push in the plastic above the cut and round out the plastic below it to form a “cave”.
4. Using an auger, dig a hole down to about ¼ to 1/3 the length of the pipe.
5. Place the pipe upright in the hole (ensuring it is the right way up) and tamp soil around the pipe to make it firm.
6. Fill the pipe with growing medium, decorate the pipes if desired.
7. Plant out pipe and water in well.

Plant list

Strawberries; nasturtiums; anise hyssop; rocket; chamomile; chrysanthemum; calendula; marigold; dianthus; violas, pansy; violets

Implementation

All the main elements in this plan are separated from each other and so can be implemented at the same time or at separate times depending on the level of resourcing at the time. If it is decided to implement the entire plan at once, all of the available personnel could be allocated to a team and each team given one element of the plan to develop. In this way the resources can be maximised and down time where personnel don't have anything to do is minimised. In practice it would be best to implement phase 4 and 5 at another time after the main work had been carried out initially.

A briefing before the work starts which sets out the limits of each phase, who is assigned to each team and what the output will be expected to be is mandatory and an experienced leader/facilitator should be in charge of each team.

Following is how an implementation could be phased –

Phase 1 – dig the swales and plant the fruit trees

Phase 2 – set out and construct the mandala garden

Phase 3 – build the wicking beds and flower towers

Phase 4 – build the herb spiral once the mandala garden is completed

Phase 5 – Build the chook tractor once the mandala garden has completed its first cycle.

References

The Permaculture Home Garden – Linda Woodrow – Viking/Penguin Books(AUS) 1996

Earth Users Guide to Permaculture – Rosemary Morrow – Kangaroo Press (AUS) 2006

Introduction to Permaculture – Bill Mollison with Reny Mia Slay – Tagari Publications (AUS) 1991

How to Grow a School Garden – Arden Bucklin Sporer and Rachel Kathleen Pringle – Timber Press (US) 2010